



Follow Me Project

Work Package K Consortium Exploitation Plan

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1 Overview

The FollowMe project has built up a support technology for a mobile agent infrastructure for mobile users and proves the technology in several major pilot applications. As part of this Esprit project an exploitation plan was produced by all partners. This document gives an overview to the exploitation paths and the exploitation plan of each partner.

2 General Exploitation Consideration

2.1 Objectives of the FollowMe Framework

The objective of FollowMe is to exploit global networks such as the internet. It focused on the requirements of mobile users; it aims to support these users in their day-to-day actions and, more generally, to enable them to exploit network based services.

FollowMe attempts to improve on the desktop as the method of driving applications and accessing data. The replacement of the desktop is network based. Mobile users are able to access and share information from any node on the network. The project examined devices and ways in which users will interact with such an environment, how they specify tasks and have these fulfilled. It explored means to aid the deployment of services with mechanisms to optimise their location and distribution.

The project has created two pilot applications to demonstrate and validate this new paradigm in utilising network based services. The Ouest France newspaper and the resources and services of Bavaria Online ISPs are the basis for these pilots.

FollowMe is constructed along a component architecture for the development of distributed mobile applications. Thus it defines a framework where each partner plugs in his individual components. The major pluggable components are

- the mobile object workbench, and the information space,
- the agent framework, comprising mobile agents, personal profiles and service interaction
- the service deployment infrastructure,
- access facilities for mobile users, and

- the pilot applications.

2.2 Exploitation Paths

The FollowMe partners have different institutional background as universities (UWE), research institutes (Inria and FAST) or commercial companies (Citrix, TCM). Thus exploitation considerations are different for each partner.

The results of the project can be exploited along the following paths:

- **Consultancy:** Through FollowMe each partner acquired skills in the area of Distributed Systems Development, Agent Based Mobile Computing, advanced Java Programming. It is only natural for all partners to exploit these skills in the acquisition and execution of future projects.
- **Products:** The results of FollowMe have led or will lead to the development of new products. This applies typically to the commercial partners. E.g. Citrix will use its FollowMe results for the further development of its ICA thin client supporting a "Java Application Server"
- **Services:** The pilot applications have the potential to be exploited. They were intended as demonstrators. Both pilot applications can provide services to a broad customer base. The Bavaria-Online pilot plans to extend the service beyond the end of the project in co-operation with the Bavarian Bürgernetze. TCM plans to market ETEL++ based services and products in the newspaper sector.

It is in the interest of all partners to make the component architecture available to the broad public as seedware. The partners have agreed to license the results of FollowMe to each other beyond the end of the project, but not to develop an detailed joint exploitation plan. Rather than that each partner will exploit its results individually.

3 Citrix Systems Exploitation Plan

Having been acquired by Citrix, APM Ltd, now renamed Citrix Systems (Cambridge) Ltd has made several changes to its business. In particular we are discontinuing both our ANSA research consulting business and our general Internet secure electronic commerce consulting business so that we can focus all our efforts on software products. With further investment from Citrix we plan to expand the company from 40 to over 60 technical staff in 1999 and further still in 2000. Currently we are developing as yet unannounced Java, World-Wide Web and security products for Citrix. Our skills in architecture, Java, security, user access and deployment developed through our participation in FollowMe have been major contribution to both the reason for Citrix acquiring us and the assignment of important new product areas to the Cambridge group.

Since products are as yet unannounced, it is inappropriate to give precise details of how the FollowMe technologies will be taken into Citrix products. We would be happy to give private briefings under non-disclosure to CEC officials and project reviewers. A summary of our intentions in general terms is given below.

