



ESPRIT Project N. 25 338

**Work Package L
Periodic Progress Report
4/98 to 06/98**

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1	Summary of Key Indicators of Project Progress	2
2	Project Progress	3
2.1	Management Information.....	3
2.1.1	WP A (Architecture).....	3
2.1.2	WP B (Mobile Object Workbench)	3
2.1.3	WP C (Personal Information Space).....	4
2.1.4	WP D, E & F: Agent Framework	4
2.1.4	WP G (Service Deployment).....	5
2.1.5	WP H (User Access)	5
2.1.6	WP I (Pilot Application Bavaria Online)	5
2.1.7	WP J (Pilot Application Etel++).....	5
2.1.8	WP K (Exploitation)	5
2.1.9	WP L (Project Management).....	5
2.2	Project Meetings	6
2.3	Roster of Personnel on the Project	6
3	Deliverables.....	8
4	Next Reporting Period.....	11

1 Summary of Key Indicators of Project Progress

The objective of the FollowMe project is to create a support infrastructure for mobile users. Users are enabled to connect to network-based services using a variety of devices and from different locations. The project will implement core facilities for the development of distributed mobile applications and a number of representative pilot services.

The project progress is measured against the planned results of the project. These are

1. a component **architecture** for distributed mobile applications that includes object mobility and distribution control, a framework for autonomous agent, and user access facilities.
2. an **infrastructure prototype**, providing a complete basic set of components for FollowMe application, to be integrated into marketable products for servicing mobile agents
3. two **pilot application** that demonstrate the architecture and the components,
4. a **public report** on the architecture, user needs, implementation guide, and the pilots.

The measures for these results are the timely availability, and the quality of the intermediate deliverables and their benefit to support other work packages.

The **architecture** is now available in a second version (deliverable DA1.2) as planned.

For the **infrastructure prototype** there exists now a set of implementations. The next months will focus in the technical integration of the results.

Both **pilot applications** have now started first implementation steps.

The **public report** will consist of a set of deliverables, produced during the project. Which deliverables will be included will be decided in the next reporting period.

2 Project Progress

2.1 Management Information

The work in this reporting period concentrated on the preparation of the review. The review was passed successfully. The recommendations of the reviewers were taken into account and first corrections were started.

Major results of this reporting period were individual implementations of agent framework components, user access and service deployment.

The following subsections describe the results and progress of the individual work packages in detail.

2.1.1 WP A (Architecture)

Work continued leading to production of deliverable DA1.2. This was released internally for the Cambridge technical meeting. A final version was submitted for EC review, following feedback from the meeting. This version was accepted by the reviewers.

DA1.2 generalised the designs from the workpackages into a toolkit of design patterns and implemented components which may be usefully reused across a range of application development projects. It provides a meta-architecture for mobile applications. The basic patterns provide a vocabulary for discussing objects, distribution, reflection, mobility and storage. The foundational patterns relate the most general patterns for mobility and storage to the components provided by the Mobile Object Workbench and InformationSpace work packages. The Agent Framework patterns present the key ideas of the Autonomous Agents, Personal Profiles and Service Interaction work packages. The extension patterns present the tools provided by the Service Deployment and User Access work packages. The application patterns generalise the information provider architecture and agent interaction frameworks of the pilot application work packages.

2.1.2 WP B (Mobile Object Workbench)

The April deliverables of the Mobile Object Workbench (version 1.1) (DB5.2, DB6.2, DB7.2 and DB8.2) were released. They were reviewed by the other project members, then submitted for EC review. They were accepted by the reviewers.

Work has continued on documentation, support, bug fixes and fine tuning. Additionally, work has continued on three major development strands. The first is network class loading, which allows a Place to dynamically load the correct versions of classes for mobile objects it receives. The second is a generalisation of mobile objects, storables, places and stores into clusters and capsules. This allows the separation of encapsulated groups of objects (clusters)

from their management. Thirdly work on a security architecture and implementation has also continued.

2.1.3 WP C (Personal Information Space)

The March deliverables of the Information Space 'black box' objects were reviewed by the other project members then submitted for EC review. They were accepted by the reviewers.

