Specific targeted research project (*short* proposal to FET Open)

E – Location Based Services
acronym: eLBS

Date of preparation: [12/07/2004]

Proposal number (if preregistered): [proposal number]

Project description

- *describe **what** they want to do, (what are the objectives, how proposed ideas fit **within the scope** of FET Open), in terms of new ideas involving high risk, embryonic research and proof-of-concept, or long term research of a foundational nature*

The project goal is to design a wireless platform for Location based Services (LS) in the city areas of European States.
LS can be accessed through mobile devices, in this case phones, and support a huge amount of services, for instance: positioning (where am I?), events (medical alert!), assets (where is my car?), service points (where are the shops?).
The project will lead to the realization of:

- a J2ME client, MIDP 1.0 and 2.0 compliant, that will be installed on mobile phones; such a client must be easy to use and allows traffic expenses fully controlled by the user;
- A server side that allows information services. Server has Java technology capabilities and it understands the Client requests and answer them.
- A sub-system software/hardware performs sign-on of users and manages non-location based services (like e-mail and on-line hard-disks).

The project is the result of two main points will be define and develop:

1. **"eLBS" Architecture Overview**

"eLBS" is a client-server architecture that enables wireless operators and services providers to provide services based on the location of mobile users.
Different implementations of this system could be done in every European City.

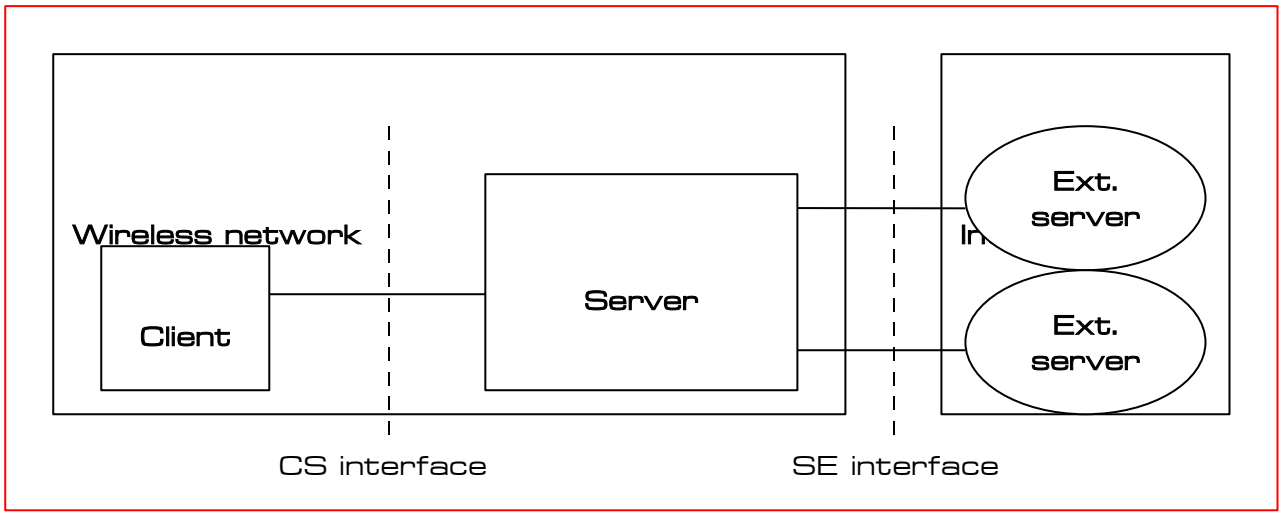

Figure 2: "eLBS" Overview

2. **Mobile Client description**

The client application, in this architecture, resides in the mobile terminal of the wireless network, while the server application resides in the fixed side of the same network. Server is the "manager" for internal and external contents.

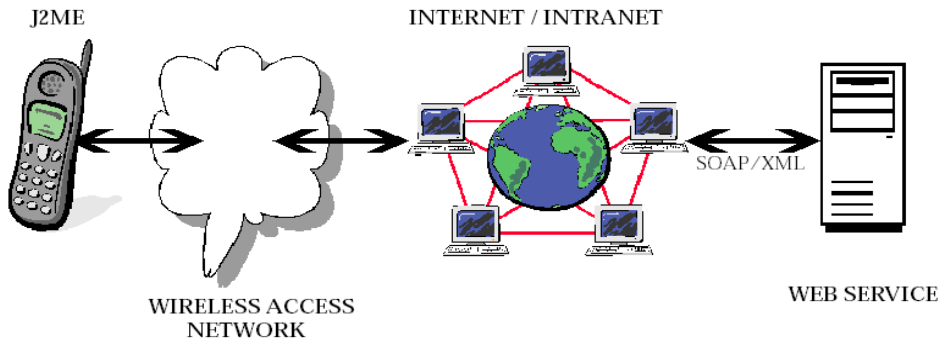

Figure 2: JSR-172 Client-Server exchange

Client exchanges information with the server according to JSR-172 specifications (see JCP on http://www.jcp.com) via "CS interface" (Client-Server interface).
Server exchanges information with external Internet servers (using gateways provided by the wireless network) through the "SE interface" (Server-External interface).