We are developing a Citrix ICA thin client supporting "Java Application Server". We see the FollowMe mobile object technology as a foundation for load-balancing between servers, and potentially for dynamically partitioning an application between that part executed on a client device and that part executed on a server. In large configurations of Citrix servers we have a need to support robust distributed management processes - the FollowMe mobile object and intelligent agent technologies can help in this domain. Our world-wide web proposals are less well developed at this point, but we see applications of the user access and service deployment aspects of FollowMe being applicable to developing servers that enable simpler devices to provide a full browsing experience. We anticipate these products coming to market in the 1999-2000 period and to contribute revenues of over \$100M.

4 FAST's Exploitation Plan

4.1 Overview

This document describes the exploitation plan of FAST. Major exploitable results are consultancy skills, FollowMe based Internet services, and SW products developed or extended through FollowMe. These results will be used to boost the Intranet and Internet operations of FAST and to run the Internet services on a commercial basis.

4.2 Exploitable Results of the FollowMe project

The FollowMe project produces three types of results that FAST e.V. plans to exploit: consultancy skills, an internet service and an agent based customisable product for delivering these type of services.

4.2.1 Consultancy Skills

Nine software engineers of FAST are directly involved in the definition, implementation, installation and maintenance of the FollowMe Internet service. During they stay in the project they acquired skills and know-how in Java, distributed computing, agent-technology that will be transferred to other projects.

These skills are transferred into customer-oriented projects.

4.2.2 Internet Service

In FollowMe, FAST develops two internet services that will be offered to users of the Bavaria-Online Network. These service will be set up and maintained in close co-operation with a number of local Bavarian Citizens Network associations. The service will consist of the following two sub-services and may be extended in the future:

- A regional event notification service: Event organisers will be able to post their events in data bases provided by the Bavaria-Online Citizens Networks. Users can define event profiles, which will be compared regularly against these data bases. When a match occurs, the user will be notified by phone, fax, or email.
- A stock portfolio management system: A user can define his personal stock portfolio. The value of the portfolio is monitored, and the user can obtain information about its status. In exceptional situations, such as when share values exceed predefined limits, the user will be informed by fax or phone.

The service will be generic in the sense that further sub-services can be added. Two extensions are already initialised: A connection of the regional event notification service with a public transport information service of “Bayern Innovativ”, and an agent-based notification service for SMEs on calls for tenders.

4.2.3 Product

The underlying application that provides the service described before, can be viewed as a product that can be re-used for other application areas. FAST develops two components of the FollowMe toolkit.

- The User Access component enables users to access his mobile agent on the internet and vice versa via various types of devices
- The two pilot applications.

The product consists of components developed by the FollowMe partners and extensions for the specific applications. These extensions can be adapted to other application areas.

4.3 The Target Market

4.3.1 FAST's Customer Base

FAST e.V., the Bavarian Research Institute for Software Technology, was founded in 1993 by the Bavarian government to advance software technology in Bavaria. FAST is an association of personal and industrial members (industrial members are the Bavarian States Bank, BMW, Siemens, and Softlab). One of FAST's roles is to support small and medium enterprises in Bavaria on their path into the information age and to foster the use of new media such as the Internet.

FAST has established close links to research institutes at universities and applies the results directly within the organisations of its members or promotes the results publicly for the industry in Bavaria.

FAST is active in the areas of Internet development and Intranet. The revenue from direct Internet-Web operation is 2.7 m DM, in Intranet operations is 1.7 m DM.

The target market for the commercial exploitation of FollowMe results is naturally inside FAST's traditional customer base. In the following the customer base is described in its three segments public, private & consumer. The private sector is in turn be divided into the two categories large & medium sized companies and small companies:

4.3.1.1 Public Sector

FAST has a major role in designing the concept and administering the implementation of the state-sponsored "Bavaria-Online" project (<http://www.bayern.de/BayernOnline>) on behalf of the Network Department (IZB) of the Bavarian Statesbank.

FAST has developed Web-Services for public authorities, such as the Bavarian Government, the Ministry of Environment, and the Ministry of Agriculture, and regional communities.

It is the main consultancy partner for the development of intranet infrastructures for such organisations as e.g. the Ministry of Interior.