Work has continued on design and implementation of the 'white box' persistence transparency implementation. This involved rationalisation of the MOW infrastructure into clusters and capsules. Implementation has continued on extending the Information Space with failure transparency, hiding the effect of failure on remote clients.

2.1.4 WP D, E & F: Agent Framework

Due to the high degree of overlap between the UWE work packages it has become meaningful to describe the combined work as an Agent Framework. This grouping was presented to the first FollowMe review successfully and the deliverable schedule has now been presented as the roll out of the Agent Framework versions.

2.1.4.1 WP D (Autonomous Agents):

The main component of the Agent Framework is the agent scripting engine. The first version of the scripting engine is substantially complete as the date of this report and is undergoing tests prior to delivery to the consortium. The implementation of the scripting engine has been quite a complex task due to the necessity of conforming to continuation semantics. It is this constraint in the scripting engine implementation that hides the complexity of thread management in the MOW from the writer of agent missions. Version 1.1 of the Agent Framework will contain a version of the scripting engine which is capable of parsing a mission script and dynamically creating the objects declared. The engine is designed to be run from a console and supports writing to the console for debugging scripts.

The next version of the Agent Framework (v1.2) will deliver the script engine integrated with a Trader (WP F) which is capable of holding agent missions and integrated with the Information Space (WP C) and User Access (WP H). The implementation in this version will use MOW classes (WP B) but will not have the capability of movement (this is expected in v1.3).

2.1.4.2 WP E (Personal Profiles):

The first version of Personal Profiles has already been released (Agent Framework v1.0). This version contained a profile editor and supported the externalisation of personal profiles in XML. The Personal Profile was implemented with the Document Object Model (DOM) and the v1 of the DOM API is accessible in the code so that arbitrary profiles can be stored (to support integration with Service Deployment, WP G).

Within the Agent Framework v1.2, this work package will provide the first version of the diary object, which will be capable of generating events, and the final version of the diary, will be delivered within v1.3 of the Agent Framework.

2.1.4.3 WP F (Service Interaction):

The Service Interaction work package is providing the Trader for the Agent Framework and the first version will be included in v1.2. The final version of the Trader will be delivered in v1.3. It is planned to concentrate work on service signatures and service contracts in this work

package and progress in these research areas will be included in the appropriate maintenance releases of the Agent Framework as planned (v1.4 and v1.5).

2.1.4 WP G (Service Deployment)

During the last three months the design and the interface specification for the service deployment was completed (DG 4). The first implementation of the group profile analyser is now available (DG 5). It enables to monitor an NT-based machine.

2.1.5 WP H (User Access)

The user access component is responsible for managing the interaction between a mobile agent and its (mobile) user. As common interaction medium XML and XSL was chosen and an appropriate design was developed (Deliverable DH3&4).

In the last three month the implementation of the user access started. Main work went into the design and implementation of the user access kernel and device gateways for mail, fax, and http-connections. A first implementation of the user access was delivered (DH5.1). A second implementation (DH5.2) with an update of the code, an additional SMS-Gateway and a trader for devices is under way.

2.1.6 WP I (Pilot Application Bavaria Online)

The requirements, and the architectural design for the pilot applications was finished (Deliverables DI2). Details of the architectural design were clarified in close co-operation with UWE in a dedicated meeting in Bristol.

Main work in the last three months went into the detailed design and a first test implementation of application-specific java classes.

At the 25th of May an initial meeting with representatives of the Bürgernetzvereine took place to clarify the co-ordination of the service development and deployment with the operational team.

On recommendation of the EC reviewers an extra-ordinary deliverable to capture the end-user requirements is under preparation.

2.1.7 WP J (Pilot Application Etel++)

Main work went into the extraction of data from the Ouest-France databases. The Design DJ3 is available.

2.1.8 WP K (Exploitation)

A first draft exploitation plan (DK2) was compiled. TCM started with contacts to SPQR (Daily Regional Press Syndicat) and with Ouest-France's advertising production agency.

2.1.9 WP L (Project Management)

The review at the 10th of July in Brussels was prepared and successfully conducted. The recommendations of the reviewers were taken into account to steer the further development in the project.

As a first task the project implementation plan was updated with a detailed effort and dependency planing for the remaining deliverables.

