FAMS : Developing a Flexible Agency for Flexible Mobility Services

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Abstract **– This paper presents developments in the domain of flexible mobility services for citizens, mostly being demand responsive transport (DRT) services. It describes the different degrees of freedom for such services – route, timing, vehicles – and describes the emerging service concepts and how Intelligent Transport Systems (ITS) have emerged to allow effective and efficient DRT. The FAMS project moves beyond stand-alone DRT services to create a new concept of a 'Flexible Agency' which is designed to meet the needs of a collective of flexible mobility services, and is based on an e-business platform. The paper shows how the Agency has a "Customer Acquirer" role through a series of B2C function, and a "Resource Integrator" role through a series of B2B functions. Both the technological and the business case dimensions of these value-adding agencies are considered from the perspective of operators, the agencies and technology suppliers.**

1. Introduction

This paper draws from the experience of the FAMS project, a current Take-Up action within the EU IST program. Within the project, ITS-supported DRT is implemented in Angus, Scotland, and Florence, Italy. The paper deals with Demand Responsive Transport (DRT) within the domain of passenger transport services.

The availability of Intelligent Transport Systems (ITS) has radically altered the possibilities for DRT, in terms of interface with the potential customers, optimisation and assignment to meet the travel requests, and in managing the service. This has been achieved by using advanced ITS applications and mobile communication platforms. Better understanding of both the needs of the users and the potential markets has stimulated new service concepts based on flexibility of services, communications, booking and reservation functions, and customer support.

In a series of projects starting from 1996 within the European R&TD effort, major advances in the ITS for DRT have been developed, trialled and evaluated. These systems are commercially available and are in increasing use within the industry. The projects SAMPO, SAMPLUS and INVETE have developed the groundwork. In this paper we will introduce the basic concepts of DRT, how it has evolved, and the critical role of Intelligent Transport

Systems (ITS). We will then consider how to exploit the potential of DRT, service concepts, and the organisational dimensions.

The current project FAMS, on which this paper is based, takes the organisation of DRT to a new level. A progressive 5-layer model is identified to reflect the advancement of DRT from stand-alone services through to integrating agencies which can collaborate to meet the users' needs through complex value-added chains.

Basically, FAMS develops a "Flexible Agency" which is designed to meet the needs of a collective of flexible mobility services, and is based on an e-business platform. The paper shows how the Agency has a "Customer Acquirer" role through a series of B2C function, and a "Resource Integrator" role through a series of B2B functions. Both the technological and the business case dimensions of these value-adding agencies are considered from the perspective of operators, the agencies and technology suppliers.

2. Concepts of Flexible Transport

This paper deals with Demand Responsive Transport (DRT) within the domain of passenger transport services. DRT covers a wide range of service concepts which allow one or more degrees of freedom to respond to the needs of the potential users, and is typically provided using small or-medium-sized buses. In this first section we will introduce the basic concepts of DRT, how it has evolved, and the critical role of Intelligent Transport Systems (ITS).

2.1 Conventional Transport and DRT

It is perhaps easiest to position Demand Responsive Transport (DRT) services by differentiating them from "conventional" bus services. Conventional bus services operate between fixed points along a fixed-route, to a fixed schedule. This is based on a mix of historic demand and the expected business potential of the travel demand along the served route. The great strengths of this type of service are that it is entirely predictable (assuming of course that it is operated competently), and that the production cost can be minimised where there is high demand.

However, this type of service does not suit all circumstances. On the economic side, there may be insufficient travel demand on a fixed-route fixed-schedule basis to fill the number of spaces required to achieve breakeven loadings throughout the operating period. On the user side, the economically justifiable service offer may not meet the needs of the user in terms of accessibility, destinations served, or available time of travel.

Conventional services are basically put in place in the trust that users will appear, based on the experience and business strategies of decision-takers. While this may utilise a substantial amount of market research into the potential and current users, it is ultimately a "take it or leave it" offer. In many circumstances, especially in larger urban areas, this is adequate and acceptable to users because a wide range of services is offered.

However, conventional services are not able to adapt to the day-to-day variations in needs of users, nor do they provide options to those whose needs are not adequately met by the planned service. At the very least, this creates a cause for dissatisfaction on the part of the potential user. In many cases, it reduces or restricts the possibility to use public transport. This

either pushes individuals towards the use of personal transportation (with negative societal and environmental impacts) or it reduces the mobility of citizens. In more extreme cases, which are particularly noted in rural areas, it contributes very strongly to social exclusion and isolation among the elderly, women, youth, and the low-waged [1,2].