FAST is also the preferred partner of the government for promoting the use of the Internet in the day to day business of small and medium sized industries in Bavaria, by leading and administering pilot projects with prototype characteristics.

4.3.1.2 Private Sector

4.3.1.2.1 Large and Medium Sized Enterprises

FAST serves as a consultancy partner for software engineering. It performs research projects in the area of distributed systems development, re-use, case tools, etc. The majority of customers are coming from the financial sector (banks, insurance companies), automobile industry, and software manufacturers.

There is also a growing market demand for consultancy in developing of Intranet, Extranet and telephone infrastructure (e.g. helpdesk optimisation).

Another important share are web-related operations for customers who need services such as web-site development, maintenance and web-hosting for instance SKW Trostberg (Chemistry), Viag Interkom (Telco provider), and more than 40 savings banks. In this area FAST faces increasing competition from lower-profile companies that may take over the standard web-development market. FAST is moving into an area of high profile web-service provider that include active components or are highly mission critical (e.g. Compaq Gran Slam).

FAST has partnerships with mainframe oriented software houses in order to support the transition of big IT-customers from host centred computing solutions to java-based client/server applications.

4.3.1.2.2 Small companies

FAST does not plan to directly target small-scale companies. It has, however, established close relationships with the Chamber of Commerce for setting up a competence centre for electronic commerce.

4.3.1.3 Consumer Market

FAST does not plan to have direct business relations with consumers. FAST has however established a close collaboration with the Bavarian Citizens Network (Bürgernetze), which is a collection of regional associations that provide internet services (internet access, regional information, regional software politics, etc.) to their members.

In co-operation with these Citizen Networks indirect service marketing is possible.

4.4 Exploitation Plan

4.4.1 Consultancy Skills

FAST sees a growing demand for distributed, web- and agent-related applications. A rise in demand has already been noted from customers in the public sector (intelligent document management for public authorities) and the financial sector (saving banks).

This targeted segment of the market is forecasted to generate 25% of the revenue increase in Intranet and Internet services due to agent-related consultancy services.

4.4.2 Internet Service

FAST plans to run the service during 1999 as a pilot service. After that FAST plans to transfer the FollowMe internet service together with the Bavarian BürgerNetze from its pilot state into a commercially oriented information service.

This service will be operated and maintained jointly by FAST and the Bavarian BürgerNetze.

Further services (e.g. a call for tender server) will be added.

The remaining trialling period will be used to develop an adequate business model.

As a first estimate, FAST's revenue from running the internet service is forecasted to be in the same order of magnitude as the consultancy revenue of the previous year.

4.4.3 Product

The software package resulting from the FollowMe application can be marketed. At the end of the project, however, the product will not be mature enough to be marketed immediately. Rather, it is a tool to be re-used and customised in other projects generated through the consultancy services.

4.5 Additionally Generated Revenue

In the following we give a forecast of the revenues generated through agent-related business. The basic revenue figures for the future development of the business areas "internet based services" and "intranet based services" are taken from FAST's latest business plan. In 1998 the revenue in both business areas were 2890 TDM. The forecasts for the for the next years is given in the table below.

It is assumed that FollowMe related consultancy business will contribute 25% of the annual growth rate. FollowMe based services also contribute to about 20% of the annual growth rate from the year 2000 on.

This additional turnover created to FollowMe related business accumulated over the next 5 years will amount to DM 5.111.000

Year	1998	1999	2000	2001	2002	2003
Internet & Intranet	2.890.000 DM	3.272.000 DM	4.000.000 DM	4.900.000 DM	5.800.000 DM	6.700.000 DM
Planned Growth wrt. 1998		382.000 DM	1.110.000 DM	2.010.000 DM	2.910.000 DM	3.810.000 DM
Agent-based Consultancy		95.500 DM	277.500 DM	502.500 DM	727.500 DM	952.500 DM
Service-based Revenue		0 DM	95.500 DM	277.500 DM	502.500 DM	727.500 DM
Agent-based Growth		95.500 DM	373.000 DM	780.000 DM	1.230.000 DM	1.680.000 DM

