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APOSDLE: Advanced Process Oriented Self-Directed Learning Environment
Integrated Project
IST – Technology enhanced Learning

Scope of APOSDLE Target Group, Problems and Needs

Deliverable D6.15

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3	2008-02-05	Second draft
4	2008-02-16	Final version
5	2008-02-18	Final layout optimisation and submission to EC

Executive Summary

This deliverable reports the results from the first effort to reach beyond the 4 application partners in the APOSDLE consortium to produce results with which to compare the in-project perspective with the needs of the wider possible markets for APOSDLE. The goal was to discover and define the scope of the APOSDLE socio-technical target group and the problems and needs related to its adoption as seen from outside of the project consortium.

We employed two basic techniques: questionnaires, circulated to potential customers of APOSDLE in the UK, Germany and France, and a face-to-face focus group with one selected commercial organisation. These techniques helped to discover and document needs, problems, perceptions and attitudes towards APOSDLE as well as the current use of learning and knowledge management tools in these organisations.

Results from the survey revealed that a sizeable number of the respondents felt there was scope and indeed a need for the use of a tool such as APOSDLE, either alongside existing solutions not deemed fully satisfactory, to integrate related software tools in use, or to provide additional features that are not being supported in organisations at the moment.

The focus group additionally provided insights into the opinions and perceptions of the participants on the APOSDLE system. They revealed issues that may arise following its introduction in the organisation and highlighted the fact that solutions may need to be put in place in organisations for APOSDLE to be used to its full potential.

Most of the answers to the questionnaires came from organisations in the field of Requirement Engineering and the participants to the focus group were also engineers with experience or an interest in the field. This gave rich insight into this area of expertise. More research is needed and has been planned to broaden the sample and collect further data.

This report concludes with problems and needs drawn from the data collected in terms of the main aspects to consider in extending APOSDLE to a wider market.

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1 Introduction

1.1 Purpose of this document

This document reports a preliminary study of the target market for the APOSDLE socio-technical system and the problems and needs that may arise in the adoption of the platform in segments of the market beyond those explored with the application partners.

WP6 has undertaken a substantial requirements process for the APOSDLE prototypes, reported in 3 major deliverables (DVI.2, DVI.3 and the upcoming requirements for prototype 3). Application partners, selected to represent different segments of future APOSDLE markets, were used in the elicitation and specification of the requirements and user needs that APOSDLE ought to address. The present study draws on this knowledge to verify and address these problems and needs in a wider market. In consequence, a broader selection of organisations, all external to the consortium, has been used for the purpose of this research. Two techniques - questionnaires and focus groups - were used to discover and document possible markets, attempt to define the scope of possible target groups and the needs and problems that may arise in the adoption of the APOSDLE system.

Questionnaires were made available online to selected organisations that included leading requirements and software engineering companies (predominantly in the United Kingdom), partners of the Darmstadt Chamber of Commerce, and partners and customers of the Innovation Service Network - ISN. A face-to-face focus group was held with a company providing power systems after its engineers expressed an interest in APOSDLE and its solutions. The data gathered with these techniques informed the definition and documentation of goals, constraints and opportunities on and for the 3rd APOSDLE prototype, towards the final product.

As defined in the APOSDLE project summary and objectives (Annex I – "Description of work" in the proposal phase), the primary user of APOSDLE is a 'knowledge worker', i.e. an employee whose main tasks involve the production, manipulation and/or dissemination of knowledge. A knowledge worker typically has to take on different roles: those of 'worker' when engaged in value-generating activities for the organisation, of 'expert' when helping colleagues, transferring and creating knowledge, and of 'learner' when, for example, confronted by new projects and tasks. Indeed knowledge workers are expected, and actively encouraged, to learn and change their thinking throughout their careers (Kidd, 1994). The organisations sought and selected for participating in the research for this WP were characterised by a relatively high percentage of knowledge workers among their employees. Their participation provided insights into the profile of organisations potentially interested in APOSDLE and the socio-technical issues to take into account for the adoption of APOSDLE.

1.2 Scope of this document

This document reports a first study of the potential market for APOSDLE. It further details the goals, constraints and opportunities for the adoption of APOSDLE beyond the segment of the market explored with the application partners. It will provide a source of inputs into the specification of requirements for the 3rd APOSDLE prototype due at m36. These requirements will be delivered in Deliverable DVI.4. It is also the basis for a full market research report that will be the object of the later work package WP VII (Deliverable 7.1 – Dissemination Activities - and Deliverable 7.2 – Exploitation Planning).

1.3   Related Documents

Documents and material produced during earlier stages of the project were consulted in the research and writing up of this report. They include Annex 1 – Description of work which, among others, states the APOSDLE project objectives, and Deliverable D6.1 (APOSDLE Scope and Boundaries) which presents the APOSDLE vision and identifies the actors whose work may be designed or re-designed through work carried out in the APOSDLE project.

2 The survey

Organisations employing knowledge workers are involved in creative activities and the generation of new knowledge, with a substantial number of employees collaborating with each other and performing research, analysis and synthesis of information as part of their daily tasks.

Research was carried out to find out more about the specificities of these organisations that may be interested in using the APOSDLE system, and involved the collection of both quantitative and qualitative data using a questionnaire-based survey.

This chapter reports the process followed for data collection and presents the findings.

2.1 Survey Methodology

The first step in the survey research design was to identify the sample. The primary user of APOSDLE had been pre-established as being a knowledge worker: a sample of the appropriate organisations for our study was identified on the basis of a significant presence of knowledge workers among the employees, even though these knowledge workers may fulfil a diversity of roles. A decision was therefore taken to approach organisations that, by the nature of their activities, were known or expected to have a sizeable proportion of knowledge workers among their employees.

The aim was to obtain, among others:

- Characteristics of the organisation surveyed: industry, size, current provisions for learning and collaborating in the workplace,

- Views and attitudes towards the APOSDLE system, notably its perceived usefulness and its potential uses within the organisation surveyed (including specific 'knowledge domains' within the organisation that could be mapped onto APOSDLE).

An online survey was the method chosen to collect respondents' data. Online surveys allow reaching a wider number of respondent in a short period of time compared to other ways of administering questionnaires (e.g. by post, face-to-face) (Preece, Rogers, Sharp 2002). They also provide flexibility both to the participants who can respond in their own time and to the researchers who can monitor the responses in real-time. Given the constraints in terms of time and the need to access a wide number of organisations across Europe, the online survey was deemed to be the best option.

The survey was sent to numerous companies in different areas of operations, this in several countries in Europe. The email invitations to participate in the survey were addressed to senior managers with decision-making powers.

The online questionnaire service chosen to create, collect and store the data was surveyMonkey (www.surveymonkey.com), a service chosen for the array of functionalities offered and good securing of data as well as the fact that there was previous expertise using it from other partners within the APOSDLE consortium (it was used to collect responses in DVI.6 - Formative Evaluation Report of the first prototype).

The online questionnaire was created in three different languages: English, German, and French, all common languages spoken by the application partners.

Some of the questions in the survey were related to APOSDLE and necessitated a knowledge of the system; in order to enable respondents to answer the questions more accurately a demo of APOSDLE (short digital movie prepared by the APOSDLE partners with a scenario related to the writing up of requirements specification on the RESCUE domain) was developed by KC and made available in English and German.

The online questionnaire structure is specified below:

- Introduction page:
    - Information about the project
    - a link to the demonstration movie of APOSDLE, available on the official APOSDLE website (http://www.aposdle.tugraz.at/publications/promotional_material/aposdle_prototype_1)
    - information about the survey: the aims, who the questionnaire is directed at
- Part I – Information about respondent's organisation
- Part II - Exploring the potential of APOSDLE in their organisation
- Part III - Exploring the potential of APOSDLE in their organisation - continued
- Part IV - About respondent and follow up

(See Appendix A for the entire set of questions.)

Two pilots of the questionnaire were conducted. The first pilot was run internally at CITY to highlight any necessary refinement of questions or corrections of any typos.

The second pilot was conducted with a selected number of participants in Germany from CCI in December. This second pilot was used to highlight possible technical problems with the online survey (such as compatibility of different browsers, security settings etc) and any non technical issues (length and coherence of the survey, for example). As a result, a shortened version was developed, compacting questions together and eliminating questions that were perceived as being redundant.