Demand Responsive Transport has emerged as a response to instances of failure of conventional transport by seeking to adapt services to the actual needs of the users, in the most cost-effective manner possible. It is extremely important to point out that DRT is seen as complimentary to conventional transport, which remains the core means of mass bus transit.

2.2 Basic Concepts of DRT

DRT can be defined as transport 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; and
- 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 demand and the background conventional service offer varies dramatically depending on whether the location is urban, peri-urban or rural in nature.

DRT services can be defined as having at least one degree of freedom for the specific trip being offered. The three main dimensions are the route taken, the timing of the service, and the vehicle used. This allows the decision taker (dispatch centre or operator) to alter the service offer and cost parameters in response to the actual demand [3,4]

Routing

The most fundamental options relate to the route taken by the vehicle. The main options are presented in order of increasing level 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 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, and 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; and
- 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; and
- 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 to be so equipped;
- Upsizing/downsizing vehicles to match the expected number of passenger 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 packages/documents handling is offered as part of the service; and
- Where there are very few passengers for the planned trip, pass the work to a taxi firm and don't operate the (mini)bus trip.

2.3 Development of DRT

Demand Responsive Transport first appeared in the 1970's in the form of "dial-a-ride" and was generally intended for rural dwellers in areas where the travel demand was too low for conventional services. Interested users would telephone in their request some days before they intended to travel. The operator or agency would plan the service the day before the trip, assign the driver and vehicle and give the driver a running board with the list of trips, pick-up points, timings, etc. While this provided some mobility for people who had no other options, it was very limiting and meant that users had to plan their travel days beforehand – in some schemes users even had to write in. Some schemes developed moderate customer bases, but with increasing access to private cars, the concept was considered quaint and irrelevant.

During the 1980's, some interesting developments were achieved on the marketing side, vehicle types, branding, choice of locations and linkage with conventional services. However, the key stumbling block remained for users of having to plan trips at least a day ahead, and for both users and operators that there was not the "critical mass" to be able to offer a wide range of destinations [5].

By the mid-1990's, a number of different initiatives in Europe and in North America confronted the key technical problems facing DRT, and developed both the applications and the communication platforms to radically change the customer proposition. This required multiple challenges to be overcome, and new functions to be offered :

- Effective, reliable means for the potential user to communicate travel demand;
- Booking and reservation systems capable of handling multiple and diverse requests, with quick turnaround time;
- Databases to manage and support the booking process;
- Computerised scheduling and assignment tools to generate, adapt and update service trips - routing and timing; to assign and where necessary reassign passengers; to assure that customer time windows were respected; to respect upper limits for distance and time deviations;
- Optimisers to minimise the resource requirements;
- Dispatching tools to create instructions for drivers, and to update these as required; and
- Communications platforms to support the exchange of information.

The most significant advances have been in compressing the timescale for the processes so that it can function as close as possible to real-time. This allows not only same-day booking, but same-hour booking to take place. In some cases, new customers can be accepted even after the vehicle has departed, just as long as the vehicle has not yet passed a critical deviation point.

This radical change in the customer proposition has completely re-positioned the DRT product set, so that services can attract a much higher revenue base, while distributing costs over a broader customer base. In the period 1997-2002, there has been an upsurge in the number of DRT systems with same-day bookings in Europe, and similar progress is now occurring in the USA which has an extensive presence of paratransit systems.

2.4 The Role of ITS in DRT

The advances in DRT services have been made possible by Intelligent Transportation System (ITS). ITS is a powerful combination of appropriate software applications on intelligent devices which can exchange information across communication platforms.

The enabling technologies include :

- Booking and reservation systems to manage the customer requests;
- Internet, IVRS and palm-top top etc. devices to assist customer booking;
- Travel Dispatch Centre (TDC) software for allocating trips and optimising resources;
- Communications systems and equipment to link the TDC with both drivers and customers;
- In-vehicle display units to support the driver;
- GPS-based or GMS-based vehicle location systems;
- Smart-card based fare collection systems; and
- MIS and other data analysis systems.