This proposed project represents a research on new idea involving high risk, fitting one of scopes of FET Open and provides an opportunity to combine, as appropriate, applied and generic technology research, with applications and services addressing the socio-economic challenges.
The proposed project addresses the objectives of the IST Work Programme, in fact, it will introduce progress in some of the main technology building blocks within this: "developing mobile, wireless, optical and broadband *communication infrastructures as well as software and computing technologies* that are reliable, pervasive, interoperable and can be adapted to accommodate new applications and services and developing *user friendly interfaces* which are intuitive, can interpret all our senses such as speech, vision and touch and that understand our gestures and various languages »
In particular the project develops one of strategic objectives concerning integrated system: "mobile and wireless system beyond 3G" with specific applications for entertainment and other social services, increasing end improving technologies for multilingual and multicultural access.

- *explain **why** it is important. (why the objectives are innovative, and, should the objectives be achieved, why the social/economic impact would be large in the long term; why it would be considered a scientific/technological breakthrough etc.)*

Services based on the location of mobile users have been developed using different technologies and solutions:

- SMS (like "Walkie" by Tiscali S.P.A.): user have to send SMS containing mnemonic codes, supplied by the operator, to a service center. The charge for the user is the cost of the SMS he send and the answer that he receive. Generally, this kind of services is not user-friendly.
- WAP (all the mobile operators e WISPs): in this case user has to connect him to the operator's WAP site, and moves toward the WAP site of the map services provider. This is a poor solution: in fact it offers just map and routing services. This kind of services also is not easy-to-use, and requires a competence with this technology.

At the end, user has a service not so interactive, and if the choice is WAP, user doesn't have an actual cost control.
GSM system doesn't offer a native capability to know the position of the user. With GSM we can only have information about the cell where the user is located. Using this solution, user position could have a tolerance up to 35 Km (rural areas), so it is not useful for eLBS.
UMTS system, with the next A-GPS capability, will give the user position with a tolerance of 5 meter, but this capability is far to be implemented.
eLBS client will be developed using the Location APIs, compliant with the JCP standards (see www.jcp.org). This standard APIs will be available in the next mobile-phones that will implement different location technology (A-GPS and others).
eLBS client is ready the future.

The Server also will be compliant with the next telecommunication standards: the Parlay-OSA interface.

Parlay-OSA defines a set of APIs that allow Software-Houses to develop telecommunication services. At this moment, different solutions are available on the market upon the Parlay-OSA standard, like Incomit (www.incomit.com) or O2 ones.

eLBS innovative features could be summarised into:

- System compatibility with the next technologies;
- Low-costs of setup and management;
- High usability for users.

Users will have an easy and useful tool, cheaper than ones present at this moment in the market.
Operators that allow services based on eLBS platform could use a "pay-per-info" business model, or they could add chargeable side-services (like virtual disk).
The value-chain for these applications and services involves different entities:

- Government: police, hospitals, schools, libraries;
- Contents Providers: shops, cinemas, restaurants;
- Services and Contents Aggregators;

eLBS project proposes a modular infrastructure that can be improved with new features and services.

The proposed project seeks to build a partnership including SMEs, involving five participants SMEs, so to help their role in promoting innovation in the IST fields and to increase their competitiveness on the international scene, often controlled by the big industries.

According with IST strategic objectives, the proposed project will pay particular attention to users' needs and to usability and accessibility of technologies and applications. In the same time it will help to reinforce European strengths in areas where it has established industrial and technology leadership, like in mobile and wireless communications. The project will determine an added value for SME participants, for which the results will have economic benefits in the long term and above all, the application's objectives will have a good social and economic impact on east Europe countries involved in the project, contributing to their technological integration.

According to a "Mobile Internet Organization" (2003) report users prefer at first place location based services on their mobile phones. The same report explains that users would pay for them up to 50 Euro-cents, and would these services easy to use.

The estimated revenue from location based services worldwide amount to 1380 million dollars in the 2005, and 1444 million dollars in the 2006.

- *provide only a short outline of the approach that sufficiently support the plausibility of proposed ideas*

The project want to design a modular platform: each module solves a specific task and can offer a service. In such a way we can demonstrate the functionalities of the idea even if we are in the middle of the project.
At the end, the result should be applicable to every town.
The project design includes, as first supposition, six chief work-packages that will get on parallel in according to a defined timesheet of 12 months, with some milestones that represent the end point of 4 main phases applied crosswise to each work-package: *study and definition, development, integration*, *in-field testing.*
Each work-package is a measurable and controllable task, assigned to a specified competence.

1) Server specifications

Server requirements and functionalities:

a) **Database of information contents.** Server implements a Database (with its own indexing function) to provide information services.
b) **Interface with mobile client.** An interface with mobile terminals according to a subset of JSR-063 and JSR-101 will be supported (see JCP http://www.jcp.com).
c) **Caching algorithms.** Server will decide the most suitable caching strategy to send information to the client, according to the situation. So the server will implements/maintains different caching algorithms/resources.
d) **Shunting functions.** Server will be able to shunt different services requests and responses between clients and external/internal resources.
e) **Interface with external servers.** An interface with external servers on the Internet according

to the HTTP will be supported. Communication with external servers will be allowed by the gateway of the wireless network (out of the scope of this project).

f) **Parlay/OSA interface for service developers controls.** Service companies will be able to develop and maintain services implemented on "eLBS", so the server will implement a subset of the Parlay/OSA interface APIs (see http://www.parlay.org).