The questionnaire was distributed by email, with an invitation to circulate the survey among those members of the organisation and other contacts that matched the established respondent profile. Word documents versions of the online survey were also provided as a back-up.

The English version was disseminated in the UK to 20 organisations, some of which had previous collaboration with City University, Centre for HCID.

The German version was disseminated through CCI IHK, ComNetMedia and ISN while the French version was disseminated through EADS; the online survey was available throughout January 2008.

The respondents totalled 26, of which 19 for the English version and 7 for the German version.

2.2 Survey Results

This section presents the information gathered from the questionnaire. The rationale behind each question and the corresponding answers collected are presented in this section question by question and are discussed further in Chapter 4 (Analysis and Conclusions). Information pertaining to the respondent's name, contact details and organisation name have been left out to preserve the anonymity of the participants.

Some of the questions in the survey required knowledge of the structure of the organisation and of its work force; the targeted participants in the survey were hence employees at a managerial level.

Part I - About the organisation

Q1. Branch of industry

In view to explore possible application areas for the finished software platform, respondents were asked to specify the branch of industry they work in. The question was open ended, there was no pre-specified set of answers

The answers gathered are listed in alphabetical order below:

- Aerospace
- Applied Research and Development
- Commercial
- Education (a University)
- Employment (an agency)
- Engineering Consulting
- Finance
- IT and IT Services
- Industrial research
- Publishing and e-Publishing
- Service and Business Integration
- Systems Engineering
- Systems Integration
- Software Company
- Training Provider
- Transport

The most frequently occurring answer was IT with 30.8% of respondent listing it as their branch of Industry. This was followed by Systems Integration (7.7% of the respondents). Other answers typically occurred only once, with research being mentioned twice – in the Applied Research and Development and Industrial Research branches of industry.

Q2. Organisation name

Although they are not disclosed in this report to preserve the anonymity of the participants, the organisation names were gathered with a view to obtain complementary information on their domain of operation, structure and possible specificities among others in further research, notably for specifying the requirements for the 3rd prototype of APOSDLE.

Q3. Number of employees:

Participants were asked to select the approximate number of employees in their companies from pre-defined ranges, this in order to obtain preliminary data that could inform the profile of the surveyed organisation.

Most (61.5%) of the surveyed individuals estimated the number of employees within their organisation at more than a thousand.

Number of employees	Responses (%)
Less than 10	11.5%
10-50	7.7%
50-100	3.8%
100-500	15.4%
More than 1,000	61.5%

Table 1 - Q3 Part I: Number of employees in the organisation
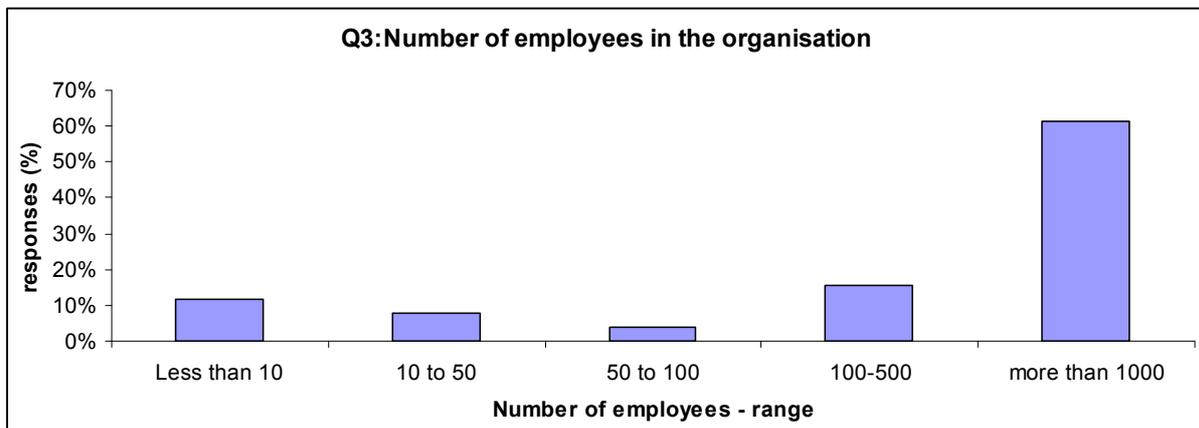

Figure 1 – Q3 Part I: Number of employees in the organisation

Q4. Number of branches

The survey participants were asked to select the approximate number of branches of their organisation from pre-specified ranges. It was expected that the answer would provide insight as to the need for communication between different offices in diverse geographical locations, which would have an impact on the adoption and use of communication and collaboration tools.

A bit less than half of the respondents' organisations have less than 10 branches; the remaining half have all more than 10 with the majority of them having between 10 and 50 branches. Some respondents were not able to give an estimation of the number of branches of their organisations, with one specifying that the organisation was a world-wide conglomerate.

Number of branches	Responses (%)
Less than 10	46.2%
10-50	23.1%
51-100	7.7%

	11.5%
101-500	11.5%
More than 500	3.8%
Unknown	7.7%

Table 2 - Q4: Number of branches

Q5. Are there employees that work off-site?

As for the question above, the presence of employees regularly working off-site would impact on the need for, adoption, and use of tools able to support work, communication and collaboration with and for these employees.

Most (84.6%) of the respondents to the survey reported that their organisation employs off-site workers. The remaining 15.4% work for organisations whose employees do not have to work off-site.

Part II - Exploring the potential of APOSDLE for the organisation

Question 1 Part II was presented as a grid (see below) allowing respondents to select the appropriate answer for each question. A comment field was provided for additional details to be provided.

The answers are presented here row by row, in the order in which the sub-questions (from 1 to 8) were asked.

	Yes, definitely	Yes but would like to do it better	No, don't need to perform this task	No but would like to perform this task	Not sure
1: Identify and access knowledge resources (e.g. documents, tutorials etc.) that support task execution	☐	☐	☐	☐	☐
2: Perform flexible searches for knowledge resources on specific topics	☐	☐	☐	☐	☐
3: Update existing knowledge resources accessible from the company's knowledge pool (e.g. shared repository, wiki)	☐	☐	☐	☐	☐
4: Add knowledge resources to the company's knowledge pool	☐	☐	☐	☐	☐
5: Identify and collaborate with other employees possessing knowledge related to a specific task WITHIN their immediate circle of colleagues	☐	☐	☐	☐	☐
6: Identify and collaborate with other employees possessing knowledge related to a specific task BEYOND their immediate circle of colleagues	☐	☐	☐	☐	☐
7: Make the content of a collaboration on a specific topic available to others for future reference.	☐	☐	☐	☐	☐

	Yes, definitely	Yes but would like to do it better	No, don't need to perform this task	No but would like to perform this task	Not sure
8: Automatically receive system-generated advice on available knowledge resources for the task at hand	☐	☐	☐	☐	☐

Table 3 - Overview of Q1 Part II

Q1: Below are listed actions that knowledge workers might find useful in the execution of their work-related tasks.

Please select the most appropriate option from the list below.