Growth of FAST's Inter- and Intranet Business

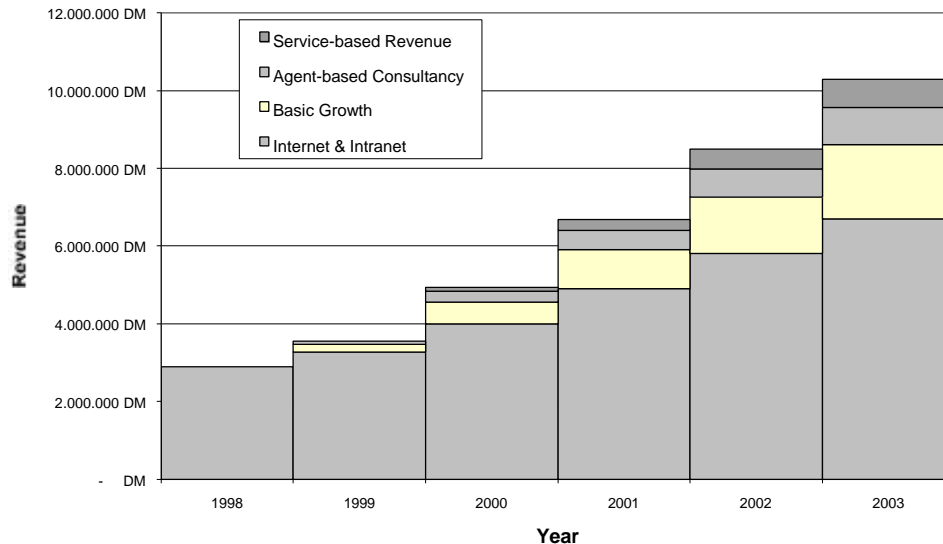


Table 1: Revenue Forecast for Internet and Intranet Business Development

5 INRIA's Exploitation Plan

INRIA is most interested in exploiting the results of FollowMe as well as its current results, and will consider this exploitation through two possible ways:

Foreground information coming from different partners of the project will be used by different teams at INRIA, working on close subjects. This diffusion can be extended, in the case of INRIA foreground information, to its own external relations, mainly academic institutes and universities around the world.

Furthermore, INRIA can integrate foreground results on current research prototypes. INRIA would not engage directly in the market place selling such prototypes. However, these prototypes can be commercialized by industrial companies, in particular by INRIA's spin-offs.

However, without considering previous aspects related to the exploitation of the result, there are many ways to justify the interest of the Solidor INRIA research group into the FollowMe project.

First, we want to generalize our research and development on multimedia information services (a newspaper service in our case) in order to integrate new facilities which are:

- to access a newspaper service using internet facilities
- to reconsider some implementation choices using new software technologies (agent, Java,...)
- to take into account new facilities such that the client mobility and service accesses from anywhere,
- to take into account geographical dependent information,
- to use different ways to access the service (laptop, workstation, notebook, phone,...),
- to improve our current newspaper service implementation in comparison to others one provided by other partners.

Obviously we hope that such new facilities will be part of the future electronic newspaper service under investigation by our associate partner (TC MULTIMEDIA)

Second point, we think that such a project is a nice testbed we can use to evaluate researches we lead on software architectures. Currently in the framework of an LTR European project (C3DS) we are investigating how to design a distributed information service using a software architecture approach, obviously FollowMe would be a good candidate to experiment our ideas.

Last point , we think that such a project has a strong influence on our research about embedded systems and services in general.

6 TCM's Exploitation Plan

6.1 Context : ETEL

TC Multimedia, is specialised in providing on-line services and their conception (notably Ouest-France's on-line service), it also provides telematic services associated with the newspaper (tax calculation services, or even the collection and treatment of exam results that are both posted on minitel and published in the paper).