These technologies and applications have been developed and validated within EU projects such as SAMPO, SAMPLUS, INVETE, as well as in independent initiatives. In addition, a substantial body of work has now been developed to provide system architectures, functional and technical specifications, and interface definitions [6,7].

Within the last 5 years there has been a massive deployment of both devices and connectivity across the three key players in the DRT service :

- The customer;
- The dispatcher/operator; and
- The vehicle/driver.

With the hardware and information exchange platforms in place, the applications needed to support DRT can be put in place and can interact to provide the range of customer, back-office and operational functions.

3. Developing the Potential for Flexible Transport

With a new generation of tools available, and a growing interest in DRT from both the transportation and business perspective, the obvious question is "how do we unlock the potential of DRT?". This requires six interlocking dimensions (not necessarily in this sequence) :

a) Identify the relevant users and understand their needs;
b) Develop new service concepts to meet these needs;
c) Identify clearly the markets these will serve, and the transportation function for each;
d) Identify, develop and deploy the appropriate technical solutions to deliver the services;
e) Develop the business case for the foreground and background services; and
f) Establish the appropriate organisational structure and relationships to provide the framework for delivering the transport services and managing the customer interface.

How these are achieved will vary from location to location, but failure on any of these dimensions will undermine the potential and stability of a DRT project.

3.1 Understanding the needs of the user

User Needs Analysis is a fundamental building block in any DRT project. This phase allows the project team to understand their users, and to use this knowledge to design a system to meet these needs. The outputs of this phase should identify the key markets, the services and features that they need, and requirements for communication and information after services are implemented. The purpose, processes, user classification and user needs for DRT are already well documented in the SAMPO, SAMPLUS and INVETE projects [5,7,8]. It is not proposed to describe these generic issues further here, although the interested reader is referred to these earlier projects.

3.2 New Service Concepts and Flexibility

The core Service Concept in DRT is a combination of mobility and convenience, which therefore extends beyond the simple transportation function. A very wide range of combined service concepts has been developed and implemented, and can be considered to have four main dimensions :

Mobility Service

The basic mobility service (i.e. the transportation offer) can be widely varied to meet the specific needs of the individual, subject to operational constraints and customer willingness to pay. The 'toolbox' for the degrees of flexibility have been described above, and case studies are readily available [4,5,9].

Communication to the Travel Dispatch Centre

The user needs to communicate his/her need to the Travel Dispatch Centre (TDC), which in turn needs to be able to accept this information efficiently, error-free, and in a format which supports the booking process. Communication options need to take into account the devices available to the user, the skill/competence level of the user, the desire for 24 hour access, that the user might not be at their regular location, and the immediacy of the desire to travel.

Options include :

- conventional telephone calls to an operator
- interactive voice response system (press 1 for .., please insert your user number, ..etc.)
- on-line request formulation
- SMS request placement
- 3rd party reservations (e.g. for clinic outpatients, the clinic organises the booking as part of the process of setting up the next appointment)

To date, direct on-line booking is not available, since systems prefer to receive requests which they process and then offer the response to the user.

The Booking and Reservation Function

The booking function accepts the detailed request of the user, and turns this into a specific mobility offer to the user. This needs to be an efficient process which minimises the input and effort by user, with fast turnaround time, and which allows the user to feel that his/her needs are really being satisfied. Developments in this aspect include :

- input templates for the TDC operator
- supporting databases of customer data : home address, frequent destinations, preferences
- locators, gazettes and other means of quickly understanding locations
- time-window offers to customers based on pick-up or set-down
- negotiation of mobility offer to customer
- block-booking of regular trips
- auto booking of return-to-home trip (e.g. by smart card, by SMS)
- advice on options for conventional services, which may be cheaper or more convenient

Customer Support

For conventional services, customers are very much left to find the service themselves. For DRT customer, the operator/agency or the TDC frequently offers additional customer support including :

- Telephone call in advance of vehicle arrival to allow the user sufficient time to prepare, lock up and get to the stop – e.g. for elders in apartment blocks, people in rural areas – but also in harsh climates to minimise the waiting times outdoors
- Telephone or SMS notification of delays or disruption to service
- Assignment of suitable vehicle or trained driver where the user has special needs

- Alignment of organised activities/events and mobility services

As DRT services become more widely deployed, we find the customer support dimension as a clear differentiator from conventional services. This may reflect the greater involvement of the community in DRT service initiation.