Employees in the organisation can currently:

Q1.1: Identify and access knowledge resources (e.g. documents, tutorials etc.) that support task execution

This question aimed to identify whether the respondents' organisations provided tools that satisfactorily allowed for the identification of and access to knowledge resources supporting their work. A majority (57.7%) of respondents reported that they felt there was scope for improving the tools currently in use. 11.5% said that they did not have this functionality, but would like to have it.
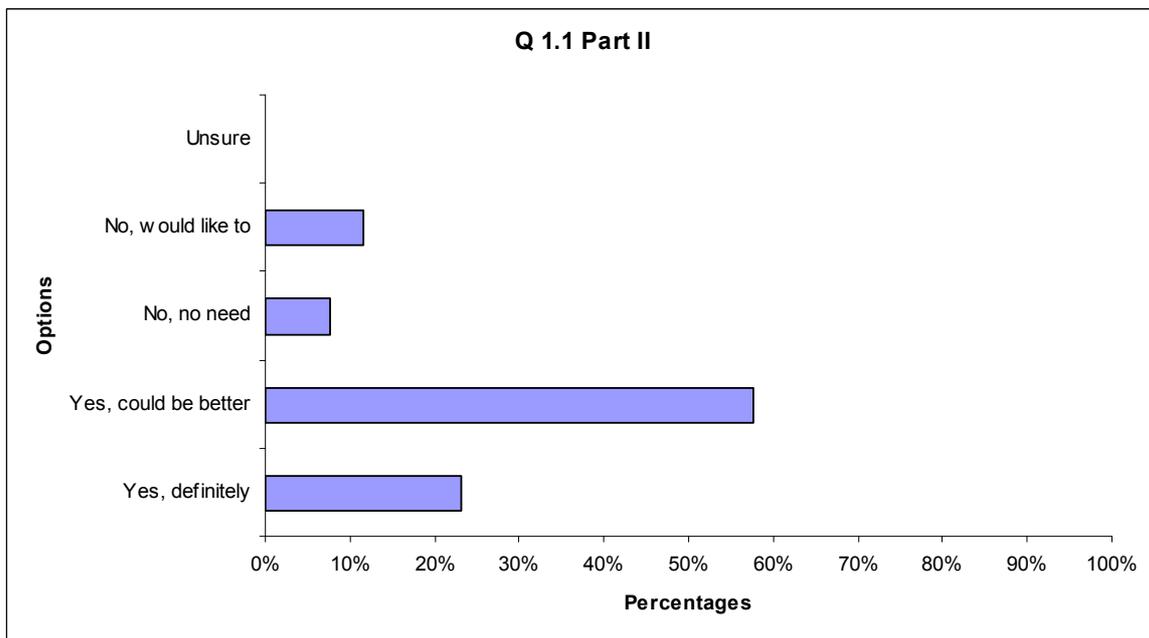

Figure 2 – Q1.1 Part II Employees in the organisation can currently: Identify and access knowledge resources (e.g. documents, tutorials etc.) that support task execution

(Q1 continues). Employees in the organisation can currently:

Q1.2: Perform flexible searches for knowledge resources on specific topics

This question aimed to find out whether organisations had tools in place that allowed for searching flexibly through existing knowledge resources, and the level of satisfaction with these existing tools.

42.3% of the respondents reported having this facility at the moment, but would like it to be improved. 23.1% declared themselves "definitely able to do so" - which we consider here as being satisfied with the functionality - while 26.9% are not currently able to perform this type of searches, but would like to.
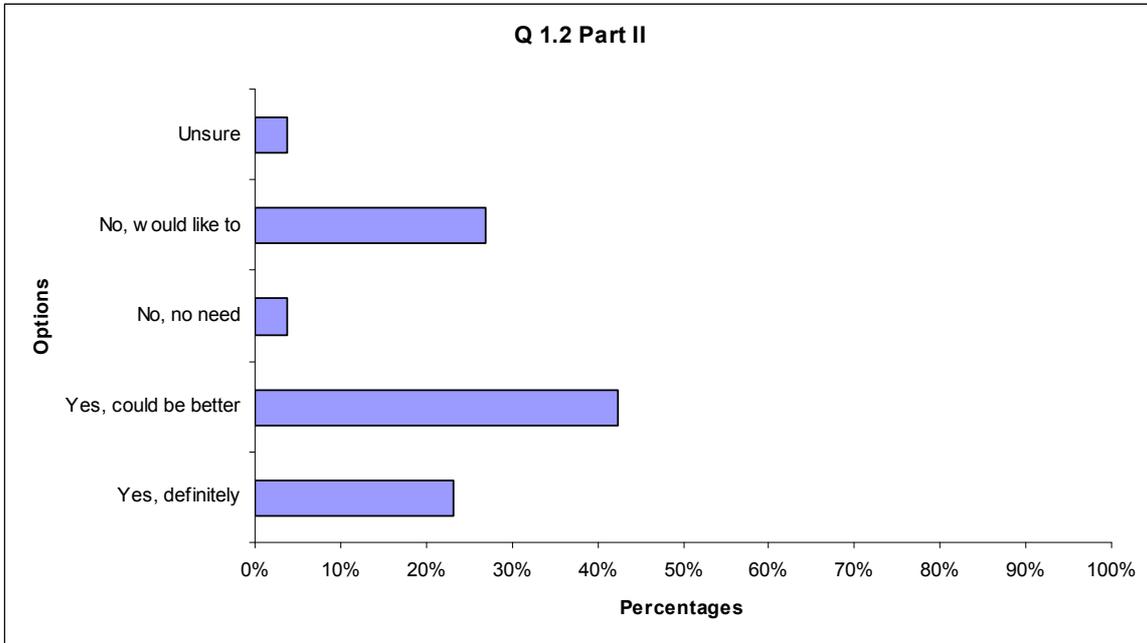

Figure 3 - Q1.2 Part II Employees in the organisation can currently: Perform flexible searches for knowledge resources on specific topics

(Q1 continues). Employees in the organisation can currently:

Q1.3: Update existing knowledge resources accessible from the company's knowledge pool (e.g. shared repository, wiki)

This question aimed to find out whether employees in the respondent's organisation are currently able to edit and update existing knowledge resources in their organisation's knowledge pool. Only 7.7% of the respondents seemed satisfied with the current provisions for this operation in their organisation; half of the respondents reported currently having this feature but not being fully satisfied with it; and 19.2% of the respondents answered they could not at the moment update knowledge resources kept on their organisation's knowledge pool, but would like to be able do so.
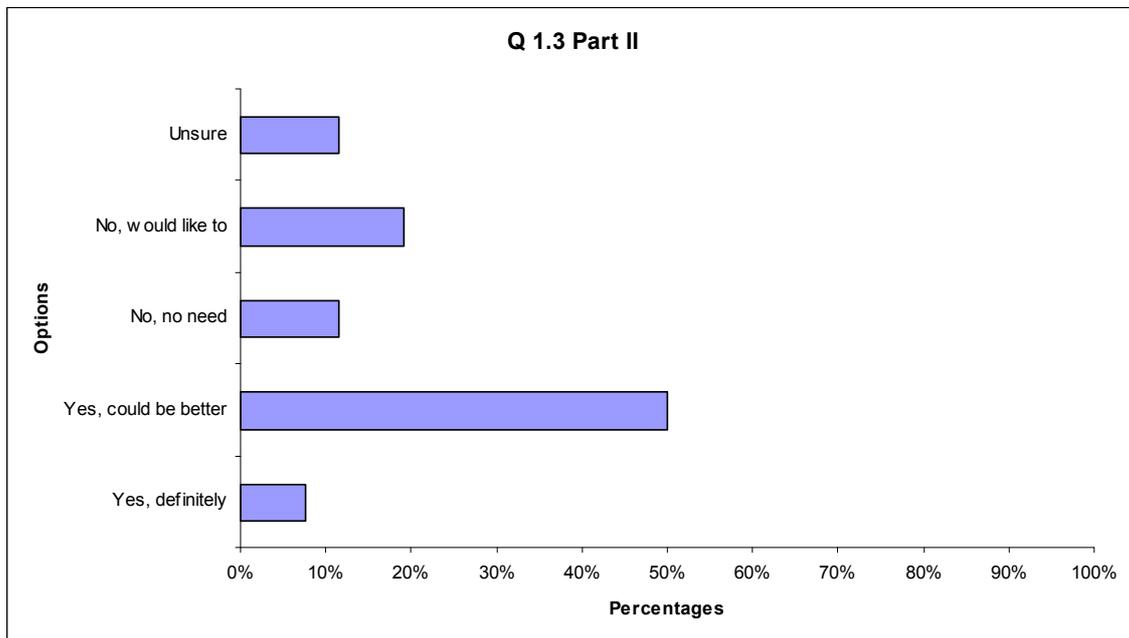
Q 1.3 Part II

Figure 4 Q1.3 Part II Employees in the organisation can currently: Update existing knowledge resources accessible from the company's knowledge pool (e.g. shared repository, wiki)

(Q1 continues). Employees in the organisation can currently:

Q1.4: Add knowledge resources to the company's knowledge pool

As above, respondents reported:

- not being able to add knowledge resources to the company's knowledge pool (26.9%)