2) VAS implementation

As described in the first paragraph, "eLBS" is a client-server architecture that enables services based on the location of mobile users. A number of services need to be implemented over the "eLBS" architecture in order to give an "actual value" to this project, and to give a better dimensioning of the System.
VAS task consist of:
• Ideation of (almost) 3 different services: commercial, public and entertainment;
• Implementation of each service: interaction between system entities, data formats, query type, and other items needed for service definition;
• Collecting data for service (the best way to collect data for each service).

3) Mobil client

The Mobile client is the "user" part of the project. It must be compliant with all Java enabled mobile phones. This is the main issue that will force the project to customize this part for single mobile vendor.
The mobile will be JSR172 (Java Web Services APIs) and JSR (Java Location APIs). The user interface will be friendly with international look.

4) Top Level

The single part of the design will be integrated with the others inside a top level test-bench for integration purpose. Top level is in a way a middleware providing also the right interface for simulation: script for simulating different inputs, and monitoring outputs; possibility for multiple mobile devices instantiation and multiple "content feeds". It must be compliant with Parlay OSA and with Java web services.

5) Scenario

The "eLBS" first will be implemented and tested in Rome (Italy). It provides information about commercial, public and entertainment services inside the City. It also provides a "benchmark" for the System in object, either for System technical functions, than for human validation (thanks to its own inhabitants).
Scenario task consists of:

- providing commercial, public and entertainment information;
- providing easy links to the contents databases of the City;
- providing advertisement in order to collect a reasonable amount of users;
- collecting users' responses (usability of the implemented services).

6) Work Organisation and Dissemination

Partners involved in "eLBS" need to exchange information, documents and results with each other partner. Also FP6 documentation needs to be exchanged and managed. A specific exploitation and dissemination plan for the results of the project will be define and respect from all partners.
Working organisation task consists of:

- information exchange (modalities and links);
- consortium agreement developing and exchange (modalities and links);
- documents and results exchange (modalities and links);
- management of knowledge.

The following aspects need of a special attention in making the project:

In-Field Testing

Test in a city will be necessary to prove the idea and the project against real input and real world. Each task owner will support this phase in order to patch the system or to refine it. Each task owner must provide a documentation for testing where performance and reliability specification will be reported. If simulated ones will match with the "In filed" then test will be pass.

System Dimensioning

Due to its "demonstration shape" implemented in Rome (Italy), "eLBS" has to support at least 1000 mobile users to collect an actual statistic, and 10 content feeds (both "internal" and "external"). This basic requirement could change during the study and development phases, but the magnitude should be remain the same.

In the following table are resumed the expected project's milestones

"eLBS" milestones			
Nr.	**Name**	**Description**	**Outputs**
1	**Study & Definition**	At this point all the partners have completed the study of standards and requirements ,and they have defined the interfaces with the other modules (in some cases a "module" is a "task" for a partner).	interfaces with other modules of the system, including documents and description in UML, javadoc (where possible) and text readable by all partners.
2	**Development**	At the end of this phase partners have developed and simulated the modules of the system assigned to them, according to the interfaces defined in the first milestone.	system modules ready to be integrated with each other, including results of simulations and critical points, need to be known to integrate modules properly.
3	**Integration & Testing**	At this point all modules are integrated and tested inside the partners' labs. During this phase partners have exchanged their modules, descriptions and test-benches with each others.	the system ready to be tested "in field".
4	**In-Filed Testing and integration**	In field test will prove the idea and project in the real word. Each task owner will support that phase.	A documentation where performance requirements will match with “in field ones”.

Documentation

All design specifications and inter-working modalities exchanged between partners will be written in UML 1.3 format, choosing the diagrams more suitable for the specific situation. In the different phases of the project, where possible, the documentation will concern:

Description of the activities - In text (PDF, RTF or TEX) and UML 1.3 formats, every task and sub-task should be explained to give an exhaustive idea of the work to the other partners.

Simulations - Results of simulations should be given in text format (PDF, RTF or TEX).

Software Documentation - In javadoc and UML 1.3 format

- *provide a short estimate of the resources needed. (full details are only needed in full proposals where the estimate may be revised)*

The proposed project involves 5 participants from 5 European Countries (Italy, Greece, Bulgary, Romany and Germany) with specific skills and roles.

The human and material resources will be deployed for the implementation of the project are so previously estimated:

Costs	Percentage of Total Budget	Requested grant
Personnel (n. 7 person for 12 person month)	51%	€ 207.030,00
Overheads	20%	
Equipment, subcontracting, other specific costs, protection of knowledge	14%	
Administrative and Financial coordination costs	10%	
Travel	5%	
Estimate Total Cost	€ 444.432,00	