2.2 Project Meetings

The following project meetings took place during the reporting period. Minutes and/or slides are available on the project server.

<i>Date</i>	<i>Location</i>	<i>Meeting</i>
22 nd -24 th April	Cambridge	FollowMe Team Meeting and Management Board
27 th -28 th May	Bristol	Meeting between UWE and FAST to discuss implementation of Pilot Application (WP I) using Agent Framework
9 th June	Brussels	Preparation for 1 st Review
10 th June	Brussels	FollowMe 1 st Review

2.3 Roster of Personnel on the Project

The following staff members contributed to the project.

<i>Company</i>	<i>Name</i>	<i>Role in the Project</i>
APM	M. Bursell	Software Engineer: Architecture and Mobile Workbench
	D. Donaldson	Software Engineer: Architecture, MOW and Personal Information Space
	D. Franklin	Software Engineer: Architecture and Personal Information Space
	W. Harwood	Software Engineer: Architecture and MOW
	R. Hayton	Software Engineer: Architecture and MOW
	A. Herbert	Project leader at APM, Project Board , Chief Architect
	R. Chiltern	Software Engineer: MOW
	J. Cooper	Software Engineer: MOW
	M. Madsen	Software Engineer: Internal Review
	T. Ugai	Software Engineer: Security
FAST	M. Breu	FollowMe Project Manager, software engineer
	L. Gebauer	Contact Manager: Pilot Application
	R. Haggemüller	Project Board
	H. Nandasena	Project Assistant
	S. Pöllot	Software Engineer: User Access and Pilot Application
	A. Rajakarunanyake	Software Engineer: Pilot Application
	H.-G. Stein	Software Engineer, Work package coordinator WP J (Pilot 1)
	A. Sindermann	Software Engineer: User Access
	E. Triep	Work package coordinator WP H (User Access)
	R. Sembacuttiara.	Software Engineer: Version Management
H. Köhler	Project Assistant	
INRIA	L. Amsaleg	Full time engineer: ETEL++
	M. Banatre and V. Issarny	Project leaders at Inria
	M. Billot	Full time engineer: WP-G (Service Deployment)
	P. Couderc	PhD student: mobility of documents
	A-M. Kermarrec	Researcher: mobility of documents

<i>Company</i>	<i>Name</i>	<i>Role in the Project</i>
	J-P. Routeau	Engineer, helps in building the bridge between ETEL and ETEL++
TCM	M. Le Nouy	Engineer: Etel++.
	C. Philibert	Project leader at TCM, project board,
	B. Toullier	Engineer: Etel++,
UWE	S. Battle	Software Engineer and Researcher: WP D, E and F
	L. Bull	Project Mentoring: WP D, E and F
	N. Taylor	Software Engineer and Research: WP D, E and F
	J. Tidmus	Software Engineer and Research: WP D, E and F
	M. Yearworth	Work Package leader for WP D, E and F, FollowMe Management Board and Project leader at UWE

3 Deliverables

The following list shows the status of each deliverable as of 31/03/98. The status of the deliverables is either:

- *Internally available*: The deliverable was produced and distributed project-internally. It either serves as an internal basis for technical decisions and preparation of the further deliverables or is a software product that is distributed project-internally. Those deliverables are not handed over to the reviewers. But they can be made available on demand
- *released*: The deliverable has successfully undergone a formal project-internal review process.

Some deliverables are rescheduled in order to take account the availability of required documents.

Deliverables that are already available are shown in grey:

<i>Deliverable</i>	<i>Name</i>	<i>Type</i>	<i>Month</i>	<i>Status</i>
DA1.1	Architecture Report	Report	2	Internally available
DA1.2	Architecture Report	Report	6	released
DA1.3	Architecture Report	Report	12	shifted to PM 15
DB1	Survey	Report	1	Internally available
DB2	Requirements	Report	2	released
DB3	Design	Report	3	released
DB4	Interface Specification	Software	3	released
DB5.1	O/S Objects	Software	4	Internally available
DB5.2	O/S Objects	Software	7	Shifted to 12
DB6.1	Object Locator	Software	4	Internally available
DB6.2	Object Locator	Software	7	Shifted to 12
DB6.3	Object Locator	Software	9	Shifted to 12
DB7.1	Mobile Object Workbench	Software & Report	4	Internally available
DB7.2	Mobile Object Workbench	Software & Report	7	Internally available
DB7.3	Mobile Object Workbench	Software & Report	9	Shifted to 12
DB7.4	Mobile Object Workbench	Software & Report	12	Shifted to 12
DB8.1	Mobile Data Object	Software & Report	5	Internally available

