SOCIETIES
Deliverable D2.1
Specification of Initial Scenarios and User Requirements

Abstract

This document presents the user requirements for SOCIETIES, based on research carried out in T2.1. It outlines, a state-of-the-art overview on user research, and presents the SOCIETIES user research methodology chosen for T.2.1. The tripartite mixed methods approach, which is comprised of: ethnographic methods; a purposely designed SOCIETIES questionnaire; and participatory design, is presented.

Three user groups participate in SOCIETIES user research: the student group; the enterprise group and the disaster management group. The particular approaches employed for selecting users, and conducting user research for each group are described in detail. Results and analysis for each research activity are presented as ethnographic vignettes, observations, statistical analysis and cooperatively developed scenarios.

User requirements for each group are then extracted, prioritised and presented in a tabular format for communication with the SOCIETIES consortium. The work is summarized and final conclusions are presented. The requirements extracted in this document will inform further research in SOCIETIES, and directly form the basis for evaluations to be conducted with the same user groups, as part of WP8.
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Executive summary

This deliverable presents the user requirements for the Cooperating Smart Space system, which the SOCIETIES project is developing, and the mixed methods approach used to generate the data from which they were extracted. SOCIETIES is following a user centric approach and employing field studies, surveys, scenarios and participatory methods to research and cooperate with users. Three distinct user groups were identified for inclusion in the user research, namely the Student Group, the Enterprise Group, and the Disaster Management group. The duration of the user research described herein is a period of four months.

A Cooperating Smart Space (CSS) represents a single participant (user or organisation), and includes their information, and services. It is a distributed collection logical node/device/cloud instances, called CSS nodes. A CSS node is one or more of these instances running CSS software, which coordinates with other CSS nodes to form a participant's CSS. A CSS provides both a pervasive capability and a social networking capability in an integrated form. The functionality provided by a CSS will vary depending on the number of CSS Nodes available at any time.

The SOCIETIES User Research methodology outlines a State of the Art review of current approaches in user research, identified as relevant to innovations in pervasive and social information and communications technologies, and an in-depth description of the user research approaches selected for extracting SOCIETIES user requirements, in the early stages of the system design process, namely ethnographic methods, customised survey and participatory design sessions. The rationale for having several research approaches is the triangulation afforded by different perspectives, along the lines of behavioural, attitudinal; naturalistic and de-contextualised research activities. This methodology includes both qualitative and quantitative techniques. Qualitative methods were used to conduct ethnographic field studies, and facilitate participatory design (PD) sessions using scenarios, while a quantitative method in the form of the customised SOCIETIES questionnaires, is used to analyse user behaviour and trends. Scenarios are used as a medium, for conveying CSS concepts in stories devised by the project consortium to users initially; as a creative tool for envisioning CSSs in future use, and as a creative site to identify and negotiate issues relevant to the potential usefulness, ease of use and desirability of CSS systems for each user group context.

Each of the user groups adapts the methodology according to parameters such as: access, availability, and context. The specific methods employed, results and analysis of all data and studies are presented in sections for each user group: the Student Group, the Enterprise Group and the Disaster Management Group. Each user group operates in a particular context. Students, for example, are interested in information sharing, navigating the campus easily without locking/unlocking doors, creating and managing study groups, accessing translators and accessing help outside of lab hours. They have a high usage of social media, and are aware of some pervasive devices. They are expected to become co-creators for services once the SOCIETIES system is made available to them. Enterprise users are very busy, and they want to reduce the tide of constant communications. They are interested in relevant information and time saving tools and services of the CSS. They are generally technology savvy and willing to try new innovations if they will save them time. Disaster Management (DM) users are always behaving in operational mode in a DM zone, and have many priorities to concentrate on in the field. They are interested in the potential benefits of CSS as a tool for managing information searches from disaster zones, and in engaging the wisdom of the crowd, to assist in seeking information required in disaster management contexts. All user groups have concerns about privacy, and how it will be maintained with a SOCIETIES system, but can see benefits in synching devices, and information within a secure CSS system.

Results from the three user research approaches are presented as ethnographic vignettes, field observations, survey statistics, and modified scenarios. Each user groups’ requirements are formulated into user requirements tables. This formulation is chosen as a means to enable easy reference to requirements, and translation into evaluation criteria for other SOCIETIES work packages.
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1 Introduction

This deliverable presents the user requirements gathered for the SOCIETIES vision of a Community Smart Space. For the purposes of explaining the concept to the end users groups, the term CSS was used and was explained as follows:

*A CSS is a system belonging to a user (or an organisation) allowing him/her to manage devices, services and information in their environment, to facilitate or establish social interactions with other CSS user’s, and to share services and information from their environment with other CSS user’s.*

From a technical perspective this definition is somewhat ambiguous, in that it refers to a “*shared space*” and a more “*personal space*” in the same definition. For this reason, this visionary concept is broken down into two technical terms: the Cooperating Smart Space; representing a single participant’s view and the Community Interaction Space; representing the view of all the participants within a single community. Formal definitions of both refined concepts are provided in further technical deliverables, but have not been conveyed to the (possibly non-technical) end users at this initial point of engagement.

This document presents a state of the art review of current user research trends in relation to pervasive and social technologies, in section 2. It proceeds to outline the methodology and techniques selected to research SOCIETIES user groups: the Student Group, Enterprise Group and Disaster Management Group, with the objective to understand users: their current experiences within their actual environments by observation; their awareness, usage and experience of pervasive technologies, social media, and Information and Communication Technology (ICT) systems and devices similar to CSSs, through survey responses; and their visions, hopes and fears through scenarios featuring CSS technologies, devised and edited through participatory design. A triangulation of approaches, which results in user responses that range from: qualitative to quantitative; natural to de-contextualised; and behavioural to attitudinal, is comprised of: ethnographic methods; a SOCIETIES user questionnaire; and scenario focussed participatory design sessions.

SOCIETIES user groups are introduced in section 3. A report, which illustrates which particular research techniques were utilised for each group, is given along with the findings and results uncovered. These results are presented in the form of: ethnographic vignettes; statistical survey results; and revised scenarios. Examples of services that could be offered by the SOCIETIES environment are also envisioned, communicated, and progressively updated through iterative CSS scenarios, created in a participatory approach involving SOCIETIES designers, developers and users.

The student group, we discovered, are familiar with digital communications and social media technologies, and regularly use a wide range of devices. The use Internet, email, sms and social media freely to communicate with friends, family and peers, and to keep up-to-date with their course information, and interests. Their use of digital data and services is seamlessly integrated with their leisure lifestyles too, but is not a preferred replacement for face-to-face communication for family and friends. They are concerned about privacy, but if that could be assured, they would be interested in devising and using services, which synch their information across devices and systems, including some which use location awareness. The results of our user research indicate that it is important to find a balance of privacy controls, and the SOCIETIES system; where the user has visibility and control over personal information, and yet can use the SOCIETIES system to share relevant aspects of that information to access novel and/or relevant services.