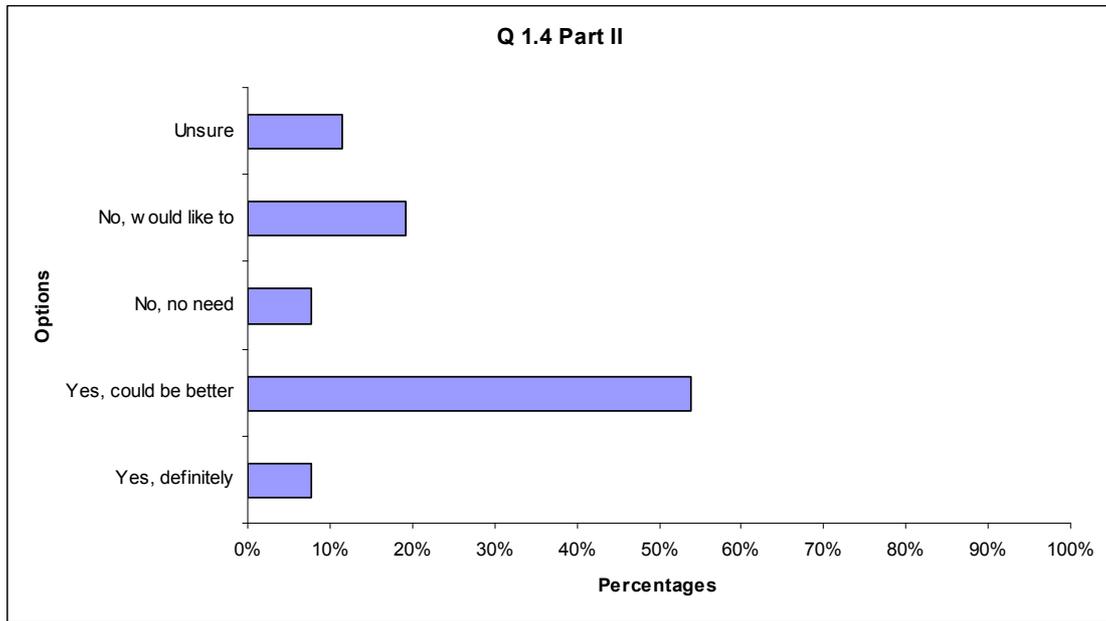- being able to do so, but not satisfactorily (53%).

Figure 5 – Q1.4 Part II. Employees in the organisation can currently: Add knowledge resources to the company's knowledge pool

(Q1 continues). Employees in the organisation can currently:

Q1.5: Identify and collaborate with other employees possessing knowledge related to a specific task within their immediate circle of colleagues

This question aimed to find out whether, and how satisfactorily, employees could currently identify and communicate with "experts" - other employees with the knowledge that could support the execution of a specific task - within their closer, immediate circle of colleagues. 38.5% of the respondents reported being able to do so but not satisfactorily while 15.4% of the respondents declared they could not but would like to be able to identify and collaborate with such employees.
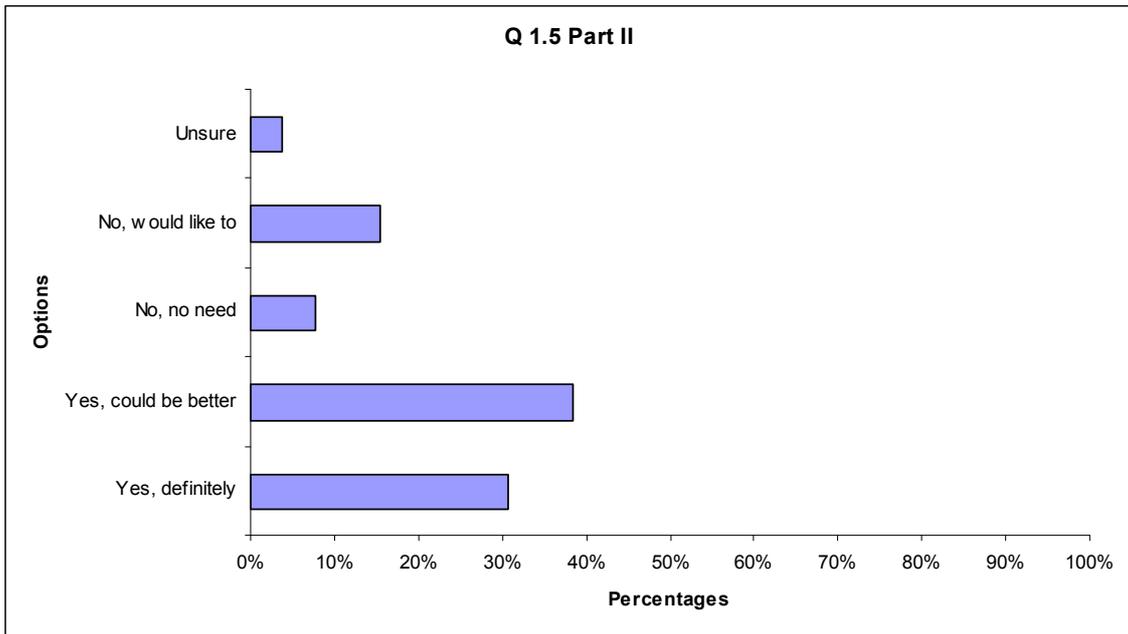
Q 1.5 Part II

Figure 6 Q1.5 Part II. Employees in the organisation can currently: Identify and collaborate with other employees possessing knowledge related to a specific task within their immediate circle of colleagues

(Q1 continues). Employees in the organisation can currently:

Q1.6: Identify and collaborate with other employees possessing knowledge related to a specific task beyond their immediate circle of colleagues

This question aimed to find out whether employees could currently identify and communicate with "experts", other employees with the knowledge that could support the execution of a specific task, beyond their immediate circle of colleagues.

23.1% of the respondents said they could not do so but would like to; 38.5% reported being able to, but not to their satisfaction.
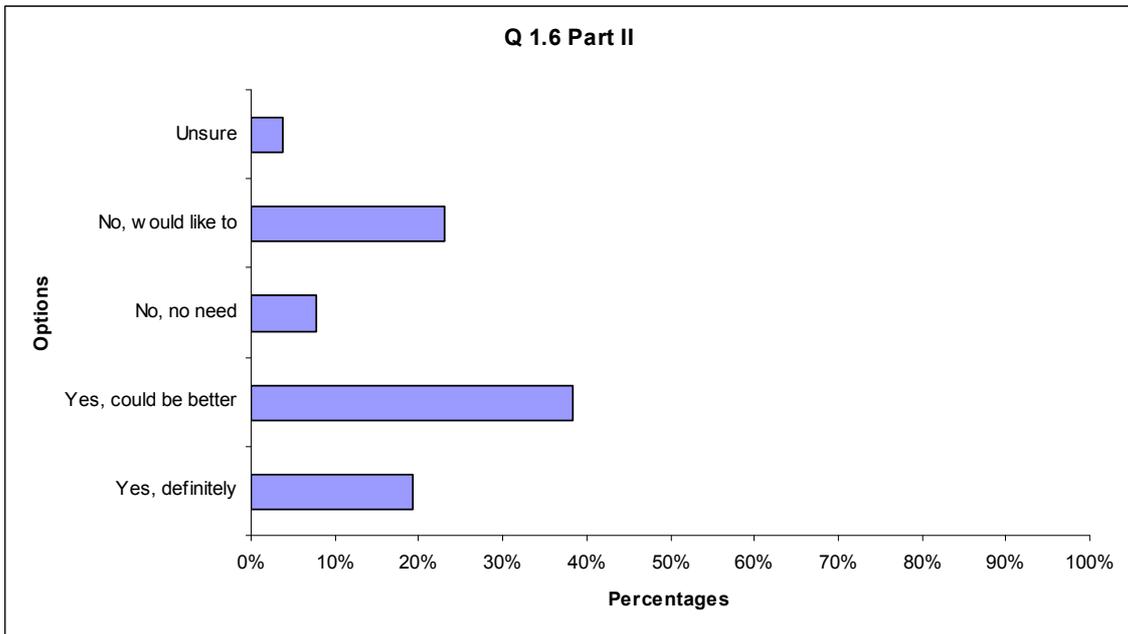
Figure 7 Q1.6 Part II. Employees in the organisation can currently: Identify and collaborate with other employees possessing knowledge related to a specific task beyond their immediate circle of colleagues

(Q1 continues). Employees in the organisation can currently:

Q1.7: Make the content of a collaboration on a specific topic available to others for future reference

The aim of this question was to discover whether employees could make the content and output of a collaboration available to colleagues within their organisation for reference and future use. This question refines Q1.4, Part II (adding a knowledge resource to the company's knowledge pool) in referring to content that has been generated through collaboration between colleagues.