<i>Deliverable</i>	<i>Name</i>	<i>Type</i>	<i>Month</i>	<i>Status</i>
DB8.2	Mobile Data Object	Software & Report	7	Internally available
DB8.3	Mobile Data Object	Software & Report	9	available
DC1	Requirements	Report	3	released
DC2	Design	Report	4	released
DC3	Interface Specification	Software	5	Internally available
DC4	Object Sharer	Software	9	Shifted to 12
DC5.1	User Authentication	Software	9	Shifted to 12
DC5.2	User Authentication	Software	13	
DC6.1	PIS Object	Software & Report	6	Internally available
DC6.2	PIS Object	Software & Report	9	Shifted to 12
DC6.3	PIS Object	Software & Report	13	
DD1	Survey	Report	3	Internally available
DD2	Requirements	Report	4	released
DD3	Design	Report	5	released
DD4	Interface Specification	Software	6	released
DD5.1	Task Agent Shell	Software & Report	7	available
DD5.2	Task Agent Shell	Software & Report	10	
DD5.3	Task Agent Shell	Software & Report	13	
DD6.1	Personal Assistant	Software & Report	7	
DD6.2	Personal Assistant	Software & Report	8	shifted to PM 10
DD6.3	Personal Assistant	Software & Report	10	shifted to PM 13
DD6.4	Personal Assistant	Software & Report	14	
DE1	Survey	Report	2	Internally available
DE2	Requirements	Report	3	Internally available
DE3	Design	Report	4	released
DE4	Interface Specification	Software	4	released
DE5.1	Profile Object	Software & Report	5	delivered
DE5.2	Profile Object	Software & Report	8	shifted to PM 10
DE5.3	Profile Object	Software & Report	11	
DF1	Survey	Report	2	Internally available
DF2	Requirements	Report	4	Internally available
DF3	Design	Report	5	released
DF4	Interface Specification	Software	6	released
DF5.1	Service Shell	Software & Report	7	shifted to PM 10
DF5.2	Service Shell	Software & Report	10	
DF5.3	Service Shell	Software & Report	13	
DF6.1	Service Directory	Software & Report	7	shifted to PM 10
DF6.2	Service Directory	Software & Report	10	

<i>Deliverable</i>	<i>Name</i>	<i>Type</i>	<i>Month</i>	<i>Status</i>
DF6.3	Service Directory	Software & Report	13	
DG1	Survey	Report	3	Internally available
DG2	Requirements	Report	4	Internally available
DG3	Design	Report	6	released
DG4	Interface Specification	Software	7	available
DG5	Group Profile Analyser	Software	8	shifted to PM 10
DG6.1	Service Deployer	Software & Report	12	
DG6.2	Service Deployer	Software & Report	14	
DH1	Survey	Report	2	Internally available
DH2	Requirements	Report	3	Internally available
DH3	Design	Report	4	released
DH4	User Interface Language	Report & Software	5	released
DH5.1	Device Adapters	Software	6	1st prototype internally avail.
DH5.2	Device Adapters	Software	9	available (PM 10)
DH5.3	Device Adapters	Software	13	
DH6.1	User Access Module	Software & Report	6	1st prototype internally avail.
DH6.2	User Access Module	Software & Report	9	available (PM 10)
DH6.3	User Access Module	Software & Report	13	
DI1	Survey	Report	3	Internally available
DI2	Requirements	Report	6	released
DI3	Design & Objectives	Report	8	(architectural design ready)
DI4.1	Working system	Software	10	demo available
DI4.2	Working system	Software	15	
DI5	Evaluation Report	Report	18	
DJ1	Survey	Report	3	Internally available
DJ2	Requirements	Report	6	released
DJ3	Design & Objectives	Report	8	
DJ4.1	Working system	Software	10	
DJ4.2	Working system	Software	15	
DJ5	Evaluation Report	Report	18	
DK1	Agreement on IPR	Report, External	6	available (with DL 1)
DK2	Consortium Exploitation Plan	Report, External	15	first draft int. available
DL1	Consortium Contract	Contract	3	internally available