The enterprise group would like a clear division between work and personal profiles. They already use a range of devices, including smartphones, notebooks, laptops, cameras, and screens, to access social media and networked services to share information with colleagues, and groups with shared interests, to some extent. They can also envision potential benefits of sharing resources, to facilitate service provisioning, like catering and transport. Enterprise users are interested in the CSS system facilitating making relevant connections; however, some enterprise users are already overloaded with information inputs from email and phones, and would have requirements that the SOCIETIES system could filter requests for their attention.

The disaster management group are working in very pressurised and demanding situations and need reliable and verifiable information and communications. They do not already using social media as widely as the other groups. They are interested in adopting new technologies that can be shown to serve their needs in the
field of disaster management, including integrating social media crowd sourcing for information, where specific basic training and controls to prevent serious errors, are included. Maintaining the privacy of individuals in a disaster management situation is noted as very important too. Any novel technology would have to take the particular and unpredictable conditions of a disaster management situation into account, and could not depend on access to technologies that are assumed in the other user group contexts.

All user groups are concerned about managing privacy, with regard to SOCIETIES systems, so allowing users visibility and controls over their personal information is key to adoption of a SOCIETIES system. Each user group can envision utilising a wide range of novel services that could be potentially enabled by a CSS system that integrates information from sensors in the environment, other peoples CSS tools and social media. These visions are captured through scenarios.

The results generated, by these research activities, are formulated into tables of user requirements for each user group in section 4. The tables in section 4, are the results from the user research described in section 3: ethnographic vignettes, survey results, and scenarios; filtered for the purpose of communication of requirements within the SOCIETIES consortium. These extracted user requirements, identify factors relevant to the CSS system’s attractiveness and the users acceptance of technologies, which will ensure that the prototype services designed by SOCIETIES for the three user domains of SOCIETIES will be highly appreciated by the end-user. The CSS has a great potential that may impact future services and users’ activities in a variety of environments. The SOCIETIES project intends to verify the system’s usefulness, usability, and “attractiveness” for the users through three prototypes/demonstrators, each one addressing a different application field and user group: enterprise, students, disaster.

1.1 Methodology

SOCIETIES T2.1 adopted a mixed methods user research methodology, collecting necessary data through direct communication with potential end-users of the system. The work was mainly user-driven, but also included cooperation between researchers and users, through a process of core research that aimed at the identification of the user requirements for CSSs. The quantitative and qualitative research methodology used has provided deep insights into: (1) people’s current behaviours in interactions with the technology in Smart Spaces that may be concurrently used by other individuals, (2) their attitudes to Social Networks and their behaviour in these environments, and (3) their broader values and needs, their wishes and dreams for the future.

The aim was to provide an operational (and theoretically) based description of the most effective practices that would allow people to fulfil their goals related to settings in the environments of SOCIETIES. This included a wide investigation regarding the potential end-users of SOCIETIES, as well as the definition of the context of use (regions, domains, user age, gender, profession, community engagement, experience of technologies and social media). In the context of this task, fieldwork was carried out in selected communities in different domains and settings, residing in several EU countries. This included selection of user groups, intake and briefing, observation of users in their naturalistic environments, homework by the selected user groups and participatory feedback sessions for data collection and analyses. All three of the user groups that will be involved in the user trials of WP8 participated in this research, which covered all the domains tackled by the SOCIETIES project. The users selected for SOCIETIES user research share common activities and domains, however, they are not all members of pre-existing communities, online or offline. While some individuals in these groups may share strong ties, others have weak connections. As SOCIETIES engage with representatives from these groups, we expect that these cooperative activities may even act a catalyst for influencing the development of further social connections, and lead to greater social cohesion between those users who take an active role.

Specifically, three different approaches were used to extrapolate SOCIETIES users requirements:

- **Ethnographic methods** – comprised of *in-situ* rapid, focussed, ethnographic participant observations, shadowing and contextual interviews;
- **Questionnaires** – a customised SOCIETIES online questionnaire was developed for each group, to capture user information, usage and behaviour data in the following areas: demographics; technologies and devices; social media, community participation; as well as knowledge about each particular user group’s domain.
• Participatory design (PD) - PD sessions comprised of workshops, group interviews and discussions, where scenarios are employed as a technique for exploring and communicating concepts about CSS in a cooperative manner.

These approaches were used with the three SOCIETIES user groups as summarised below:

The SOCIETIES “primary” Student Group, is formed from a group of first year Herriot Watt University (HWU) Computer Science students. SOCIETIES user research was done during field studies that took place over the course of three days in November 2010, facilitated by HWU and TSSG researchers. The ethnographic fieldwork was comprised of observations, contextual enquiry, and informal interviews. A PD workshop was organised to introduce the group to the SOCIETIES project. It provided explanations about pervasive technologies, then involved the use of scenarios, brain-writing, brainstorming and bodystorming techniques to explore relevant concepts, and generated novel potential SOCIETIES scenarios. A SOCIETIES (online) Student Questionnaire was circulated the HWU student group, prior to commencement of the field studies, and left open online for several weeks. A slightly customised version of SOCIETIES Student questionnaire was later circulated to another student group (the “secondary” student group), at the Department of Computer Science at National Technical University of Athens (NTUA), to allow for a control group and cross comparison of data.¹

The SOCIETIES Enterprise Group is comprised of Intel employees based in diverse locations around the world. The activity of attending conferences was selected as an appropriate enterprise activity around which to organise user collaboration on CSS design. TSSG and Intel researchers organised field studies over two days at a conference in Dublin in November 2010. TSSG User Experience researchers shadowed and conducted contextual enquiries with three key enterprise informants. Intel researchers facilitated two PD sessions, one face-to-face with a subset of the group in Intel’s Dublin offices, and another in the form of a discussion around SOCIETIES scenarios on an existing Intel Social Network forum. In addition, the SOCIETIES enterprise questionnaire (developed by T2.1) was circulated both in person and via email.

The SOCIETIES Disaster Management group is comprised of AMC course leaders and participants. SOCIETIES partner DLR performed the liaison with this group. The Disaster Management field study took place during a week-long AMC training course, held in Cyprus in November 2010. DLR researchers drew on their long-standing relationship and previous studies with this group to inform their field research. As users in this group were focussed on completing demanding disaster management course tasks, there was no opportunity to facilitate SOCIETIES focused workshops, or completion of the disaster management SOCIETIES questionnaire for this group during the field study. Instead, guerrilla fieldwork² was adapted as a non-intrusive, exploratory approach. Information about users was gleaned from close observation and casual contextual interviews. Informal group discussions, about the initial SOCIETIES disaster management scenario, provided a means for enabling PD. Following the field study a modified, shorter version of the initial questionnaire was prepared and circulated to the group.

Results from the three different approaches of user research are presented as ethnographic vignettes, statistical analysis, and updated scenarios. Triangulation of approaches ensures a range of attitudinal, behavioural, and creative user responses, which allows for extraction of a broad range of requirements, which are formulated into prioritised tables for each group, to ensure their translation and mobility throughout the SOCIETIES project.