Nearly 35% of the respondents reported they could, but felt it could be improved; 23.1% said they could not, but would like to be able to do so, and 11.5% reported being unsure as to whether their organisation had tools in place for this.
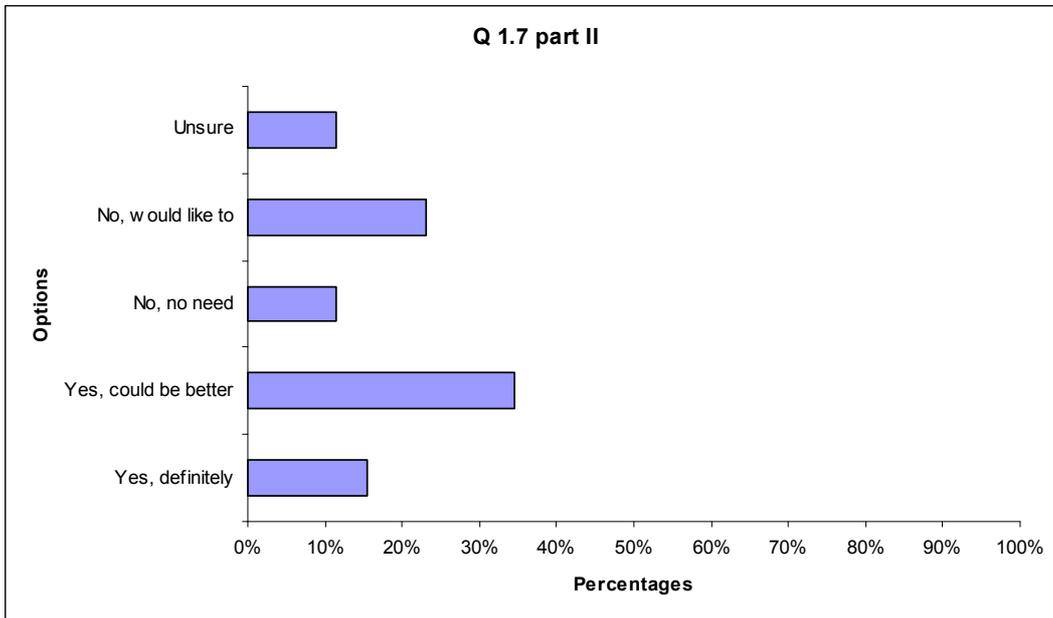
Figure 8 Q1.7 Part II. Employees in the organisation can currently: Make the content of a collaboration on a specific topic available to others for future reference

(Q1 continues). Employees in the organisation can currently:

Q1.8: Automatically receive system-generated advice on available knowledge resources for the task at hand

This question aimed to find out whether there was a system in place in the respondent's organisation to automatically deliver suggestions of appropriate knowledge resources for the task being executed by the worker. 30.8% of the respondents said they did not have this functionality but would like to and 26.9% reported having this functionality but thought it could be improved.
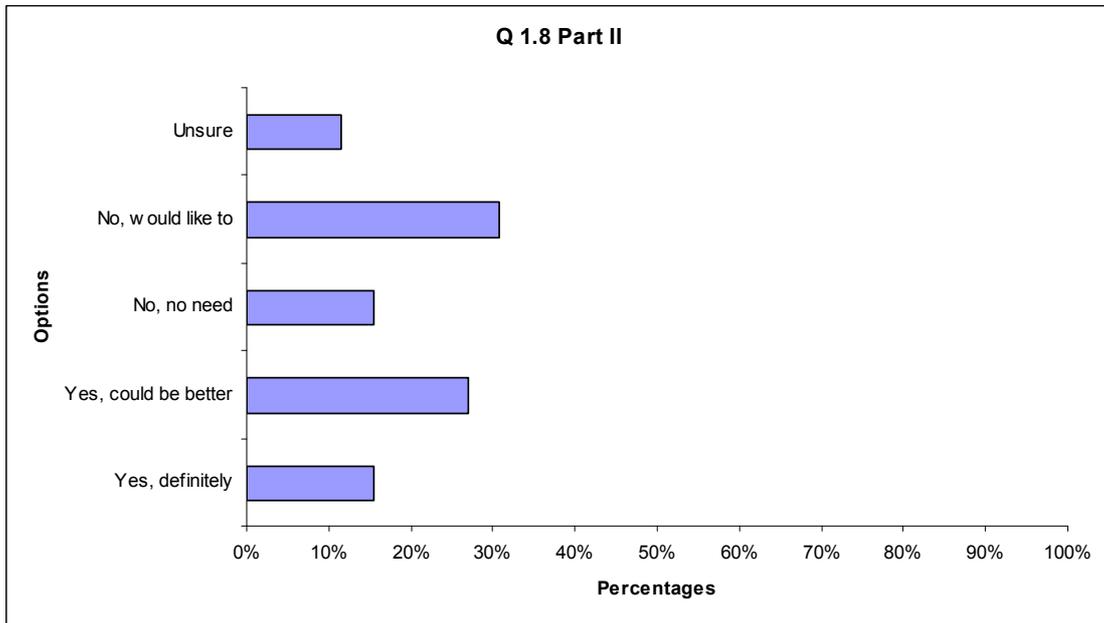
Figure 9 Q1.8 Part II Employees in the organisation can currently: Automatically receive system-generated advice on available knowledge resources for the task at hand

Q1.1 comment space:

If you answered 'Yes' to any of the above questions please specify the software tool(s) used if any:

This question applied to all of the single questions above and provided space for the user to comment on the software tools used to perform the mentioned tasks and activities. It aimed to inform our knowledge of the software tools used to perform tasks similar to the tasks the APOSDLE system will support and that it will have to compare to. It was not expected to find tools that perform the same range of tasks as APOSDLE, however it was felt that awareness of tools that are used in performing part of these tasks may yield results of interest.

Among others, the gathered answers made mention of:

- MS Internet Explorer (for Intranet access)
- Google (as a search engine on the company Intranet)
- MS Outlook (for direct information and notices)
- Livelink
- Company Library Management System
- Shared Network Drives
- Wiki
- SharePoint
- NetMeeting
- IM
- Data repositories
- web*Café* project

- Company-specific Servicer Portal
- Mailing lists
- TRIOLE system
- ProjectWeb

Q2. Based on the information you have at the moment, please comment on how APOSDLE compares to the tool(s) currently used in your organisation to perform the actions listed in question 3.

This open-ended question aimed to gather the opinions and perceptions of the respondents on the APOSDLE system as well as help recognise the salient points (both positive and negative) identified when comparing APOSDLE to solutions in use in organisations. Since the respondents had limited knowledge of APOSDLE, only based on the demo provided, it is understandable that most (57.7%) respondents did not feel they could compare APOSDLE to the tools currently in use in their organisation. One respondent thought it was similar to SharePoint Portal Server and the answers of the remaining respondents were mainly favourable to APOSDLE as illustrated by the quotes below:

- "*It looks like APOSDLE might offer opportunities to improve access to information. The main issue we have is finding the information in the first place.*"

- "*The integration would make it easier to use*"

- "*The advantage of APOSDLE is that it appears to deliver resources to relevant work and experience and monitoring capabilities to facilitate knowledge enhancement*"

- "*It appears to be more interactive and more collaborative*"

Q3. For which level of employee expertise do you see APOSDLE being used for learning purposes? (please select all that apply)

This multiple choice question allowed for the selection of more than one option; it seems respondents felt that the APOSDLE system would be more used by employees with an intermediate level of expertise (76.9%) although many felt that employees at beginner and expert levels of expertise respectively would also use the platform.