<i>Deliverable</i>	<i>Name</i>	<i>Type</i>	<i>Month</i>	<i>Status</i>
DL2	Project Progress Report	Report	6	released
DL3	Project Progress Report	Report	12	
DL4	Final Project Report	Report	18	

4 Next Reporting Period

The focus in the next reporting period is on the further development and integration of all components. The integration is mainly driven by the pilot applications.

In End of July a joint workshop is planned, where the designs of pilot applications will be discussed in context with the detailed support from the FollowMe framework.

Annex: Table of Resource Consumption

In order to adapt the project plan to the actual needs of the project and to the availability of staff the partners of their effort across their tasks. This will not change the overall effort or the dates of any deliverables. The changes are reflected in an project implementation plan.

		Effort						Effort			
		Planned					Total	Used			
<i>Architecture</i>											
TASK	NAME	APM	FAST	INRIA	TCM	UWE		APM	FAST	INRIA	TCM
TA1	Scenarios	1,0	1,0	0,5	0,5	0,5	3,5	2,0	1,0	0,5	0,5
TA2	Model Creation	4,0	1,0	0,5	0,5	0,5	6,5	2,3	1,1	0,5	0,4
Total:		5,0	2,0	1,0	1,0	1,0	10,0	4,3	2,2	1,0	0,9
<i>Mobile Objects Workbench</i>											
TASK	NAME	APM	FAST	INRIA	TCM	UWE		APM	FAST	INRIA	TCM
TB1	Survey	1,0					1,0	1,0			
TB2	Requirements	1,0	0,5	0,5		0,5	2,5	1,5	0,5	0,5	
TB3	Design	2,0					2,0	2,0			
TB4	Interface Specification	2,0	0,5	0,5		0,5	3,5	2,0	1,0	0,5	
TB5	Implementation	14,0					14,0	9,8			
TB6	Tests	3,0					3,0	1,0			

TB7	Deployment	3,0					3,0					
	Total:	26,0	1,0	1,0			1,0	29,0	17,3	1,5	1	0
<i>Personal Information Space</i>												
<i>TASK</i>	<i>NAME</i>	<i>APM</i>	<i>FAST</i>	<i>INRIA</i>	<i>TCM</i>	<i>UWE</i>		<i>APM</i>	<i>FAST</i>	<i>INRIA</i>	<i>TCM</i>	
TC1	Requirements	0,5					0,5	0,5				
TC2	Design	1,0					1,0	1,0				
TC3	Interface	0,5					0,5	0,5				
TC4	Implementation	4,0					4,0	2,8				
TC5	Tests	1,0					1,0	0,3				
TC6	Deployment	1,0					1,0					
	Total:	8,0					8,0	5,1	0	0	0	
<i>Autonomous Agents</i>												
<i>TASK</i>	<i>NAME</i>	<i>APM</i>	<i>FAST</i>	<i>INRIA</i>	<i>TCM</i>	<i>UWE</i>		<i>APM</i>	<i>FAST</i>	<i>INRIA</i>	<i>TCM</i>	
TD1	Survey					2,0	2,0					
TD2	Requirements	1,0				2,0	3,0	1,0				
TD3	Design					3,0	3,0					
TD4	Interface Specification					2,0	2,0					
TD5	Implementation					16,0	16,0					
TD6	Tests					3,0	3,0					
TD7	Deployment					2,0	2,0					
	Total:	1,0				30,0	31,0	1	0	0	0	
<i>Personal Profiles</i>												
<i>TASK</i>	<i>NAME</i>	<i>APM</i>	<i>FAST</i>	<i>INRIA</i>	<i>TCM</i>	<i>UWE</i>		<i>APM</i>	<i>FAST</i>	<i>INRIA</i>	<i>TCM</i>	
TE1	Survey					1,0	1,0					
TE2	Requirements	1,0				1,0	2,0	1,0				
TE3	Design					2,0	2,0					
TE4	Interface					0,5	0,5					
TE5	Implementation					5,0	5,0					