1.2 Scope

Our primary goal of this document is to identify user requirements for SOCIETIES CSS system development. The objectives of T2.1 were:

• to provide a state of the art review of user research approaches;

¹ This is possible due to SOCIETIES partners having close ties with this particular university. Extending the user groups in the other domains was beyond the scope of this initial study.

² Guerrilla fieldwork is an exploratory research approach, which is a combination of observations and short conversations with random people in a given context. The idea is to be able to see first-hand the situation and talk with people spontaneously.
• to design a field study methodology regarding the user perceived experience in CSSs and their features;
• to produce field study material to be communicated with the users;
• to select user groups, communicate with them and complete appropriate field studies;
• to collect and analyse field study results and outcomes;
• to extract user requirements regarding Collaborative Smart Spaces.

Conducting user research is a first step to involve SOCIETIES users in this process and to use the outcomes of this work as an input for design development in WP2 Task 2.2, and WP8: User Trials and Evaluation. As this document is concerned with upstream\textsuperscript{3} user research, methods chosen reflect this, and do not consider user evaluation methods, which will be outlined in SOCIETIES WD 8.2.

The outputs of the task, as documented in this deliverable, will serve as input for T2.2: CSS Scenarios, Use Cases and Technical Requirements and will form the basis of the overall user evaluation criteria for WP8: User Trials and Evaluation, to be used for evaluating the system based on the user trial findings. It will also serve as input for all the tasks of WP3: System Architecture, WP4: CSS Platform and WP5: CSS Individual and Community Experience.

1.3 Structure

The deliverable is structured as follows. Section 2 outlines the state-of-the-art review of user research, and the methodology chosen for SOCIETIES user research. Section 3 describes the research undertaken with each of the three user groups, and presents the analysis and results for each section. Section 4 has formulated the user requirements for a CSS, into tables, where they are prioritised and references are given to their origin. Finally, Section 5 summarises the work undertaken and the main outcomes.

\textsuperscript{3} Upstream user research is research conducted in the early stages of the user centred design process.
2 Methodology

The SOCIETIES methodology combines qualitative methods, including ethnographic methods and participatory design (PD), with a questionnaire-based quantitative analysis technique. Before outlining the methodology we will present a brief overview of the state-of-the-art in user research, focussing on the current thinking in User Centred Design, Ethnographic Methods, and outlining the rationale for the selection of the suite of methods being used in SOCIETIES.

2.1 State of the Art Review

User research is being undertaken to extract user requirements for SOCIETIES, in Task 2.1. The overarching objective is to investigate where human input and activity is relevant and informative for the Cooperating Smart Spaces system we want to design and develop. The focus is on user research in innovative pervasive and social communications technologies, with regard to how best to discover both tacit and explicit user requirements.

A myriad of user research methods have emerged over the course of the last forty years that consider the role of the user in ICT development. These methods have roots in various different disciplines including: human computer interaction (HCI); cognitive science; media studies; anthropology; sociology; user centred design (UCD); human centred design (HCD), user experience (UX); software development and marketing. For the purposes of this document user research has a broad meaning, including many methods, approaches, models and theories. In this respect, techniques and methods selected for SOCIETIES research are approaches rather than strictly defined methods, belonging to one particular academic domain. In the mesh of interdisciplinary and cross disciplinary approaches, several techniques which facilitate user research, and evaluation, have emerged which can be employed and adapted to fit a particular research or development focus in a cross disciplinary manner, and it is with these that our methodology is designed.

In his review of his landmark paper on human factors in computing, “20 years a growing”: Revisiting From Human Factors to Human Actors”, Bannon [3] suggests that “we are at a unique moment in the history of computing where, finally, the human centred perspective on information technology, can become a more mainstream perspective within information systems (IS) and related fields”. He expects the human, cultural and social aspects of computing may come to the fore in contemporary computing.

As a plethora of new digital technologies emerge, their applications extend widely beyond the workplace into everyday life. The role of the user has evolved beyond that of passive receiver to become a creator, publisher or developer. Several typologies of users in the new digital landscape have been identified. Of note, are the European internet users study by Ortega Egea et al. [53]; Brandtzæg’s unified Media-User Typology (MUT) [17], which attempts to unite various other user classifications into one, based on European users; Forrester’s North American consumer focused Social Technographics [42] and TNS Digital Lifestyles [66].

The user types in the Ortega Egea et al. [53] study are based on data collected from a questionnaire in 2002 from users in 15 EU countries. The user types he classified were: (1) Laggards (16%) who rarely used Internet services, did not use private services often or eGovernment services ever; (2) Confused and Adverse (2%), who were a diverse group of low Internet usage users, who appeared to be confused about Internet services; (3) Advanced Users (16%), who frequently used eGovernment services, and shopped online, (4) Followers (19%), who used the Internet frequently but not on a daily basis, did use eGovernment services, but didn’t shop online; and (5) Non-Internet Users (44%) who did not use the Internet. This study also mapped typical users to European countries, demonstrating the diversity in Internet usage across Europe.

The MUT [17] identifies eight new media user types based on analysis of EU statistical information from several sources and data from a variety of face-2-face and telephone interviews with users. These types are: (1) Non-Users, (2) Sporadics, (3) Debaters, (4) Entertainment Users, (5) Lurkers, (7), Socializers, and (8) Advanced Users. All types are based on users’ general Internet behaviour, but two types are particularly active in social networking sites and blogs. Debaters use the Internet for discussion, while Socializers use the Internet for communicating with friends and family.

Forrester’s Social Technographics [42], while not based on European users, and referring to consumers rather than users, is of interest to SOCIETIES because it classifies consumers according to how they use
social technologies. It lists seven overlapping levels of social technology participation: (1) creators, who create the content in the form of audio, video, articles, web pages and blogs; (2) conversationalists, who post status updates, and comment on the content; (3) critics, who rate the content, participate in online forums, comment on content and edit wikis; (4) collectors, who subscribe to RSS feeds and tag content; (5) joiners who visit and maintain profiles on SNS; (6) spectators who read, watch and listen to online content; and (7) inactives, who do not fit any other category.

TNS Digital Life is a recent 2010 study, based on a large global research project into people’s online behaviours and activities. It provides a detailed country-by-country breakdown of users’ digital activities in such areas as: social; email; knowledge; organise; administrative; shopping; browsing; news; interest; multimedia; and gaming. It defines six digital lifestyles emerging from their data as: (1) influencers for whom the Internet is an integral part of their life; (2) communicators who like to express their opinions and be connected online, (3) knowledge-seekers who are motivated to use the Internet to gain knowledge, information and to educate themselves; (4) networkers, who are interested in maintaining relationships using social networking, (5) aspirers who are trying to create a personal space online, who are new highly motivated users likely to be more active in time; and lastly (6) functionals who are long time Internet users, mainly interested in using it as a tool but not interested in social networking.