3.3 Organisation and Business Case of DRT

For anything other than the most basic DRT (e.g. one bus, phone-in), there is a need for an appropriate organisational structure. As the number of services, number of users, and degrees of freedom increase, the organisational structure needs to be robust, flexible, adaptive, and expandable. It needs to be based on clear allocation of functions and responsibilities within a proper regulatory, contractual and business framework. These issues have been examined in depth with clear recommendations issued from the SAMPLUS project [3] and this paper does not propose to deal further with these issues.

A progressive 5-layer model of DRT

What is of interest here is the evolution of the organisation of DRT services, especially as the service offer becomes more complex and different agencies/operators are in adjacent or overlapping areas. This could be between DRT services and networks, or between DRT services and conventional services (urban bus, rail, long-distance bus).

In March 2002, the EU-supported project FAMS [10] has taken on the task to examine the organisational, technical and business requirements of the expanded agency for integration of DRT services. Such an agency may be virtual or actual, is based on a range of B2B and B2C services, and supported by ITS applications and communication platform. It will be developed within FAMS.

The FAMS project suggests [11, 12] that the foreseeable evolution of DRT will involve five layers as shown in Table 1 with FAMS being at the third layer.

Table 1: A 5-layer model for the evolution of DRT

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	FAMS project : Florence region, Italy; Angus region,	To be tested

		synergies and optimises resource utilisation. Business and organisational models still being tested and developed	Scotland	
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

The primary 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.

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

3.4 Business Case dimensions considered in FAMS

Until the sector has successfully developed business-oriented concepts and process, and demonstrated that DRT is profitable, then DRT will remain a mildly interesting way of meeting the mobility needs of a few, at high cost and unjustifiable levels of support. A few entities will continue to experiment with DRT, but it will fail to gain credibility. DRT will remain on the margins of transport supply, and will not achieve its true potential.

The alternative, considered within FAMS, is to innovate by seeking business-based concepts in the market definition, customer propositions, value-chains, delivery mechanisms, and organisational capabilities. DRT needs to move "from the margins to the middle".

There is a three-layer nested business case for DRT and the associated ITS products. Not surprisingly, it begins with the end-user, which is the basic source of most of the revenues (through a mix of tariffs and sponsor support). Initial FAMS analysis suggests that this is a valid generalisation across service types and contexts.

The three layers, and their associated hypotheses are :

a) *Stand-alone DRT services* can generate a sufficient user base and associated revenue to cover the combined costs of organisation, operation and support services, and provide a sufficient return on capital employed.

If this basic test is passed, then DRT can generate surpluses, and will be of interest to the operator and business communities.

If this test is not passed, then DRT services will not spontaneously arise (or will collapse with debts). They will need to be stimulated by an agency which is willing to provide financial support for a lengthy period.

b) *Integration of DRT services into a virtual or actual agency* allows new/enhanced revenue opportunities and/or cost efficiencies. This improves the business case of the stand-alone DRT services, so that marginal services generate acceptable surpluses, and services which would have failed can now at least move to breakeven. The costs associated with the agency (organisational, operational, equipment) are funded from the revenue stream of the DRT services, either by direct charges to the end-user, or as a charge on the operators.

The agency will offer services to either/both of the end-user and the operator which would not have been easily achieved in stand-alone mode. This will require increased functionality and capability, and will require both ITS-based and organisational tools.

The core test for this layer is whether the added-value of the agency layer exceeds the costs associated with it.

c) *ITS products* allow the added-value services to be provided by the agency to the needed level of functionality and reliability. These services allow new enhanced revenues and/or cost savings for the agency and/or operator. The financial benefits compared to the total cost of the ITS products (capital, implementation, training, maintenance) offer an acceptable payback period.

Based on this value chain, the supplier can price its products and support services at a sufficient level to generate surpluses after investment, operating and support costs. The supplier is encouraged not only to remain in the market for these products, but to continue to adapt and innovate the ITS products to offer the agency improved functionality and performance.

4. The Added-Value approach of the FAMS project

FAMS aims at improving demand responsive, intermediate transport by addressing fundamental organisational and technical issues at the heart of such kind of transport model: **improving communication**, **integration** and **cooperation** among all actors involved in the DRT domain, on the side of transport service planners, **transport providers** and **end-users**.

