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IMS ARCS - An Industrial Academic Cooperative research program for IMS

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Abstract: IMS ARCS is an Industrial and Academic cooperative program conducting research in the area of IMS technology with a view to creating a body of intellectual property for the use of the project partners, and serving as a case study on how to develop IMS application software. This paper outlines the objectives of the project, how the research work was planned and executed, and how it intends to transfer knowledge to its industry partners and create a route to allow commercialisation of the research work. The paper also describes how a set of exemplar IMS services and enabler prototypes are being developed to showcase the research work and provide examples of how such services may be developed for commercial purposes. The prototypes will also demonstrate the capabilities of IMS, such as location and presence information, and sophisticated call control. The project employs the OpenIMS testbed from Fraunhofer Fokus, as the basis for the development and execution of the prototypes.

1. Introduction

The IMS ARCS [1] project is an Industry Lead Research Project sponsored by Enterprise Ireland and consists of a partnership of between 25 commercial companies and 4 academic institutions whose objective is to research and develop a number of innovative end user services concepts and service enablers based around, but not limited in the application, to the IP Multimedia Subsystem [2]. This group of companies and academic groups are referred to collectively as the project stakeholders.

The applicability of the various service concepts spans areas such as commerce, health, public transport, personal and child security, education, entertainment and recreation. All such service concepts make use of next generation service capabilities such as mobility, location information, extended presence, multi modal communications, security and anonymisation, mobile wallet functionality and personalisation to provide a high value service and sophisticated user experience.

2. Objectives

This paper proposes to study the various service concepts, their value propositions and business cases, how they might be realised and what their likely societal impacts may be. The paper proceeds to argue the value of such collaborative research projects for both stimulating innovation within the commercial sector and promoting adoption of services by the public.

3. Methodology Used

The IP Multimedia Subsystem is a collection of 3GPP and ITU standards which propose a technology infrastructure to enable an all IP based Telecommunications Network based around the use of protocols such as SIP [3] and DIAMETER [4]. IMS evolved from an early specification from an industry consortium which sought to create an IP based core networking standard for telecommunications network. It was envisaged that by defining an all IP control layer and adopting IETF track standards such as SIP, network operators could reduce network management overhead, medium to long-term Capital Expenditure and increase Average Revenue Per User (ARPU) through new IP-based services. These services would potentially use capabilities from the telecommunications network control plane and the Internet, hence they've been called Converged Network Services.

The objectives of the project are twofold; the first is to create a body of intellectual property including a number of IMS end user and enabling services, and a set of marketing and business analysis documents evaluating IMS, the various service concepts and the national and international business opportunities that migration to IMS will bring about. The second is to educate the commercial companies about how to develop and deploy IMS applications, including identification of what tools to use, how to use the Open IMS Testbed [5] and the best development processes to follow. This is achieved via the experience gained through bringing a number of the service concepts to realisation.

The key objective of the project is to identify and develop both prototypes to demonstrate a number of end user service concepts, and a number of IMS enablers, or building block type services which can add value on top of the basic IMS infrastructure and be used as reusable components in the creation of end user services.

To achieve this, a top down methodology was employed. It was necessary first to come up with a set of validated end user service concepts, which could be prototyped, followed by a technical analysis which would allow the required and common service building blocks to be identified. The process is shown in Figure 1 below.

To create the set of service concepts, a brainstorming exercise took place. The various stakeholders gathered together to brainstorm the typical lifestyles of various people profiles in the year 2020. Stakeholders divided into groups who were charged with dealing with particular people profiles. From this, the types of services that they might use were imagined and listed. Each group then presented their results, which were then discussed and clarified by the larger gathering. This information was recorded and used as the basic input to a process of analysis that followed.

The first step was to assign each concept that was recorded a unique concept ID. This allowed it to be tracked. The next step was to go through each of the concepts and come up with a one paragraph description of what the service concept was, and eliminate subjectivity in interpretation, as in many cases the output from the brainstorming process was a simple 3 or 4 word description. Having done this, it was recognised that there was a certain degree of duplication in the service concepts that emerged from the various groups, or that certain concepts were very similar and should be merged, so a process of duplicate elimination followed. There were also cases where people had misunderstood what was required and had created technical wish lists or requirements rather than service concepts. These too were eliminated. This left a list of essentially different fleshed out service concepts that were traceable though their ID back to their origin.