Level of expertise	Responses (%)
Beginner	42.3%
Intermediate	76.9%
Advanced	38.5%

Table 4. Level of employee expertise that may use APOSDLE

Q4. Are there particular job roles in your organisation that you think would benefit from using APOSDLE?

The survey respondents had to select either a "Yes" or "No" option to indicate whether they thought particular job roles could benefit from the use of the APOSDLE system; they were additionally provided with a comment field to specify some of these roles.

The majority (73.9%) of the respondents felt that there were job roles in their organisation that could benefit from using the system.

Q4 comment space:

The job roles mentioned included:

- Analysts (including Business Analysts)
- Consultants
- Corporate Managers
- Designers
- Developers
- Pre-sales
- Project Managers
- Researchers
- Solution Architects
- Testers
- Writers

with the roles of Consultant, Designer and Developer being the most recurrent.

15.4 % of respondents did not specify job roles and 7.7% reported that *"potentially all"* and *"almost all"* roles could benefit. As well as specific job roles, areas of use such as Network, Hardware and Software Training, Projects Offices, Engineering Group, and Customer Service were also suggested.

Part III - Exploring the potential of APOSDLE for the organisation (continued)

Q1. APOSDLE can be tailored to include models of specific domains of knowledge (e.g. medicine, requirements engineering, mechanical engineering etc.). If your organisation were interested in using APOSDLE, which specific domain(s) knowledge would be needed?

This question aimed to identify domains of knowledge to which APOSDLE may need to be tailored for possible markets, beyond those identified in collaboration with the application partners. This would require modelling of the underlying domain and appropriate tagging of resources.

The identified domains included:

- Civil Engineering
- Design
- Educational science
- Engineering (Electrical, Mechanical, Requirements, Safety, Software and Systems engineering)
- Finance and Financial Business Knowledge
- Healthcare
- IT infrastructure
- Management (Asset, Corporate, Customer Relationship, Event, Project and Risk Solutions Models management)
- Networks and Telecommunications

- Public Administration

- Software Technologies and Testing

- Transportation (especially rail)

Q2. As far as you know, for the features of APOSDLE listed below, please state whether they would go against your organisation's current policies, regulations and/or terms of employment:

This question aimed to gather data about possible issues for particular features of APOSDLE with organisations' policies, particularly regarding privacy, monitoring and storage of user data.

There was a relatively high level of uncertainty regarding the features of APOSDLE mentioned, and 11.5% of the respondents reported that storing data about user profile might go against their organisation's policy while 19.2% of them voiced the same concerns on the monitoring of users' work context.

	Yes	No	Unsure	No answer
Centralised storage of users profile that could include contact details, job title and a picture	11.5%	50%	34.6%	3.8%
Centralised storage of users task history for personal purposes (e.g. self-reflection on tasks undertaken)	3.8%	42.3%	50%	3.8%
Centralised storage of users' task history for illustrative purposes (e.g. allow other users to view the context of a collaboration)	7.7%	30.8%	57.7%	3.8%
Monitoring of users work context (including documents being currently worked on) to allow for existing learning resources to be appropriately suggested by the system	19.2%	30.8%	46.2%	3.8%

Table 5. Q2: Features of APOSDLE and compliance with organisation policies

Q3. Based on the information you have now, are there features of APOSDLE you feel would be useful for your organisation?

The survey respondents had to select either a "Yes" or "No" option to indicate whether they felt that APOSDLE had features that might be useful for their organisation. Respondents were also provided with a space for comments.

Out of the persons that answered this question, the majority (61.9%) felt that indeed this was the case, with a respondent commenting that *"it would be useful as a central point and an integrated product".* Another respondent emitting a favourable opinion on the potential of APOSDLE in their organisation added that "*… "advanced" members of staff need to develop and keep up-to-date and they are often forgotten in terms of development as they appear to have plenty of it already".*

The remaining 38.1% responded negatively to the question and raised various concerns over possible infringement of Data Protection and FOI (Freedom Of Information) policies, change issues regarding the existing set of tools in use in organisations, and the fact that it would require in some cases a *"large culture shift"* as a respondent put it.

Q4. How would you see APOSDLE being used in your organisation? (e.g. particular tasks and/or scenarios that you think could be supported by the tool)

This was an open question aiming to explore new possible applications and scenarios for the use of APOSDLE, beyond those already identified in collaboration with the application partners.

73.9% of the respondent did answer this question. Although a few expressed a desire to access more information about the APOSDLE platform, the responses clearly showed interest, even from those of the respondents that thought their organisations had tools that covered some of the features of APOSDLE – they still saw scope for its use.

The examples and views provided as an answer to Q4 mainly illustrated the following uses:

- Information searching

- information sharing

- business knowledge transfer

- cooperation among departments, groups and researchers

- the population of the company know-how with new knowledge

One respondent envisaged that the APOSDLE system could be used in the development of all the projects in his organisation while another saw possibilities of the system being used as *"a medium where one can quickly and easily enter experience, learning outcome such as with help of templates or online"*. Other answers evoked possible uses in training programmes, to enable setting up and carrying out remote meetings and targeted interests groups, and to interface into other existing systems.

This chapter presented the answers to the survey; the following chapter is dedicated to the findings obtained with the focus group. A more in depth analysis of the data collected with both methods is offered in chapter 4.

3 The Focus Group

Focus groups are a qualitative research technique aimed at collecting data on users' attitudes and feelings on a particular topic (Greenbaum, 2000). A focus group is an interview with a small group of people (usually between 4 and 10) selected according to specific common criteria (backgrounds, demographics, etc). The interview is in fact a discussion among the participants, with the interviewer assuming the role of a moderator. Attitudes, feelings and ideas on the topic being discussed are generated by the interaction between group members and recorded for later analysis (Morgan, 1997; Greenbaum, 2000).

Focus group interviewing was introduced in market research in the 1950s to gather more information on consumer preferences and buying decisions taken in social contexts (Patton, 2002). Moreover, focus groups have now assumed in the marketing process the role of a technique that captures "the voice of the consumer on the future of a product ..." (Greenbaum, 2000 p.6).

3.1 Focus Group Interview

A Focus group, organised by City University in coordination with a provider of power systems, was used for the current research in order to complement the survey data and generate additional functional and non-functional requirements for future prototypes of the APOSDLE system.

The aim of the session was to find out potential users' perceptions and feelings on the APOSDLE system and APOSDLE 'self-directed learning' vision, focusing on the perceived strengths and weaknesses, users' concerns and obstacles to adoption. We also aimed to collect additional requirements: i.e. missing functionalities in the current prototype (needed or just wanted). Any technical information (applications in use, operating systems, etc) surfacing through the discussion would also be noted for further investigation at a later stage.

In preparation for the meeting, a discussion guide and presentation materials were prepared by the researchers for the occasion.

The Focus Group took place at the offices of the company, on 21 January 2008, 1-2pm. Seven engineers attended the meeting, two of them via a conference call from remote offices. Two APOSDLE researchers were moderating the focus group and took written notes of the discussion (no audiovisual recording was allowed). The seven participants included:

- an Engineering Design Specialist
- a Programme Manager
- the Chief of Requirements
- an Engineer, Controls Product Families section
- a Whole Engine requirements specialist

And via conference call:

- the Technical Lead for Control Systems
- the Head of Engineering Process

To maintain anonymity of all participants, reference to them and their contribution to the discussion is done in the field notes with a number from #1 to #7 (e.g. statements from participant 1 are referenced with [#1]).

All participants had a common interest in Requirements Engineering and had been working at the company for several years. They all had experienced the need for retrieving up-to-date information on the workplace and the problems associated with it. Given their characteristics, their job roles and their information needs, they all represented potential users of APOSDLE.

A discussion with one of the participants prior to the focus group meeting revealed to the researchers that a system aimed at supporting provision and sharing of information and knowledge at the company had been put in place, although still at the initial stages of development. The system, named 'DMCS', is intranet based and currently mandated for use within the organisation. The fact that the users had prior experience of this system happened to be very useful for the discussion.

3.2 Discussion

After the initial introductions, the meeting began with a short presentation of the APOSDLE project using power-point slides and the demonstration movie of APOSDLE prototype 1 previously used for the survey.