TE6	Tests					1,5	1,5				
TE7	Deployment					1,0	1,0				
	Total:	1,0				12,0	13,0	1	0	0	0
	<i>Service Interaction</i>										
TASK	NAME	APM	FAST	INRIA	TCM	UWE		APM	FAST	INRIA	TCM
TF1	Survey					1,0	1,0				
TF2	Requirements	1,0	2,0	1,0	1,0	1,0	6,0	1,0	1,9	1,0	1,0
TF3	Design					2,0	2,0				
TF4	Interface					1,0	1,0				
TF5	Implementation					5,0	5,0				
TF6	Tests					1,0	1,0				
TF7	Deployment					1,0	1,0				
	Total:	1,0	2,0	1,0	1,0	12,0	17,0	1,0	1,9	1,0	1,0
	<i>Service Deployment</i>										
TASK	NAME	APM	FAST	INRIA	TCM	UWE		APM	FAST	INRIA	TCM
TG1	Survey			2,0			2,0			2,0	
TG2	Requirements	1,0	2,0	2,0	1,0	1,0	7,0	1,0	0,2	2,0	1,0
TG3	Design			3,0			3,0			3,0	
TG4	Interface			1,0			1,0			1,0	
TG5	Implementation			8,0			8,0			3,0	
TG6	Tests			1,0			1,0			0,3	
TG7	Deployment			1,0			1,0			0,3	
	Total:	1,0	2,0	18,0	1,0	1,0	23,0	1	0,2	11,5	1
	<i>User Access</i>										
TASK	NAME	APM	FAST	INRIA	TCM	UWE		APM	FAST	INRIA	TCM
TH1	Survey		2,0				2,0		3,5		
TH2	Requirements		2,0				2,0		4,2		
TH3	Design		3,0				3,0		4,3		

TH4	Interface		2,0				2,0		2,5		
TH5	Implementation		16,0				16,0		5,8		
TH6	Tests		3,0				3,0				
TH7	Deployment		2,0				2,0				
	Total:		30,0				30,0	0	20,21	0	0
	<i>Pilot Application 1</i>										
TASK	NAME	APM	FAST	INRIA	TCM	UWE		APM	FAST	INRIA	TCM
TI1	Survey		2,0				2,0		2,2		
TI2	Requirements		3,0				3,0		4,1		
TI3	Design		4,0				4,0		1,1		
TI4	Implementation		24,0				24,0		3,9		
TI5	Deployment		6,0				6,0				
TI6	Trials		9,0				9,0		1,9		
TI7	Evaluation		3,0				3,0				
	Total:		51,0				51,0	0	13,2	0	0
	<i>Pilot Application 2</i>										
TASK	NAME	APM	FAST	INRIA	TCM	UWE		APM	FAST	INRIA	TCM
TJ1	Survey			2,0			2,0			2,0	
TJ2	Requirements			2,0	2,0		4,0			2,0	2,0
TJ3	Design			3,0	1,0		4,0			3,0	0,8
TJ4	Implementation			21,0			21,0			8,4	
TJ5	Deployment			6,0	2,0		8,0				
TJ6	Trials			3,0	0,5		3,5				
TJ7	Evaluation			2,0	0,5		2,5				
	Total:			39,0	6,0		45,0	0	0	15,4	2,75
	<i>Exploitation</i>										
TASK	NAME	APM	FAST	INRIA	TCM	UWE		APM	FAST	INRIA	TCM
TK1	Exploitation	2,0	2,0	2,0	3,0	2,0	11,0		0,3		0,9

	Total:	2,0	2,0	2,0	3,0	2,0	11,0	0	0,3	0	0,85
	<i>Project Management</i>										
TASK	NAME	APM	FAST	INRIA	TCM	UWE		APM	FAST	INRIA	TCM
TL1	Projekt Management		9,0				9,0		5,5		
	Total:		9,0				9,0		5,5		
	Overall Total	45,0	99,0	62,0	12,0	59,0	277,0	30,6	44,8	29,9	6,5
								68%	45%	48%	54%