The next phase of the project undertook to analyse each of these service concepts under a number of different headings. These were:

- Value Proposition – Why would someone use this service & what alternatives are available
- Business Case – Is there a market for such a service & analysis including charging models
- Technical Feasibility – How feasible is implementing this service – for example would it rely on information that it may not be possible to get.
- Relevance to IMS – is this service relevant to IMS or is it simply an internet type service
- Originality and Patentability – How original is the service concept and what similar services exist. Are there existing patents that might prevent creation of such a service?
- Legal Issues – Data protection, Accessibility
- Deployment issues and Value Chain – What parties are required to deploy this service and how feasible is it. It the service scalable?
- Implementation Effort – How much effort is required to create a service prototype

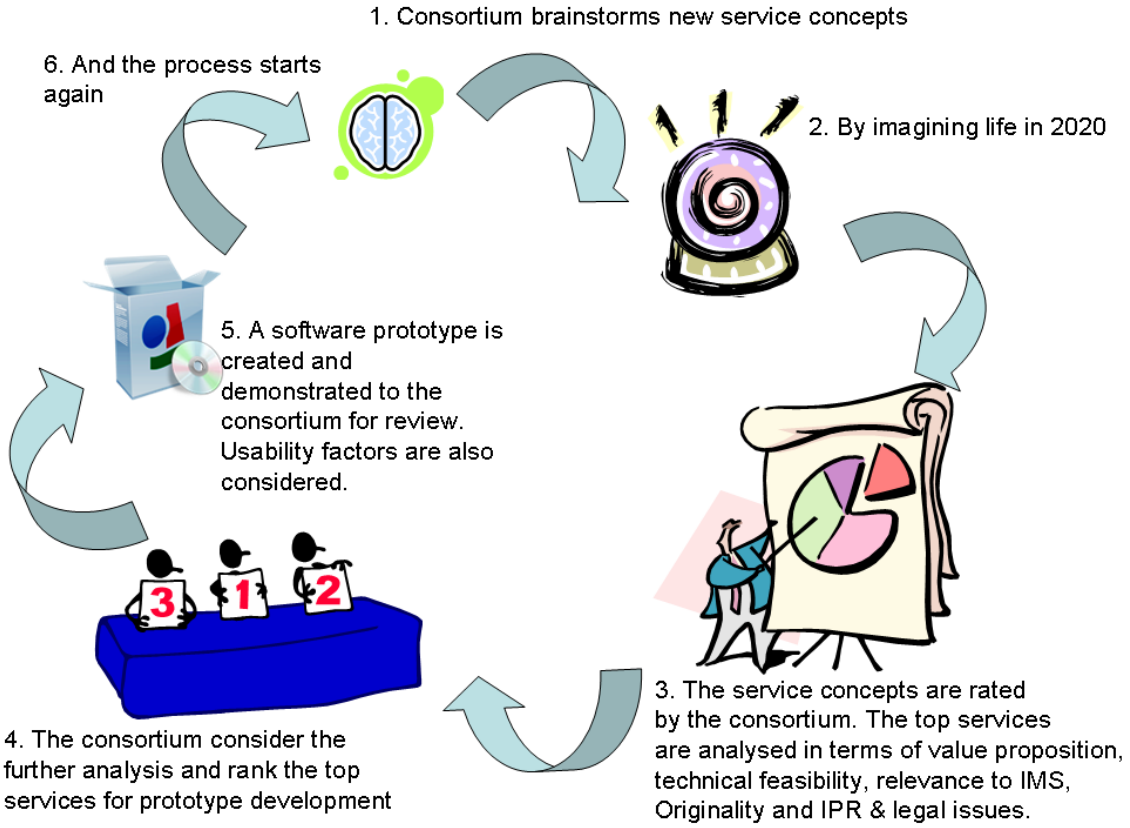

Figure 1: Ten-Month Service Concept Development Cycle

The output of the above analysis process allowed the service concepts to be scored under a number of headings and eventually a list of ranked service concepts were produced. Many of these were eliminated for a number of reasons, while a small number which ranked highly and were deemed technically feasible to prototype were selected. An exercise to identify the IMS enablers required for the project was also executed.

4. Technology Description

The following prototypes were selected for prototyping:

The health monitor consists of a mobile application which gathers vital statistics information through automated sensors, and a data analyzing service that determines what the

health data means in the context of the medical history of the service consumer. Automated retrieval of sensor information may use a Bluetooth enabled monitoring device which relays information through the user's mobile phone through to the backend system. The backend system performs a recording function and will also monitor for alarm conditions such as a heart flat line or fibrillation, a diabetic's critical sugar level etc. On detecting such an alarm, a configured response such as notifying emergency services, family members together with location information is triggered.