The main vision supported in FAMS is that all actors of the DRT service chain, both the different transport operators and the different users groups, constitute a Virtual Community. Through an appropriate e-Business infrastructure, the member of the community will obtain several benefits including: knowledge sharing, improved access to information and services, improved travel service offer, enhanced management of the workflow between the customer and the transport service providers.

Existing DRT management tools will be adapted and made interoperable within an e-Business collaborative environment. This will allow improved cooperation among transport service suppliers and operation of a new service value chain (Figure 1) .

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.

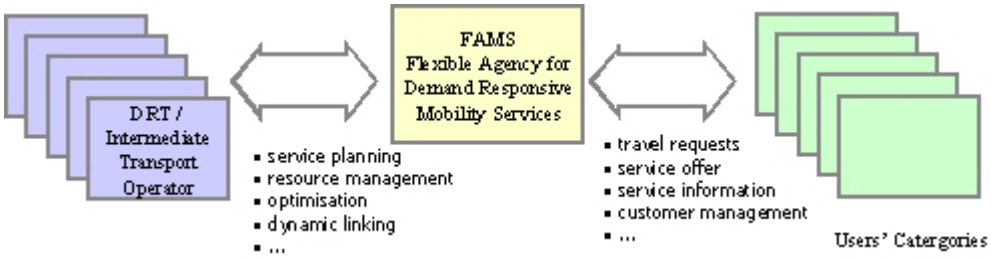

Fig. 1. The FAMS service value chain for Intermediate Transport (DRT) provision

The FAMS Agency will enable operation of a Virtual/Extended Enterprise of transport operators. Despite the physical location of the operators, the different types of fleet, booking systems, services provided, etc., the Agency will manage the entire service chain - from customer booking to service planning, monitoring and control - operating as unique entity, as "one operator with one fleet and one booking system", providing an effective response to the mobility needs of the different user groups.

Figure 2 shows an abstract view of the operational reference model for the Flexible Agency.

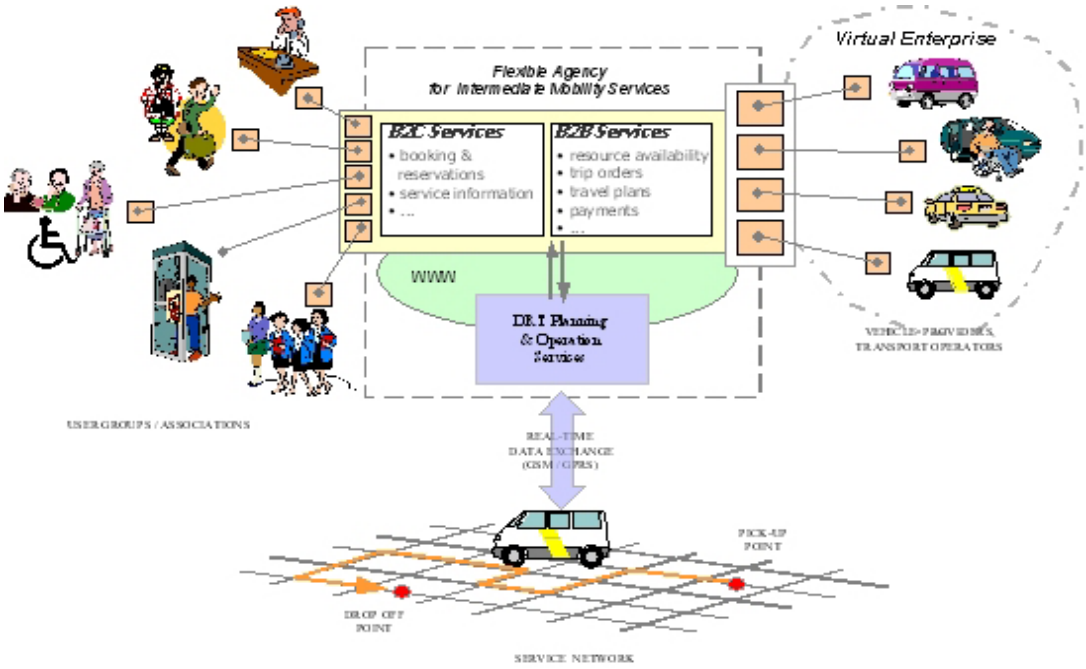

Fig 2. Overall structure of the Flexible Mobility Agency

Overall, the FAMS architecture is based on the following main components:

- a common **FAMS Service Centre** (TDC) sharing a number of services for planning, managing and monitoring the different type of flexible services. These will include: shared route and service planning facilities, shared resource (vehicles) management, customer management repository, service information and data repository;

- the **e-Business 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 services are grouped in two different service and one support category:

    - **Business-to-Business (B2B) services**, allowing interaction and teamwork among the different transport service providers co-operating through the Agency. Provided services will include: support to management of resources (vehicles) availability and sharing, request and delivery of trip orders and travel plans, notification of events (e.g. service modifications, expected events, etc.)
    - **Business-to-Consumer (B2C) services**, supporting access to information and services different associations, user groups, communities, etc. Provided services will include: remote service information, booking facilities for associations and user communities, inquiry and notifications, etc.
    - a **communication network** among 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 will trial, evaluate and gather best practice evidence about a number of operational schemes, looking in particular at:

- the **coordinated 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 the services;
- real-time monitoring of **service operation** through GPRS;
- diversification of **service access** modalities for different end-users groups and user categories;
- 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.

5. Technical Framework of the Flexible Agency

5.1 Defining the Users and their Relationships

The FAMS Team investigated the project context and identified the main interests and requirements of stakeholders for the FAMS Agency. The work provided the basis for both the development of the Evaluation Plan and for design of technical adaptations required.

User requirements have been investigated for different user categories within the DRT service production process (operators, citizens, etc.) specifically from the angle of Flexible Agency concept (the key view and added-value of FAMS project). Particular emphasis was put on examining user requirements related to on-line services and collaboration between the different DRT operators (the *B2B segment* of the FAMS concept) and to end-customers services (the *B2C segment*).

Furthermore, the *institutional, organisational* and *operational* needs and constraints have been assessed in order to define the support scenario to the FAMS solutions and identifying the relevant stakeholders (EU, Authorities, Agencies, Operators, Users, etc.). The work was carried out at both *site-level* and *project-level* following a common methodology.

This trial design work reflected the differences across the two sites, especially as regards the degree of penetration and operation of DRT schemes in the sites. In Florence, FAMS has built up upon and around the existing DRT services (Porta Romana, Campi Bisenzio, Scandicci, Sesto Fiorentino, etc.) with a view of gradually expanding, after successful implementation and evaluation of the trials, as the Agency for coordination of all intermediate transport services in Florence Region. The aim of Angus was to create a co-ordination centre (Flexible Agency, FA) to administer a rural DRT system that did not yet exist at the time the FAMS project started. The centre is to take bookings for all residents and visitors wishing to access the rural areas of Angus surroundings Alyth, Kirriemuir and Brechin. The objective is to maximize the use of existing resources and provide the residents of the pilot area with the equal access to employment, training, childcare, health care and leisure activities. Services have been designed to embrace the concepts of rural regeneration, social inclusion, sustainability and community planning.

Accordingly, starting from a detailed analysis of the sites' context, an in-depth presentation of the stakeholders and their specific objectives were carried out for both Angus and Florence. Based on this knowledge from the two sites, a synthesis of the requirements and context of the FAMS project in the form of "Problem Definition" was defined and *common FAMS*

system requirements as well as an initial overall functional design of the Flexible Agency were identified.

Fig. 3. Overall FAMS Context Diagram

The context diagram in the Figure 3 provides a summarised view of the general context investigated for development of the FAMS concept, and illustrates the main type of actors defining the operational context of the Agency. The results of this phase provided also the basis for the FAMS system design and implementation work.

52 FAMS Physical and Functional Architecture

The work on adaptation and development of supporting technologies for the FAMS model was completed in Spring 2003, although it is expected that, as a result and feedback from the ongoing trials, technology adaptation activity will continue to fine tune the supplied solutions and meet requirements eventually arising from the trials.

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, designing also the main functionalities related to B2B and B2C services. The implementation of designed solutions has then started in the two sites, starting from baseline technology available or supplied by the local IT partners. Figure 4 provides an overview of the general FAMS (Physical) architecture. This was taken as a reference for local implementations in the two sites (which differ according to a number of local requirements in relation to technologies and functionalities/services provided).