Technical evolutions in the field of communication and computing have enabled newspapers editors to envisage the publication of electronic versions of their traditional paper-based products.

The newspaper Ouest-France has a daily circulation of 800,000 copies, making it the most widely circulated French daily paper. TC Multimedia (TCM) as the multimedia and telematic subsidiary of Ouest-France, is heading up Ouest-France's future electronic newspaper project, ETEL. In collaboration with INRIA, TCM is spearheading the elaboration of an extremely high-quality electronic press service which will enable end-users to directly access information. The electronic version of the newspaper will provide access to Ouest-France's 40 editions, 400 pages, 2,500 news and 1,500 photos daily. Ouest-France is a local newspaper, it means that news are separate into different granule information : general (as National newspapers) regional, departmental, cities, small towns ... ETEL will retain the identity of the printed version, this is the uniqueness of ETEL which resides in the continuity between the layout of the current paper version and its electronic edition. These two versions are generated from a single digital representation stemming from a given editorship's output. In addition ETEL will provide multimedia capabilities (video, sound and images), and will enable end-users to specify their own geographic and thematic interests. Access to ETEL will require subscription fees. Another goal of ETEL is to provide a generic and modular electronic news distribution service intended for daily or weekly newspapers, and specific bulletins.

ETEL is based on a traditional client-server architecture, a request-reply communication model based on HTTP protocol and ISDN link to ensure availability and fast response time. The client viewer application is a dedicated interface on top of Win95 or WinNT platform, which uses PDF formatted data with Acrobat Reader, in order to preserve the visual identity of the paper version.

6.2 Etel++ for Experiencing with New Technologies

The pilot application Etel++ that is developed within the context of FollowMe investigates new ways to get over some of the limitations of ETEL:

- Internet access instead of ISDN network, despite of poor quality of service due to large variance in the response time when transferring data.
- Large scale distribution, using service deployment, and mobility to take into account the processing power of any provider and user's terminal.
- Multi-terminal support, allowing access to news via phone, laptop, notebook, fax ... from anywhere.
- Agent based interaction, and services interaction to allow the discovery of local services that may interest users, according to their personal profiles, when users travel.
- Pull and push based data delivery helping deployment of Etel++.

FollowMe Project is a way for experiencing with new technologies. Etel++ is designed as a complementary application which fits ETEL to user's mobility and to distributed-based application on the internet.

6.3 Exploitation Plan

In the context of FollowMe, the exploitation plan for TCM is articulated as follows:

- *Opening new consulting domains.* Experiencing with the technologies used in the context of FollowMe allows TCM to improve its level of knowledge. It completes TC Multimedia background through its consulting business. TCM plans to sell this knowledge to clients through consulting actions. In particular, Java, Agents, Mobile Computing are "hot topics" that have a great potential for new revenues.
- *Improving existing on-line applications.* Lessons learned from the work achieved within the FollowMe project are likely to have an impact on the numerous on-line applications that have been sold by TCM to its customers.
- *Extending ETEL.* Some of the concepts and techniques developed for ETEL++ will be directly integrated into ETEL. In general, extending ETEL by introducing additional features provides opportunities for new revenues. It is planned that these revenues will be generated by an increasing number of subscribers convinced that the electronic version of Ouest-France is far more powerful and useful than its paper-based counter-part. Potential new subscribers are likely to be:
 - Expatriate Westerners. A significant numbers of "Bretons", "Normands" and people originating from the "Pays de la Loire" leave overseas (these are French regions that are the primary focus of Ouest-France). They are having today great difficulties in getting the newspaper. Electronic editions together with the Internet break distance barriers, making daily editions instantly available anywhere in the world.
 - French residents not living in Western France, in other words for all our readers not residing in the 12 departments in Western France, a perfect complementarity between news of western France provided by ETEL and local service-oriented news provided by using some of FollowMe components.
- *Marketing and sale of some technology* developed in the context of FollowMe to other newspapers is another business objective. FollowMe's business strategy is quite complementary to ETEL's one. The latter is expected to be subscription-based, with an extra charge in order to access sophisticated services that are similar in spirit to the ones developed in the context of FollowMe. TC Multimedia regularly works with numerous regional dailies which are keen on implementing this type of software. If we planned on an additional subscription of 10 F.F /month for these services over a three year period for readers of the three newspapers (Ouest-France, Sud-Ouest, Le Figaro, for example) who are subscribed to ETEL, these results in the following :