Many users do still behave passively online. They read, consume, ignore, lurk and avoid but other users also use complex online applications in the cloud, blog, micro-blog, vote, like, tag, create and share content. As they do so; their activities create intricate trails of data, which extend in interconnecting webs beyond users’ desktops, work environments, personal computers, gaming devices and smartphones. These data trails combine with data streams from smart objects, smart buildings, and smart RFID tags in the environment - as lowering costs take the potential of ubiquitous computing ‘everyware’ [31] devices beyond the theoretical into everyday life - to create fast flowing mats of complex information. Social media and crowd/cloud computing are generating reams of ‘big data’, and this is being mined as a rich seam for analysing human participation, both direct and indirect, with online services and technologies [26]. Innovative new means of harvesting the wisdom of the crowd are now feasible through social computing [65]. This valuable data analysis yields information about users, which is at the other end of the spectrum from traditional user research where the user plays a conscious role in the proceedings.

User research is struggling to keep track. Bodker [15] identifies this third wave of computing as “changing the nature of human-computer interaction in ways that we don’t quite understand.” Whereas the second wave HCI, was dominated by the PD and Computer Supported Cooperative Work (CSCW) user centric approaches, she argues that in this current third wave of computing; innovations are defined by a “take-it-or-leave-it” consumer push, that is more concerned with what can be sold to users rather than what is useful to them. She outlines how the mobility of contexts; and the rise of emotion and reflexivity in designs, have changed the HCI landscape so dramatically that “that many of the questions that we need to deal with as designers of the new multiple, experience-oriented technology are still so open that we need to make technological experiments in order to understand which questions to ask”. Tailorability and reconfigurability are identified as key characteristics for innovative technologies that would support “cooperation between different users in the reconfiguration process.” She calls for an integration of the democratic citizen empowering PD practices, with the new complex landscape of ‘webs of technologies’.

Streitz, calls for a redefinition of human computer interaction, to human environment interaction (HEI), as the “disappearing computer”, becomes embedded in everyday objects like tables and, walls, which have affordances that enable them to be reconfigured as ‘smart’. He indicates the need for a new perspective in research that focuses on how to facilitate human-information interactions to support human-human cooperation, and human empowerment in pervasive environments [63].

Wright and McCarthy [70] note that empathetic design in HCI is becoming more prevalent as experience centred design is widely adopted as a useful approach in the development of new mobile and web interactive and social applications and services. Thus as technology systems extend beyond the task-lists and processes of a work environment; user research must consider the holistic human experience in multi-channel multi-device pervasive complex communications ecologies.

“HCI is concerned with understanding the influence technology has on how people think, value, feel, and relate and using this understanding to inform technology design. Ontologically, HCI is now concerned with the experience, felt life, emotion, desire, fulfillment as well as the more
familiar ontology of activities, practices and tasks. In this context empathy has emerged as an important concept with practical consequences for HCI.” [70]

Ethnographic studies, cultural probes, narrative approaches including scenarios, personas, and technological biographies are referenced as potential methods for empathetic design. Dialogical approaches, where the communication between different stakeholders, such as users and developers, forge “creative understanding”, and innovation occurs through active listening to different perspectives, are also considered important.

Social computing has not only made it possible for users to become content creators, but has allowed users to contribute to the development processes in novel ways. Users’ interactions with other users, their community affiliations, and sharing activities through social computing, are changing the perception of the user in HCI. Brandzaeg et al. [16] have outlined the potential for a new ‘community-centric’ approach to open innovation; where users’ creativity and problem-solving skills are considered as well as their wants and needs. He underlines that it is early days for engaging online communities as co-creators and cites the Norwegian national RECORD project as an example which used online communities through Living Labs, as part of the innovation discovery and evaluation process for new information and communication technologies (ICT) development. However, issues related to: community interaction, user motivation, engagement, participation, and commitment, have to be given due consideration; and can be time consuming when conducting research with virtual communities. Also, establishing the users’ trust, with regard to security and privacy, is an essential aspect of involving users in innovation processes.

The European Network of Living Labs (ENOLL), have registered users across the continent who are participating in co-creating and testing innovative ideas and products, using social computing tools.

“The role played by consumers and end-users is recognized as a powerful source of innovation for companies engaging in user-driven open innovation, by the innovation strategy discussed during the i2010 mid-term review That review looked at users in the continuously changing landscape of information and communication technologies. As new services and applications are created and taken-up rapidly towards the mass-market scale, it is necessary to ensure that they meet the expectations of the consumers. The explosion of user created content is adding yet another dimension to the role of users in the information society.” [27]

Users are creatively engaging in the power dynamics afforded by the emerging social and ubiquitous ICT convergence, as active citizens and ‘smart mobs’ [56], playing with social influence as a design tool in movements such as Avaaz [2]. Social media in particular is evolving to take an active role in political and social events, and communications from areas where the traditional media is closely controlled. It has been recognised as an enabling factor for grassroots social & political movements [51, 29], and also as a medium that could encourage civic participation. However, as the public sphere widens online with more inclusive citizen engagement through social technologies, simultaneously the digital divide also widens with larger inequalities of online participation indicated for the future in Europe [18]. However non-adoption by users of technologies should be considered as complex. “Non-use is, often, active, meaningful, motivated, considered, structured, specific, nuanced, directed, and productive” [60]. Developing societies around the world are discovering novel and creative social uses for ICT technologies [20], for example, using phone credit as alternative local currency. As mobile social computing could enable the next billion to come online globally; it sets new challenges for ethical and sustainable human centred innovation, [22].

“As digital, interactive technology enters every aspect of our lives we must do justice to the full complexity of actual human lived experience, where people actively and individually construct meaningful experiences around technology. We might even have to take responsibility for how society is shaped by this second digital revolution – making values such as privacy, autonomy or trust, but also living a good, rich life, explicitly part of our design processes and study methods, creating for a sustainable, human-friendly society.” (Hook [35])

2.1.1 User Centred Design (UCD)

User Centred Design (UCD) prioritises the user and in doing so ultimately aims to achieve both aesthetic and usable design. The UCD process is an iterative approach that focuses on the end user. Traditionally, UCD,
has a functional approach in HCI, where the main goal is to improve the execution of tasks and activities, reduce error and frustration.

“Tasks should be simple in structure, minimising the amount of planning or problem solving they require. Unnecessarily complex tasks can be restructured, usually by using technological innovations. Here is where the designer should pay attention to the psychology of the person, to the limits on how much a person can hold in memory at one time, to the limits on how many active thoughts can be pursued at once.” (Norman [49])

UCD proposes that when building complex systems, designers should ensure that they do not lose sight of the people who have to use these systems. This principle applies to any system that requires user interaction with machines, whether it is the instrumentation that a pilot controls in an airplane cockpit or the application menu of a mobile phone. It is essential, from a UCD perspective, therefore that the designer includes the end user in all iterations of their design process. Real world tests, which focus on gathering user requirements from real users, are central to this design cycle. Designers should not make assumptions about the user but instead work with users to establish their goals and help them achieve these goals as easily as possible. Some of the criteria used to measure usability are effectiveness, efficiency, safety, utility, learnability and memorability [49].