The LBS home help service provides a virtual golden pages for the user. If for example the user needs a tradesperson (plumber) then the system provides a list of plumbers in the user's direct area. The list will show plumber availability (via presence), cost and can also integrate references (i.e. so that the user can immediately communicate with other people that plumber has worked for). The service would also be applicable to any type of service provided by the golden pages (taxis, electricians, piano fixers etc).
The service provides automated and anonymous call setup between the customer and tradesperson, job management and Identity Verification when the tradesperson arrives at the customer's home.

The Public Transport Adviser integrates the GPS from the user's device with real time public transport information and relays this information to a back end system which then presents the user with all the possible options using public transport from getting from the user's current location to the desired destination. The user wants to take public transport from A to B, so the system calculates the most convenient method to transport, and correct route, for that person. The system can give users voice prompts when they are coming near to a point where they must disembark from the public transport (e.g. as an aid to blind people). The system will also take users preferences into account (cheapest route vs. fastest route,, window seating, 1st class or economy class seating, wheelchair access only, go via a breakfast bar etc). The service will keep the user updated with changes in their journey, due to interruptions such as a broken down bus or by user choice, when perhaps the user decides to interrupt their journey temporarily to grab a coffee or breakfast.

The Gambling Service can build upon existing internet based gambling sites to allow mobile IMS users to:

1. Login to the service
2. Place bets on events on the handheld device
3. View event programs to allow users to study form.
4. Receive notifications about the events; starts, results etc.
5. Offer the user the ability to view or listen to event commentary streamed to their device.
6. Possibly charge bets, credit payoffs against the users IMS provider's account.
7. Notify the user of events that they may be interested in, based on previous betting profile.
8. Inform user of local events (specific to location) on which the service is offering odds.
9. Determine if a user is present at a location based event and offer to place bets on the event.

5. Example Service Prototype

The LBS Home Help Service was prototyped as a web based application that integrates with various IMS enablers such as location, presence and SIP call control, using these capabilities to allow a user to find a tradesperson within a location and given a radius. By doing a location based search on tradespeople registered with the service, and using presence to determine their availability, the service shows the user a list of those potentially available. It then uses SIP call control to setup a call between the user and the tradesperson while preserving anonymity until

the user agrees to place the job. The service then creates a job number and tracks the job until it has been completed.

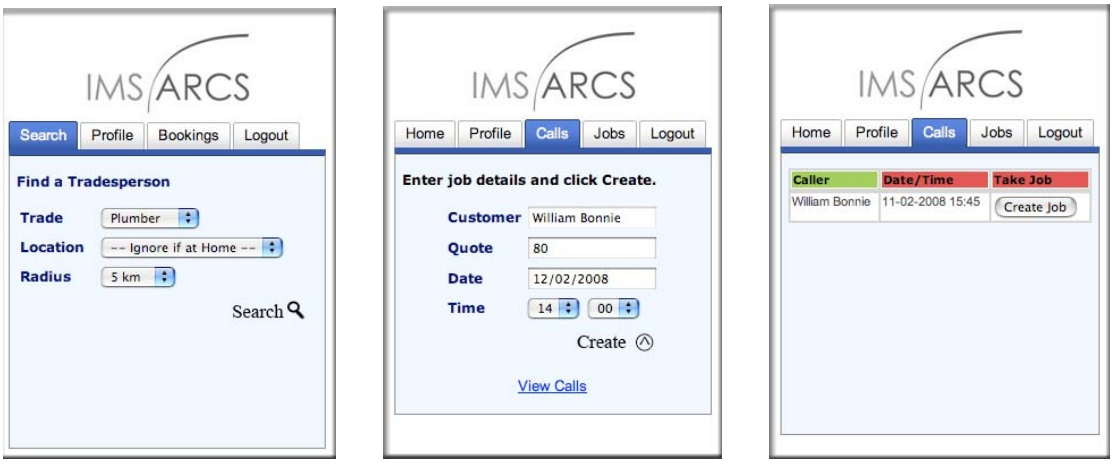

Figure 2: Screenshots from the LBS Home Help Service

The service is integrated with the OpenIMS Testbed [5] from Fraunhaufer Fokus which supplies the call control functionality, location information and presence through its ParlayX and presence enablers. The service can be deployed on a smartphone with WiFi access capabilities such as the Nokia N95 or Apple iPhone.

IMS ARCS hosted a stand at Mobile World Congress in February 2008 in Barcelona designed to showcase the achievements of the project to date and to highlight the many benefits of IMS technology. The LBS service was demonstrated on this stand and received considerable interest from visitors.