After the short presentation, the researchers opened the discussion asking participants their impressions and their experiences with similar systems, if any. The discussion was well balanced and focused on potential problems with the use and acceptability of the system by its users. At times, participants introduced issues encountered with the existing DMCS system, but the moderator steered the discussion back to a more general perspective and/or relevance to APOSDLE.

Socio-technical issues that could impact on acceptability and use of APOSDLE and/or its components at the company became most apparent. Among them:

- **Conflicting goals between stakeholders**: the organisation aims at building a repository of company knowledge and information but this may conflict with single employee's interests and preferences. A participant phrased this dilemma as: "What is in it for the users?" He explained that he had tried before several 'portals to knowledge', that he could see the purpose of them from a business perspective as 'knowledge gets lost to the business' but, he said, 'People prefer talking to each other'. [#1] So the question is: How do we get everyone to value the system?

- **Perceived Usefulness and Usability**: The solution to the issue above was identified in the system usability and usefulness. The system must work efficiently and effectively: *"It must always deliver value, even if it is only someone's telephone number"*. [#1]

- **Incentives and mandated use**: In fact the problem with the use of the current DMCS system were associated with a general disappointment in the retrieved information: difficult to retrieve, not up to date or not comprehensive, therefore not necessarily reliable. The efficiency of the system affected its efficacy and perceived usefulness. Despite the fact that the use of DMCS is mandated within the organisation, engineers have to find alternative solutions (e.g. ask a nearby colleague) when they cannot find the answer to their questions with the use of this tool. If the pre-requisite of 'usefulness and usability' is not satisfied, having a system mandated, or the introduction of incentives, would not work.

- **Automation versus User control:** in relation to the issue of having a tool relying on users adding data and metadata in the common system, a participant supported the idea of complete automation: an intelligent system capable of understanding users information needs, knowledge sources, etc., without interference to the user and her work: *"It should map processes, map where the information is, learn itself, and then show that to the users. An intelligent system. It needs to be without interference. If you expect people to add data, they're already on a different task!"* [#3] Because of lack of time (and possibly because of conflicting interests and goals, as mentioned above) the users would not be able to consistently add data to the system. On the other hand, users need to be in control of and maintain awareness of the information available in the system – something that cannot be easily achieved with

complete automation. Furthermore, a system that tracks users work remaining invisible to the user infringes on the user privacy.

- **Privacy and Trust**: Building a system that supports and promotes users trust is essential to the success of the system. If the system is perceived as monitoring employees' performance, it may have the unexpected consequence of undermining employees trust in the system and the organisation: "*It would be counterproductive, it would destroy trust, trust built with face to face meetings".* [#5]. Another participant pointed out: "*It's down to credibility".* [#3] Therefore, the system should have mechanisms that support user trust. The result then would be *"a 'pull' from the users"* [#5]*.*

- **Information Architecture**: The 'pull' from the user depends on trust but this must build on usefulness of the application. The participants to the focus group proposed solutions for knowledge/information repository that they consider useful for their work practice. Among the proposed solutions were two similar structures of 'information architecture':

  o A simple 'root map' based on input-process-output structure, which each element opening to further information. [#1]

  o The electronic equivalence of '*a series of A3 sheets of paper'* with progressive layers of detail, from general to specific [#4]

These suggestions highlight the need for a clear process map that would show the users 'how to do something'. A brief overview of the process (a A3 sheet of paper) would encourage a reuse approach, rather than always starting from scratch.

The problems that the engineers could see associated with these structures they proposed were:

  o The depth of the structure: "The problem then is there are too many layers" [#4]

  o The fact that among the 'engineering population' *"some people always prefer to start from a clean piece of paper"*, and therefore they may not use such a system anyway. [#1]

- **Comparison with existing system:** lessons can be learned from the comparison with the existing information systems being developed at the company (DMCS). As mentioned before, the fact seems to be that "*people struggle with the tool"* [#4]. Among the possible reasons that were mentioned during the discussion:

  o Well-defined scope of operation: *The problem is it tries to be all things to all people.[#4]*

  o People questioning the underlying idea: *People are questioning the idea of a central repository.* [#5]

  o Problems with information retrieval: *There is too much [information] and can't be found.* [#7]; *A poor search engine is a problem.* [#5]

  o Quality of information: *Resources need to be updated! There's so much information that is not up to date (quality of information is an issue)* [#5]; *We need live, up to minute knowledge.* [#1] *We have a range of systems in place that do not talk, do not interact, and at times the information in them is contradictory. [#2]*

  o Relevance of information: *There is a problem with the relevance of the documents. There is always the need for human judgement to decide the relevance [of the information].* [#4]

  o Absence of information: Lack of *'access to archives' [*customers files that go over 40+ years] [#1] *Many DMCS resources are not relevant* [meaning: they do not cover the topic/task at hand]. [#7]

- Social interaction: *It would be better if it would connect to people. Each document could give* [access to] *someone to talk to* [to confirm the relevance or meaning of the information retrieved]. [#4]

In fact, the usability and usefulness of DMCS is assessed in absolute terms but also in comparison with the possible alternatives, mainly: Internet and the World Wide Web (e.g. Google) and face to face interaction.

When asked how the DMCS compares with Google, a respondent revealed that there is a constraint in accessing Google or other resources online: access to the Internet is restricted on the workplace for security reasons. The alternative then must be an information source within the organisation.

Among the engineers, social interaction (face-to-face, or telephone communication) seems the preferred method to seek and share information and knowledge. Statements in support of face-to-face interaction, or more generally direct interaction between people, were recurrent: examples are the assertion "*People prefer talking to each other*" [#1] seen above, or the idea that the DMCS "*would be better if it would connect to people*" [#4] and the value associated with the contact details of someone to talk to ("*It must always deliver value, even if it is only someone's telephone number*" [#1]). In fact, the organisation is thinking of incorporating a wiki within the DMCS: the wiki would play the role of 'a conversation page'. [#6]

At the end of the discussion, the person responsible for DMCS posed two questions to the researchers in relation to the APOSDLE solution:

- *Does Aposdle address things such as Uncertainty (e.g. on a requirement)?*
- *Does Aposdle address Risks with requirement? [#6]*

If these questions rose from the experience of building the DMCS, they may be indicative of issues that need to be addressed by APOSDLE.

Since the two participants who attended from a distance did not have the opportunity to see the demo of APOSDLE and expressed a keen interest in it, the session was closed with the agreement to arrange a further demonstration of APOSDLE at their location. The session will be extended to other employees of the Knowledge Management team.

This chapter presented the data gathered with the focus group. The following chapter will further analyse this data together with the information collected with the survey.

4 Analysis and Conclusions

Before proceeding with the analysis of the data collected, it is important to acknowledge the inevitable bias inherent in the responses. Most of the answers to the questionnaires came from organisations in the field of Requirement Engineering and the participants to the focus group were also engineers with experience in requirements engineering; different findings could be derived from a different range of participants. A bias could also be found in the size of the organisations involved and the geographic origin of the participants. Most of the responses to the survey came from companies with more than 1000 employees; most of the respondents work in the UK, and the focus group was also based there as well. The involvement of a different range of organisations from a larger number of European countries would provide insight into different needs and requirements. Yet, the data collected offer interesting insight into the scope of the target group, problems and needs for adoption of the APOSDLE system, and reveal areas that may be further investigated at a later stage.

In this section we are presenting the main conclusions that can be drawn from the data collected, this in terms of the main aspects that need to be considered with a view of extending APOSDLE to a wider market. Despite the efforts towards a broad dissemination of the survey at the data collection phase of this research, the population of respondents was limited both in terms of size and of range and so to define the scope of the target group for APOSDLE, more research is needed. Findings have however been made as to the problems and needs of a group of the potential market, especially but not only in the area of Requirements Engineering.

4.1 Needs

In order for the APOSDLE application to be successful, it should be 'organic' with the organisation as a whole and 'blend with the background' without disrupting the activities employees are engaged in. Therefore, for instance, the APOSDLE system would appear to be self-learning to the users and the technology behind it, transparent to them.

Despite the need for an 'invisible' system (Norman, 1998) the design of the interface should empower the users, leaving them feeling in control of their profiles, use history, and of features related with any usage monitoring tool.