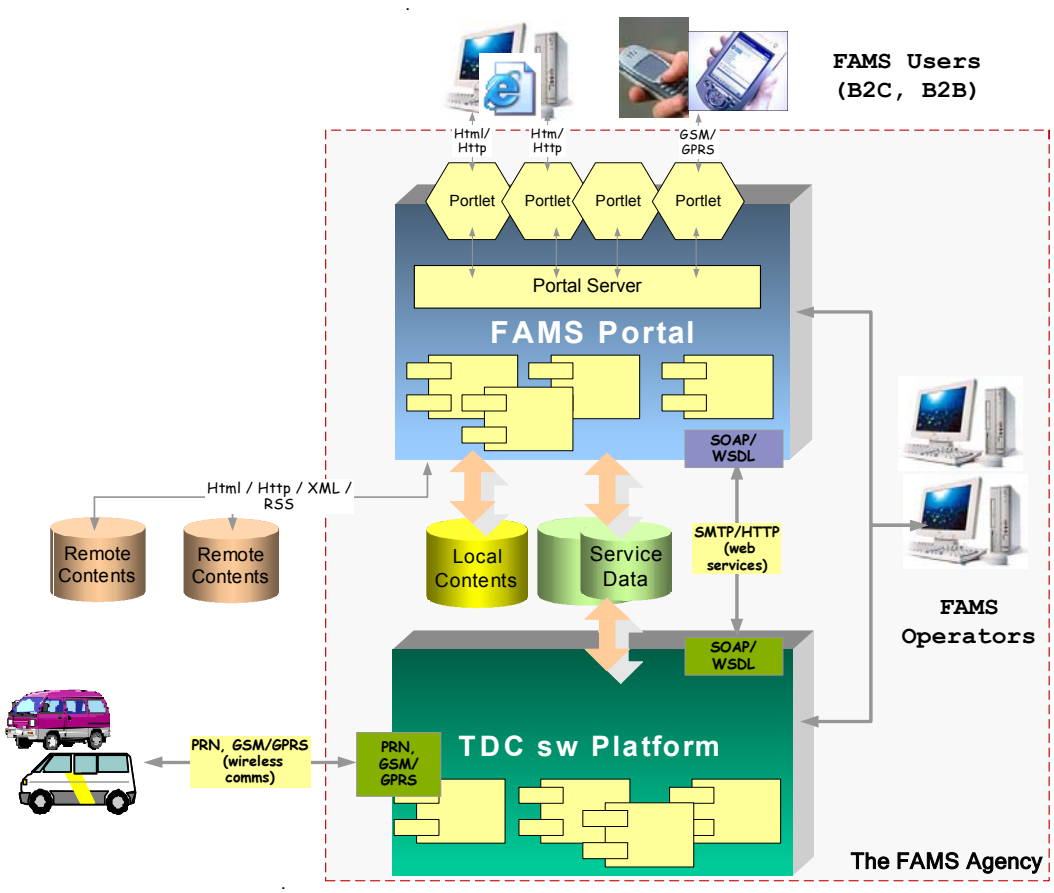

Fig. 4. FAMS Physical Architecture

The overall functional architecture for FAMS is represented in Figure 5. The notation used (Data Flow Diagrams, DFD) follows the methodology adopted within the EU Fourth and Fifth Framework Program transport projects for system architectures specification (see e.g. CONVERGE, KAREN, FRAME projects).