The human centred design (HCD) process for interactive systems, as outlined in the ISO 9241-210 standard (see Figure 1) deliniates four linked activities which are necessary during a system development lifecycle. These are: to understand and specify the context of use; to specify the user requirements; to produce design solutions; and evaluation. [37]

![ISO 9241-210 standard on human-centred design process for interactive systems](image)

The ISO 9241-210 standard defines the following principles of HCD. It should include clear understanding of the user, task, and environmental requirements. It should support the early and active involvement of users; be driven and refined by user-centred evaluation; and also include iterative design solutions which address the whole user experience and promote multi-disciplinary design. A model (see Figure 2) illustrating an emergent conceptualisation of HCD, which combines Maslow’s hierarchy of human needs model with Jordan’s hierarchy of user needs and Kuthe’s design and society model has been advanced by Zhang and Dong [71]. It indicates that in order to design human centred systems, we should consider users’ emotional (self-actualisation), psychological (esteem) and social needs, taking both the users’ prior experiences and expectations into account, as well as their needs for functionality and usability.

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4 The term human-centred design (HCD) has become more prevalent, recently and can be considered interchangeable with user-centred design (UCD) for the purpose of this document.
UX is influenced by the “user’s internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organisational/social setting, meaningfulness of the activity, voluntariness of use, etc.).” (Hassenzahl and Tractinsky [32])

User Experience (UX) is the term commonly used to refer to the holistic ‘felt-life’ view of the human-computer interactions [70]. It includes human expectations, emotions, prior experiences, aesthetics, context and feelings about interactions with a system to be significant to its design, acceptance, and value. A formal definition of UX issued by ISO 9241-210: “A person’s perceptions and responses that result from the use and/or anticipated use of a product, system or service” suggests that UX can be measured using the behavioural and attitudinal metrics of usability. HCI researchers recognise the limitations of focusing on functional attributes of a system, particularly with regard to mobile computing which is used in multiple contexts and is therefore, also focused on pleasurable and sensory hedonic use. The context: environment, social, and temporal aspect of interactions; along with the system: products, services, and infrastructure; and users: emotional, subjective, and physical attributes of the person interacting with the system; are the core building blocks of user experience [57]. UX is potentially a useful design perspective when considering Technology Acceptance Models (TAM) [21] for mobile, social and ubiquitous computing as it invites us to think beyond the traditional focus on the users’ tasks and activities, to think not just of perceived ease of use, and perceived usefulness, but also of perceived desirability [57]. Neilsen lists usefulness, practical acceptability, and social acceptability as relevant to UX acceptance [47]. Roto has graphed her findings on user experience evaluation as relative to the user’s expectations about investment versus value, in her study on mobile user experience (see Figure 3) having qualified user experience is acceptable if the expectations are met, negative if not met, and positive if exceeded [57].

UX design is recognised as a commercial differentiator in the marketplace, popularised by the success of Apple iPhone, and other high-end technology products. Norman, who introduced the concept of “total user experience” to Apple, explains user experience as the sum of the visceral (aesthetic attributes), behavioural (useful and pleasurable attributes) and reflexive (cognitive, self-image, memories) qualities of a user’s experience with a product [49].

With the evolution of social networking and online communities coming to the fore, UCD, HCD and UX approaches are becoming more prevalent in software design and accordingly these processes are adapting; community-centric design, with cooperative work tools, is becoming increasingly important, and traditional usability methods are evolving to online media formats. There is a prevalent rise in the use of: digital cultural probes, digital ethnography, online surveys, smartphone applications, focus groups, and visualisation tools as a means of gathering user experience data. Users availing of these emerging technologies are now viewed as co-creators, embedded in Collaborative Work Environments (CWE). Participatory methods are imperative to develop services that aim to narrow the digital divide. Projects such as Living Labs observe users context and social interaction by running rapid co-creative experiments. [16]
With the widespread deployment of high-speed wireless networks and mobile phones becoming more like hand-held computing devices that include multimedia functionality and rich user interfaces, the focus of HCI is more important than ever [1]. Mobile applications will appeal differently to different people and it is critical to match the applications to the people who will use them, and as such it is crucial that designers of applications need to understand their users.

Take for example the meteoric rise in the late 1990s of the use ring-tones and personalized logos as a fashion statement amongst teenagers. Nokia clearly understood that their younger customers used the cheaper text messaging rather than voice calls, as a way of communicating with their friends. The company started producing low-cost mobile phones specifically to exploit the explosive growth in this market. Then they developed “Smart Messaging”, which allowed ring tones and screen logos to be swapped between users by using standard text messaging. Teenagers became empowered to define themselves as a separate group and established the mobile phone as a youth icon, promoting freedom and individuality. The key point is, knowing your user works well for the system development process.

2.1.2 Ethnographic Methods

User observation is a common field study method to gather information about the user, his attitudes, behaviour and activities. There are many different methods that can be applied: informal interviews, direct observation, participation in the group and more. Participation can range from simple physical presence to the full participation of the researcher in the user’s work. The objective of user observations is to get access to information that would not be accessible via other methods, such as questionnaires or studying documents. The personal and direct experience allows the researcher to get a deeper understanding of the user. It can be distinguished between open and covert observations, where the user either knows that he is observed or not, which can significantly influence his behaviour. Although user observation is generally characterized as qualitative research, it can also include quantitative measurements.

“While the ethnographer is interested in understanding human behavior as it is reflected in the lifeways of diverse communities of people, the designer is interested in designing artifacts that will support the activities of these communities. The current challenge is to develop ways of linking these two undertakings” [11].

Ethnography is an interpretive, exploratory, qualitative method of data collection and analysis; traditionally employed by anthropologists and social scientists, to describe a culture, a community, or users’ behaviour in a naturalistic context. It is both the research activity and the written artefact reporting on the research analysis. Millen notes: “ethnography is rather a form of analytic reportage, with the ethnographer acting as a translator or cultural broker between the group or culture under study and the reader” [43]. It involves non-obtrusive immersive field studies. Researchers aim to align themselves with the community to be researched, to gain an emic\(^5\) perspective. They then partake in community activities, and they simultaneously observe and record how people behave as they go about their activities within their naturalistic environments. The corporate ethnographic approach was pioneered by PARC in the 1970’s, with a famous study of photocopier use [64]. This popularised the use of ethnography for human centred technology design, with a focus on situated action and contextual design. It is employed by large corporations, such as Nokia, Intel and IBM as part of their innovation process.

The primary method of field study is participant observation, where the objective is to try to experience the community’s culture from a member’s perspective, and record it. [30]. Researchers also may interact with some representative users, who are called ‘informants’ or ‘guides’ directly but non-obtrusively: following and closely observing an individual member through the use of ‘shadowing’; or interviewing informants about their activities while they are in the context of performing them, through Contextual Enquiry. Contextual Enquiry was popularised as a PD technique and employed by Digital Equipment Inc. in the early 1990’s [34].

Ethnographies usually take place over an extended period of time, often several months. Researchers gather large amounts of data, with a ‘wide angle’ perspective, often including audiovisual data, such as video

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\(^5\) An “emic” perspective, is a description from within the culture, of cultural behaviour or a belief in terms meaningful (consciously or unconsciously) to the user or actor. [69]
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footage, audio recordings and photography. This data is then parsed, analysed, and interpreted to provide cultural descriptions of a particular group.