6. Usability Analysis

As part of the service design process, the Interactive Design Centre of the University of Limerick, an IMS ARCS partner, carried out a usability analysis of the fore mentioned prototypes [6]. The initial step in this process was a mock up of the prototypes user interfaces on paper. This was important to ascertain the feasibility and the logistics of implementing a working prototype, while also getting feedback on the user interface design before implementation. In the usability lab, users were given a simplified task analysis for the four IMS applications. These studies were conducted with four different user groups. The heuristic approach involved gaining analysis of the following elements; visibility of system status, match between the system and the real world, user control and freedom, consistency, error prevention, recognition, flexibility, efficiency, aesthetics and navigation.

The data gathered from the usability study was later collated and the results were used to help the development of the services' user interfaces. For LBS, features such as credit card payment capabilities were suggested during the study but not included in the prototype. User's feedback and comments included security issues about using the service and whether the tradesperson quotation was binding or simply an estimate. A second iteration of usability testing based on the prototypes created will provide further feedback.

7. Ongoing Plans for Exploitation of Prototypes

An important objective for the project is to identify and develop opportunities for the commercial exploitation of project deliverables. The project is in fact set up to maximise the

potential for commercial exploitation – in particular the project brings together of a broad range of stakeholders with diverse set of expertise and experiences to work on user centric next generation services.

There was a focussed effort at the outset to ensure the industry consortium collectively represented the entire telecommunications value chain – operators, telco ISVs, and Equipment Vendors. The operators (there are three in the consortium) have a specific interest in identifying services which are of interest to their user base and from which they can generate additional ARPU in the face of falling voice revenues. The equipment vendor members are motivated to identify both services and service enablers to demonstrate a return on investment for the IMS platforms they are, in turn, trying to sell to the operators. Finally the 20+ telco ISVs are using their individual domain backgrounds to identify opportunities to extend and combine their existing offerings with project deliverables.

A specific initiative within the project is the commercial exploitation of the Public Transport Advisor service. A preliminary analysis has been conducted on the potential end user take-up and ultimate commercial viability of this service. The focus to date has been on:

- Working with companies in the transport industry to determine what added value can be provided to users beyond what is currently available
- Identifying ISV industry stakeholders with complimentary and enabling product offerings
- Promoting the service amongst the operator stakeholders with a view to setting up user trials within their subscriber bases

The results achieved to date are:

- An opportunity with the Dublin Transport Authority (DTA) has been identified whereby shortest path decision engines could be combined with GPS location services to deliver routing information to mobile users. Additional services are being considered including the use of telemetry data from public transport vehicles to
- Opportunities have been identified for a number of ISV stakeholders to extend the target market for their existing product sets. One particular ISV, a producer of video-based IVR products, has helped define whole new video based use case scenarios for the PTA service. It is expected that these use cases will improve the probability of mass market uptake.
- One of the stakeholder operators has committed to conducting preliminary live user trials of the PTA service based on the results of early usability analysis.

8. Conclusions and Recommendations

The project aims to take a number of such end user services and bring them to a prototype phase and to the level of usability trials. The prototypes are deployed on the OpenIMS network from Fraunhofer Fokus, an industry standard and open source testbed. The resultant foreground IP created by the project will be available to the project stakeholders for unrestricted exploitation and will be put in the public domain and open sourced 6 months after the end of the project. The project also showcases a development process for IMS services and enablers through combining both internet and telecoms software development paradigms, including the use of various development and testing tools, the use of agile methodology, and incorporating a usability analysis and feedback stage as part of this overall development process.

Projects such as IMS ARCS are a very good way of encouraging research and development activity among companies which often have little or no R&D resources through giving them access to academic research expertise and knowledge, while providing a route to allow commercialisation of existing research work and improving academic industrial cooperation. Simultaneously, academic institutions get access to commercial realism and market

requirements, allowing them to tune their research priorities to areas where it is most relevant. Such projects also can have a “stone soup” effect, where the various participants are encouraged to cooperate by contributing some of their background IP and the end result may be far more than the sum of the parts, in which they can all share

Because of the large number of stakeholders in the project, there can sometimes be competing objectives and differences of opinion regarding the direction of the project or where effort should be focused. There can also be a tendency towards “mission drift” where goals can be subtly moved over time. The challenge is met by the academic partners who must sometimes make judgement calls to decide how the project can maximise its value to the overall stakeholder group, and also maintain a clear focus on the project goals while being flexible enough to deliver value to the stakeholders.

References

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