		Year 1	Year 2	Year 3
Ouest France :	num. of readers	4000	6000	8000
	subscription fees	480 000	720 000	960 000
Le Figaro :	num. of reader		3000	5000
	subscription fees		360 000	600 000
Sud-Ouest :	num. of reader			3000
	subscription fees			360 000
Total		480 000	1 080 000	1 920 000

It must be noted that the above number of readers represents to 1% of the readership of Ouest-France, le Figaro, and Sud Ouest.

At last TC Multimedia has teamed up with Ouest-France's advertising production agency to form a multimedia advertising branch. What is most pertinent for our products, owing to the introduction of FollowMe, is that they will thus open up to new national and international advertising perspectives.

7 UWE Exploitation

7.1 Products and Results for Exploitation

The main exploitable results from FollowMe for the University of the West of England (UWE), Bristol, is knowledge about the design and implementation of a framework for scripting mobile agent based applications and integration with Internet services and also the design of the data structures and applications necessary to hold personal information about the user. Most of this knowledge is encapsulated as a set of design patterns that have been elaborated during the project and which are likely to prove invaluable in a number of application domains as well as those developed by the pilot applications. ICSC has also developed code which combines the work on autonomous agents, personal profiles and service interaction into the FollowMe Agent Framework. This framework facilitates the development and deployment of mobile, scripted agents. Whilst there are other scripted and mobile agent systems that have been developed elsewhere there is a very limited set of scripted and mobile agent systems in existence. As part of a University ICSC has an important obligation to disseminate knowledge and intends to publish its work in FollowMe where appropriate.

7.2 Routes to Market

UWE's Intelligent Computer Systems Centre (ICSC) intends to exploit these results through the following routes

1. Providing consultancy to organisations and companies requiring assistance in the development of such systems for the Internet
2. Participating in industrial and other consortia to design, develop and deploy agent based systems on the Internet
3. Designing and deploying systems directly

UWE is ideally placed to provide consultancy and participate in consortia to provide knowledge, guidance and expertise in the complete project life cycle. ICSC's mission statement is to transfer advanced technology into UK and European industry. UWE's ICSC is also in a position to design, implement and deliver systems directly particularly where such systems are part of some research or feasibility study.

7.3 Markets to be Targeted

The FollowMe project has not yet placed ICSC in direct contact with a particular market for deploying agent technology. However, through other projects and industrial contacts ICSC would expect to generate interest in a number of market areas such as process control, real

time road traffic management and on-line market places. There is significant research activity ongoing in ICSC providing basic techniques in machine learning which has grown out of research into genetic algorithms, evolutionary computing and neural networks. Participation in FollowMe has significantly improved the position of ICSC to provide agent technology which exhibits adaptive behaviour.

7.4 Market Size

ICSC has limited market intelligence as to the size of the agent based computing market. This is a new application domain and as far as we are aware no specific market research has been done in the EU. However, as this a generic technology the anticipated world-wide market size is considerable. With the ever increasing use of the Internet as a vehicle for conducting business across Europe we can see many opportunities to deploy agent based solutions.

7.5 Exploitation activities to date

ICSC has started dialogue with a small Bristol based company that is developing Java applications for mobile Java enabled devices with a view to investigating possible collaboration on developing products. ICSC is also talking to the Transport Research Laboratory Ltd. in order to obtain near real time road traffic information so that ICSC can look at Agent based applications for the dissemination of road congestion reports to users.