However, variations have evolved to research and record cultural behaviour, in a shorter period of time particularly with regard to interactive systems design [36], namely ‘rapid ethnography’ [43], the ‘quick and dirty’ ethnography [36], and ‘focused’ ethnography [39]. These methods are particularly suited to ICT and corporate environments when often it is not feasible or cost effective to place researchers in the field for extensive studies. In 1999, Don Norman wrote about how rapid ethnographies, which could take place over just one or two days, could be useful for human-centred development in his book “The Invisible Computer” [48].

“What human-centered development needs is a variant of traditional ethnography, one that I call rapid ethnography. This is an observational technique for going to the prospective users of a product and observing the activities they perform, their interactions, and the subculture in which they live, work, learn, and play. Rapid ethnography is critical to the invention of new product classes. New product concepts come from observation of the needs of prospective users, devising tools that will simplify and enhance their lives. The goal is to make the people who are being observed become participants in the discovery process of learning just what their real needs are—not the artificial needs proscribed by the way they do things today, but what the goals are, what they are striving for. This is the role of rapid ethnography” [48].

Virtual ethnography [33], and ‘Webnography’ (or ‘Netography’) [55], are other variations, which have been developed for conducting ethnographies on the Internet, with online communities, though websites, discussion forums and social networks. From the beginning virtual communities provided a rich research ground for ethnographers, as it facilitates ‘lurking’ where the researcher can ‘eavesdrop’ with easy access and relatively easy conscience on discussion forums and groups, that they are studying. The meteoric adoption of social media has also provided new territory for ethnographic researchers who are rapidly devising and implementing new methods for recording useful data from users’ performances in these arenas. Social media has allowed ethnographers to join the ‘virtual campfire’, (as described by Ryan [58], in a study based on five years participant observation in social media sites). The auto-recording aspect of micro-blogging and social networks enables reflective analysis based on real data, and thus is potentially an ideal tool for understanding users in SOCIETIES, if these users are willing to be cooperative.

“The approach that is proposed here is to narrow the research question sufficiently so that the field data collection yields a preponderance of useful and actionable data. A telephoto lens is the metaphoric approach of greatest value to the corporate (or HCI) ethnographer. This suggests that the research question is sufficiently well defined and that the research team has a pretty good idea where to aim the camera” [43].

Dourish [24], while questioning the feasibility of translating ethnographic qualitative descriptions into easily accessible and usable requirements; recognises the value of ethnography as an approach that redefines users as actors and re-sites technology use as a creative social activity: “what it does is to refigure “users” not as passive recipients of predefined technologies but as actors who collectively create the circumstances, contexts, and consequences of technology use, inspiring articulation of an alternative”.

2.1.3 Participatory Design (PD)

The second wave of HCI [4] proposed a framework for cooperative design for software development, in which users and developers both participated in defining, designing and developing applications relevant to the work of end users. This built on the first wave of HCI, which focused on "software psychology" in the 1970s (e.g. Shneiderman [61, 62]). Participatory Design (PD) was an approach adopted to facilitate this second wave cooperative software design. PD was popularised by the Scandinavian led Computer Supported Cooperative Work (CSCW) approach. In this approach users are invited to join in the software design process, with developers, as stakeholders in the development project. It aims to allow for a democratic design. Early projects tended to focus on applications for the work environment. [46].

Muller identified the overlapping area in the boundaries between the knowledge and practices of users and those of developers for PD as a potentially fertile zone for cooperative design, which he refers to as the third space in HCI:
“Workshops are thus a kind of hybrid or third space, in which diverse parties communicate in a mutuality of unfamiliarity, and must create shared knowledges and even the procedures for developing those shared knowledges. The best-known workshop format in PD is the Future Workshop ... whose overall framework proceeds through three stages: Critiquing the present; Envisioning the future; Implementing – moving from the present to the future.” [46]

Stories are another method identified by Muller, with the potential to site PD in the third space. They can be used in three ways: to trigger conversations, feedback and analysis; to be told by end users to inform developers about their needs for products and services; or they can be used by design development teams to present their concepts of how a potential technology or service could appear to end-users (e.g. storyboarding).

“Scenarios are mediating the thinking and communication that takes place in design. Thus they are grounded in this co-operative effort and in the practice of the participants.” [13]

“Analysis of Scenarios can foster the identification of areas of difficulty (“pain points”) and experiential gaps (or opportunities), that may be addressed or enhanced through various design solutions.” [10]

PD methods, where successfully enacted, can lead to creative innovations and democratic system development. However, the factor of social influence or ‘group think’ should be taken into account when analyzing group interactions. Users may be hesitant to publicly and openly express their own opinions, or ideas, for fear of being wrong or misunderstood. They may also be influenced by what others say and restrict their own contributions, or design contributions to enhance their reputation or status within the group.
2.2  SOCIETIES User Research Methodology

The Societies methodology is designed to give a broad and deep understanding of the users. Each aspect of research undertaken in T2.1 is approaching users from a different paradigm. Combinations of qualitative and quantitative methods have been used to establish user requirements for D2.1. Qualitative methods were used for field observation, and PD sessions, while quantitative methods such as the questionnaire were used to confirm user behaviour and trends.

An overview of SOCIETIES mixed methods user research methodology, comprising ethnographic methods, questionnaire and PD for WP2 T2.1 is illustrated in Figure 4.

![Figure 4 - SOCIETIES mixed methods user research methodology.]

2.2.1  Rapid Ethnographic Methods

The rapid ethnography model was adapted for SOCIETIES, to gain immediate relevant insights into users’ worlds, with a focus on users’ attitudes and perspectives on community, communications media and technologies.

SOCIETIES aims to understand as holistically as possible, our users, the environment in which these users act, the demands on a user within that given environment, and their goals. By observing users in the context of their own environment, SOCIETIES gained insight into users’ attitudes and perspectives. These observations unveil patterns of group interactions, behaviour, goals and status maintenance.

We focused on recording observations about: how users use social media, various technologies and devices, and what do they use them for. We also sought to uncover interaction patterns with other users within their communities. Who do people contact, why, and how often? How would they like to be contacted? Would they wish to be identifiable to a stranger based on shared interests?
Rapid ethnographic methods are utilised to gain insight to the users’ worlds, in the effort to consider CSS technologies proposed by SOCIETIES from the perspective of the end users. Participant observation, contextual enquiry, guerrilla fieldwork and informal interviews are used to get close to the users and understand the culture and context of their real experiences. Users are observed and interviewed within their own environments in field studies. As in all cases the time available to conduct field studies was limited, rapid and quick and dirty approaches were taken for focussed ethnographic observations. Guerrilla fieldwork and informal contextual enquiries were also conducted in the field. Our results are presented as brief ethnographic vignettes.

2.2.1.1 Participant observation, shadowing and contextual enquiry

Participant observation, shadowing, and contextual enquiry were approaches used in the ‘rapid ethnography’ paradigm for SOCIETIES. These ethnographic approaches are used to unveil what users do, and how they behave in the naturalistic setting of their own environment, as Kuniavsky explains below.