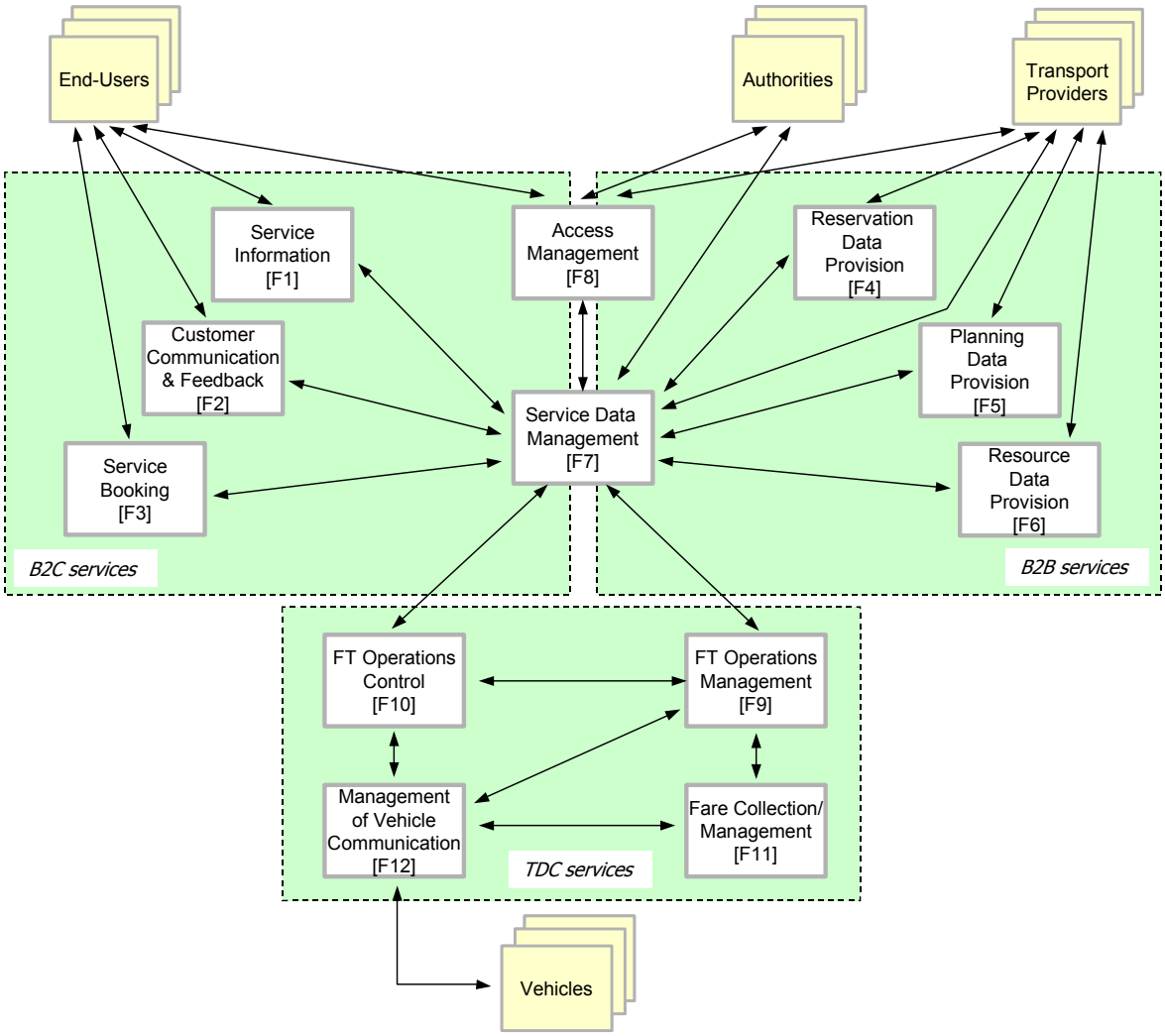

Fig. 5. Top-level functional architecture of the FAMS Flexible Agency

The functional architecture is meant to illustrate the structure and interrelations between all main functional components of the Flexible Agency and is assumed to abstract with respect to the different solutions adopted in the FAMS sites as regards technological choices and set-ups (physical architecture, communication architecture). These further levels of architecture specification and design will form the basis of the finalised FAMS functional architecture.

5.5 FAMS Technology Development and Evaluation

The FAMS technical solutions are under development at the time of writing, and will be implemented in April-May 2003. These will be evaluated in full operational conditions through the remainder of 2003. It is foreseen that the implemented services and support systems will remain in full commercial operation indefinitely.

The interested reader will be able to access the reports on both the technical developments and the evaluation of the FAMS concepts on the FAMS website (see end of references section below) in late 2003/early 2004.

6. References

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Notes :

1) SAMPO and SAMPLUS were projects part-funded by the European Commission under the 4th Framework Program for R&TD. All Deliverables from not only these two projects, but all other projects in the Transport for Telematics action can be accessed and downloaded from the CORDIS website at http://www.cordis.lu/telematics/tap_transport/research/11e.html

2) Information on the FAMS project can be obtained at website http://www.famsweb.com