Responses to Question 1 part II clearly show a need for a knowledge management system with APSODLE functionalities. However, the value of using the APOSDLE system, both for the individual and for the organisation as a whole, ought to be self-evident to encourage the adoption and widespread use of the platform; for instance the users should find value in using the system every single time, even if only by receiving the contact details of a person they can direct a query to. It should also be comparable if not superior to engaging in face-to-face communication: face-to-face communication seems to be the benchmark against which the efficiency and usefulness of APOSDLE will be measured. The system's scope of operation should also be well-defined in order for the users to have the right understanding of its abilities, use and limitations and accordingly set their expectations.

The software tools currently used in the surveyed organisations (Q.1 Part II of the questionnaire) do not seem to integrate knowledge access (to information resources) with communication tools: such integration appears to be one of the aspects that make APOSDLE particularly valuable and distinguishes it from most related tools currently available on the market. Furthermore, there is a need for integration of APOSDLE with existing legacy systems; this should be considered for the design of the final product and its success on a wider market: those of the users that reported a high level of satisfaction with the tools in use in their organisation (Questions 1.1 to 1.8 Part II of the questionnaire) still saw scope for the use of APOSDLE and typically mentioned using a mix of tools including company intranets, Projectweb or web*Café*, Livelink and shared network drives as well as MS Outlook that it would likely have to interface with.

The findings validate the vision of an APOSDLE platform that supports access from different geographical locations (across branches and/or off-site work). Remote access to APOSDLE may also include a need for 'mobile' access, though this would need to be investigated further. A further validation of previous findings is the need for different learning and collaborating approaches to be supported and catered for by the platform: for instance, the engineering population itself includes people with different learning styles and approaches to problem solving.

As from the responses to the questionnaire, APOSDLE should be tailored to varied knowledge domains and there hence is a need for resources to be put in place for this purpose.

4.2 Problems

Potential problems with the adoption and use of the APOSDLE socio-technical system were identified from the data collected.

First of all, the introduction itself of the system in the workplace may entail questioning of its functionalities. Most knowledge workers are trained problem solvers apt to critical assessment of resources they are provided with. They will apply these skills to the APOSDLE system and may find the objectives behind its introduction conflicting with their own. The system should have socio-technical mechanisms in place to deal with the inevitable concerns that will arise regarding some of the APOSDLE features, such as the monitoring tool.

Since the success of APOSDLE in the workplace depends on a critical mass of users using the system and contributing to the knowledge pool, depending on the history and culture of the organisation there may be a need for a 'culture shift' and socio-technical mechanisms in support of 'organisational change' – a prerequisite to the success of the system.

As from the results of the survey, possible conflicts between features of the platform and policies and practice in effect in organisations ought to be investigated since a sizeable percentage of the respondents were uncertain about the position of their organisation in regard to some of the presented features.

Relying on the user to annotate knowledge resources might also prove to be problematic as attention was drawn to the fact that users move on quickly from one task to another, being under pressure for work deadlines, and in all likelihood will be too busy to tag or record something after it has happened.

Technical constraints, such as limited access to the Internet for security reasons, may also constitute problems for the development and adoption of the APOSDLE system.

Further research in the form of focus group and extended survey deadlines have been planned in order to supplement the data collected and further refine the findings related to the scope of the APOSDLE target group, its requirements and additional problems that may be identified.

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6 Appendix

6.1 Appendix A: Questionnaire

1. Knowledge Work Performance: Using the APOSDLE platform and tools in the workplace

This is a study conducted by the APOSDLE project (http://www.aposdle.org), a research project co-funded by the European Community. Our research is guided by the following question:

How do knowledge workers find and apply knowledge at their workplace so they can more effectively perform in their job?

With the current study we are exploring organisations' needs in that respect as well as their perception and opinion of the software developed in the project. Your participation in this survey is invaluable and to thank you for your time we will send the first ten respondents copies of the book **Mastering the Requirements Process** by Robertson and Robertson. For each other respondent we will donate 1€ towards the planting of fruit trees in communities in need - for every 14 respondents, about 10 fruit trees will be planted - and send you an e-card .

The survey runs until the 21st of January; it is six pages long (including this page) and should take no longer than 15 minutes to complete. The data gathered will be anonymised and used solely for the purpose stated above; none of it will be passed on to a third party.

You can email us your questions, problems or comments on the questionnaire at sbbc775@soi.city.ac.uk

2. Part I - About your organisation

1. Branch of industry

2. Organisation name

3. Number of employees:

Less than 10 ☐ 10-50 ☐   50-100 ☐   100-500 ☐   more than 1000 ☐

4. Number of branches

5. Are there employees that work off-site?

Yes ☐   No ☐   Don't know ☐

3. Part II - Exploring the potential of APOSDLE for your organisation

1. Below are listed actions that knowledge workers might find useful in the execution of their work-related tasks.

Please select the most appropriate option from the list below.

Employees in the organisation can currently:

	Yes, definitely	Yes but would like to do it better	No, don't need to perform this task	No but would like to perform this task	Not sure
1: Identify and access knowledge resources (e.g. documents, tutorials etc.) that support task execution	☐	☐	☐	☐	☐
2: Perform flexible searches for knowledge resources on specific topics	☐	☐	☐	☐	☐
3: Update existing knowledge resources accessible from the company's knowledge pool (e.g. shared repository, wiki)	☐	☐	☐	☐	☐
4: Add knowledge resources to the company's knowledge pool	☐	☐	☐	☐	☐
5: Identify and collaborate with other employees possessing knowledge related to a specific task WITHIN their immediate circle of colleagues	☐	☐	☐	☐	☐
6: Identify and collaborate with other employees possessing knowledge related to a specific task BEYOND their immediate circle of colleagues	☐	☐	☐	☐	☐
7: Make the content of a collaboration on a specific topic available to others for future reference.	☐	☐	☐	☐	☐
8: Automatically receive system-generated advice on available knowledge resources for the task at hand	☐	☐	☐	☐	☐

If you answered 'Yes' to any of the above questions please specify the software tool(s) used if any.

2. Based on the information you have at the moment, please comment on how APOSDLE compares to the tool(s) currently used in your organisation to perform the actions listed in question 3.

3. For which level of employee expertise do you see APOSDLE being used for learning purposes? (please select all that apply)

Beginner ☐   Intermediate ☐   Advanced ☐

4. Are there particular job roles in your organisation that you think would benefit from using APOSDLE?

Yes (please specify**)**   No ☐

4. Part III - Exploring the potential of APOSDLE for your organisation (continued)

1. APOSDLE can be tailored to include models of specific domains of knowledge (e.g. medicine, requirements engineering, mechanical engineering etc.).

If your organisation were interested in using APOSDLE, which specific domain(s) knowledge would be needed?

2. As far as you know, for the features of APOSDLE listed below, please state whether they would go against your organisation's current policies, regulations and/or terms of employment

	Yes	No	Unsure
Centralised storage of users profile that could include contact details, job title and a picture	☐	☐	☐
Centralised storage of users task history for personal purposes (e.g. self-reflection on tasks undertaken)	☐	☐	☐
Centralised storage of users' task history for illustrative purposes (e.g. allow other users to view the context of a collaboration)	☐	☐	☐
Monitoring of users work context (including documents being currently worked on) to allow for existing learning resources to be appropriately suggested by the system	☐	☐	☐

3. Based on the information you have now, are there features of APOSDLE you feel would be useful for your organisation?

No (please comment)   Yes (please comment)

4. How would you see APOSDLE being used in your organisation? (e.g. particular tasks and/or scenarios that you think could be supported by the tool)

5. Part IV - About you and follow up

1. Name

2. Job title

3. Department

4. It might be useful for us to contact you via phone or email for brief follow-up questions. Would you be willing to participate?

Yes ☐ No ☐

5. If yes to the previous question, please leave your details for your preferred mode of communication

Email:

Telephone number:

6. As well as being able to put across your company's specific needs and views of the tool, the benefits of participating in a focus group for APOSDLE include free workshops and tutorials. Would you be available to be part of a focus group?

Yes ☐ No ☐

If yes, please leave your contact details unless done above.