“Examining work and life context produces a richer understanding of the relationships between preference, behavior, problems and values. Laboratory and survey methods extract people from their environments to focus on individual tasks or perspectives or aggregate responses from many people. Field observation’s goal is to gain insight into the total relationship between the elements of the user experience as experienced and understood in the context of use.” [40]

Participant Observation seeks to uncover the meanings in the everyday realities from the perspective of end users by a researcher becoming immersed in the users’ world, and recording his/her observations. By taking on the role of a user, the researcher directly experiences the problems and potentials of the users’ culture and environment. A researcher, who is so completely immersed in the users environment that they identify completely with the culture, is said to have ‘gone native’. While usually an extended period of time is necessary for fully immersive participant observation, a short partial or temporary immersion fieldwork study is recognized as useful, when the objective is to focus investigations around particular key hunt questions. Several techniques are employed to enhance participant observation data collection and note taking. More than one researcher is used where feasible. Audiovisual recordings are used if possible. Microblogging is becoming a popular means of generating diary entries, as a tool for data collection. Traditional hand-written notes are still popular. Notes often guided and collected around specific mnemonics, for example eLabs “A, E, I, O, U” mnemonic [25] for listing activities, environment, interactions, objects and users repeatedly over frequent and regular time slots. Field notes are then coded and researches seek patterns emerging from the data. Ethnography is reflexive and researchers are aware that they will necessarily interpret and bias the results to some extent.

Shadowing is the technique, used here in combination with participant observation, where a researcher follows an ethnographic informant or key user, to observe how they behave in their environment. It differs from participant observation where the emphasis is on the researchers own learning and understanding of the users culture, through interpretation of observations, and instead turns the observation lens onto other participants or users in the field. The participants, whom researchers select to shadow, may be high profile members of a group, typical ordinary members or fringe informants. Fringe informants sometimes provide valuable insights, as they have a boundary position; they may observe interactions within the group, as an ethnographer would, both with insider (emic) and outsider (etic\(^6\)) perspectives.

Contextual Enquiry is the process of conducting informal interviews with end users during the course of their everyday activities, which is known to have different results to information collected in focus group studies.

\[\text{"Much of our skilled behaviour is not conscious: we are primarily aware of our acts when they go wrong or when we have difficulty. Moreover, focus groups tend to reveal what people assume they should think rather than true underlying beliefs. Mind you, this is not deliberate; within the setting of the focus group, pleasant interaction is the norm. In psychology this is called a demand characteristic. People respond to these subconscious demand characteristics by behaving in whatever manner is deemed appropriate: polite, formal, respectful. These are all} \]

\(^6\) An "etic" account is a description of a behavior or belief by an observer, in terms that can be applied to other cultures; that is, an etic account attempts to be 'culturally neutral'. [69]
Contextual Enquiry involves the researcher questioning key users, identified as informants, as they are shadowed throughout a typical day. Users often have tacit knowledge about their activities and practises, which the researcher seeks to access through casual questioning. Interviewing participants in context also means that they are not going to have difficulty remembering what they do. This technique is less invasive than out of context interviews, but more invasive than pure shadowing or non-invasive observation techniques.

For the purposes of SOCIETIES research, these methods have been used intermittently as feasible, over a short intensive and focussed field study for each user group. The results for all rapid ethnographic activities in SOCIETIES are filtered by the researchers’ interpretations and biases. The results for all techniques have been combined and presented as ethnographic vignettes, in an attempt to better communicate the holistic nature of the users’ environments and experiences.

2.2.2 SOCIETIES User Questionnaire

The questionnaire was selected as a quantitative method for the SOCIETIES project to gather statistical information about our users’ demographics and behaviours in relation social media usage, community group communications, technology usage and domain specific issues. It was conducted with a representative a sub-set sampling from our three defined user groups. These were namely the Student, Enterprise and Disaster Management user groups.

SOCIETIES decided to include a customised questionnaire, as a method in our methodology because it enabled us to gather relevant statistical data; gain access to a larger sample size of users than could be feasibly achieved through direct contact; and also gain remote access to users. The questionnaire allowed for generalisations to be made with regard to the larger user group, from which patterns could be observed.

A questionnaire, unlike observation methods, requires respondents to self-report. Users are required to extract themselves from their daily lives and take time to read, and answer questions. It differs from PD sessions where other users’ opinions are likely to influence some responses; as users complete questionnaires independently.

It is also hoped that this statistical information and sampling within the SOCIETIES user trial groups, could help locate our users within the wider European landscape with reference to other studies on the digital landscape such as where they fit in typologies of users [18], Digital Life [66] and OFCOM [52], which although beyond the scope of T2.1 could be useful in the future.

SOCIETIES researchers collaborated to devise questions. In order to investigate our user and the context of use within which, the user would interact with CSS technologies, we generated questions and gathered data which facilitated the following types of user analysis: demographic; usage and experience of technical tools, and devices; awareness of, and expectations of use of sensors, and pervasive devices; participation in social media; community belonging and involvement. In addition, we included sections that explored the specific requirements and technologies for each of our user group domains. The questionnaires were designed to take no longer than 15 - 20 minutes to complete and were circulated to users by SOCIETIES partners.

Quantitative research is used widely in social sciences to prove or disprove a hypothesis. For example, findings such as the fact 100% of all enterprise users use their laptops all the time are an indication that this user group is likely to engage in online activities or communities. We also ascertained the relative distribution of device usage with respect to different activities, with the objective of defining potential devices for a Cooperating Smart Space. Active users tend to communicate on social networking, instant messaging, chat, and e-mail on balance between various mobile and PC devices. This indicates a willingness on the users’ behalf to use smartphones and other seamless technology in their everyday lives.

Different modes of communication are used for different groups. What is successful for one community group, may not work for another. Although users tend to use several types of communications tools, face-to-face discussion is still ranked as most important by over 90% of users.

The SOCIETIES questionnaire has been broken down into the following categories:
• General Questions - The objective of these general questions was to ascertain the basic demographics of the users, their background, age and experience for all three of our user groups.

• Tech Audit - We sought to ascertain the familiarity and usage patterns of the users with personal and multi-function devices (e.g. smartphone, laptop, games console, printer/scanner/fax etc) based on frequency and application use (e.g. VOIP, email, games, social networking etc). Other questions addressed the use of integrated sensor technologies and the perceived desire for pervasive features. Additionally, the user was queried on their preferences for device and data synchronisation, and the privacy aspects related to this.

• Social Media Audit - The goal of the social media audit was to evaluate users’ habits, trends and key activities on social networking sites. It also helped establish users’ likes, dislikes, and show possibilities for improved functionality in social networks. We asked users which social media sites they belonged to from a range of the most popular sites, to those that are for more niche interests but might indicate something of interest to SOCIETIES. For example Couchsurfing was included, as usage indicates a high level of trust among participants as it is used to organise staying in otherwise unknown members homes, as guests.

• Community Audit - Community is fundamental to the concepts of the SOCIETIES project. We wanted users to define what community means to them, by identifying which groups and communities they belong to, whether online and offline communities, how they tend to form their communities and how to best communicate within that community.

• Student Context Specific Questions - Student context specific questions were designed to understand the patterns of student group communications and community. We wanted to establish how university students interact with staff, fellow students, academic activities and campus or extra curricular activities. Having this information is vital to gain insight into how and with whom a Cooperating Smart Space can work in a university capacity.

• Enterprise Context Specific Questions - Enterprise context specific questions were focused on establishing the needs of enterprise users while attending conference events. These questions were focused on drawing on users experiences when attending these events. We also wanted to gain insight into the types of information and communications services that the user would find useful to have in advance, during and after the conference event. Finally we specifically queried the user to see what community related services would they see as useful for a conference situation.

• Disaster Management Context Specific Questions - Disaster Management (DM) users are a specialist group. The objective of the DM questions was to establish what exactly users’ needs are in the case of emergency response specialists on the field. These questions were also aimed at establishing future potential for smart technologies and harnessing the wisdom of the crowd through social media, in disaster management situations.

The need to gather more detailed information about users’ usage and device patterns for new media in order to classify users for useful reference has been identified by Brandtzæg:

“However, the need to gain more knowledge about users and usage of new media has been growing for some time now. What is meant by media behaviour and how can the different types of behaviour be determined? This is important partly because of the complexity of media systems and partly because of the importance of users who handle new media. ... research should not only focus on a technological artefact, but should also consider patterns of usage when studying the digital divide and social implications of technologies. This implies that we should, as in this MUT, go beyond the binary differentiation of users versus non-users.” [17]

We expect users’ behaviours and devices to change over the course of the SOCIETIES project. Having gathered statistical data at the project’s outset allows SOCIETIES to consider capturing the most relevant data sets again, at a different point in the project, to provide for a longitudinal study of SOCIETIES user behaviour.

7 CouchSurfing is a worldwide network for making connections between travelers and the local communities they visit. (http://www.couchsurfing.org/)
2.2.3 Participatory Design (PD) Sessions

Participatory Design sessions were chosen for the Societies user research methodology as a democratic, collaborative approach, to enable creative, cooperative development of SOCIETIES concepts; involving all the stakeholders in SOCIETIES; namely researchers and users in the Student, Enterprise and Disaster Management groups. These techniques are influenced by the philosophy and experiences of Computer Supported Cooperative Work (CSCW) experiences in living labs.

Scenarios are employed as a design and communications technique in these PD sessions for exploring concepts about CSS in a cooperative manner. Scenarios in T2.1 function both, as a creative process for visioning exercises and as an empathetic narrative conduit for complex ideas and information. The divergence and convergence of the various scenarios maps the expectations, emotions and perceived uses for CSS technologies situated in each of the user groups’ environments, through a cyclical and transformative journey from developers to users to developers, in a spiralling process of concept development and refinement.

PD sessions also give SOCIETIES researchers a chance to experience how users interact socially, and behave as a community, and users an occasion to observe and listen to researchers. The sessions enable cooperative design, facilitating relevant group discussions and collaborative creation of visions for SOCIETIES, which are rooted in end users’ real world contexts. The material generated in these sessions, as scenario iterations, will support the creation of applications and services, desirable to users, on SOCIETIES CSS prototypes. These shared experiences in the PD sessions, help researchers and users to share ideas and forge creative understandings [70], which are the shared mental models through which visions of what a Cooperating Smart Space could be, can be sketched.

2.2.3.1 Initial Scenarios For Participatory Design Sessions

Building scenarios aiming to extract user behaviour and expectations is a common practice in software systems design, especially when a PD methodology is used. In order to further verify the system’s “attractiveness”, the SOCIETIES consortium decided on three demonstrator scenario categories, each one addressing a different applications field and user group, i.e. enterprise, students, and disaster management.

These three scenario classes are the outcome of a process where all partners initially contributed with several scenario/scene ideas during various brainstorming sessions. The initial contributions were processed and consolidated into a single initial scenario per user group and each scenario was then visualised. As part of the adopted PD methodology the scenarios were presented to the potential end-users of the system.

A Student scenario brainstorming session was held during the SOCIETIES kick-off meeting in Dublin in October 2010. The session was split into 4 focus groups: i) Pervasive support in a Social setting, ii) Pervasive support in an Academic setting, iii) Social Network support in a Social setting, and iv) Social Network support in an Academic setting. The raw results of each focus group are presented in subsection A.1.1 of Annex A. Based on these results, a suite of scenarios was designed covering both social and academic aspects of University life. More specifically, these scenarios demonstrate how students could benefit from SOCIETIES when they try to meet new people, make friends and spend time with other students performing favourite activities (e.g. sports, games and hobbies). Out-of-classroom and in-classroom educational experiences supported by the CSS framework have been discussed, while new ways of teaching and sharing knowledge have been identified, as presented in subsection A.1.2.6. Finally, subsection A.1.2.7 demonstrates how SOCIETIES could provide the basis for cooperatively distributing a University’s research budget. It should be noted that this scenario also applies to the business/office domain.

A collection of initial scenarios designed for the Enterprise user group is described in subsection A.1.3 of Annex A. The conference-related scenarios describe how Societies can facilitate the organisation of multi-day large conferences with many employees/attendees from different companies and locations. Various examples which enable like-minded business people to discover potential networking targets and relationships though a CSS system are also presented. The e-procurement scenario illustrates how business-to-business purchase and sale of supplies can be managed through the automated social facilities of SOCIETIES. The sustainability in an office environment scenario demonstrates how group context can be utilised to achieve comfort (with regards to temperature, humidity, ventilation and lighting conditions) and, at the same time, efficient energy consumption in office buildings. Finally, the car-pooling scenario describes
how commuters can benefit from SOCIETIES in reducing the costs involved in car travel by sharing journey expenses, with respect to fuel and tolls for example.

The suite of initial scenarios designed for the Disaster Management user group is presented in subsection A.1.4 of Annex A. This suite includes an earthquake scenario that demonstrates how a team of European civil protection experts are performing early stage needs assessment and how they are supported by the Monitoring and Information Centre (MIC) in Brussels, by the local authorities, by the local general public and by offsite volunteers that are organised and are able to communicate via the SOCIETIES advanced social networks facilities. There is also a forest fire scenario demonstrating how SOCIETIES can facilitate the coordination and effectiveness of a fire-fighting joint operation organised by the local authorities and the army.
3 User Group Studies

Three distinct user groups have been identified for exploring and testing SOCIETIES Cooperating Smart Space concepts and ideas; The Student Group; The Disaster Management Group; and The Enterprise Group. In all three cases the groups have been selected, so that they can participate throughout the life of the SOCIETIES project, from this early requirements gathering activity; to consultation and involvement in the design and development of the CSS software and the third party services to be offered by CSS. The CSS and the third party services developed will then be made available as prototypes at various stages of development for user trials, where these same user groups can evaluate how the prototypes meet their requirements, as formulated in this document.

These users selected for requirements gathering activities and participation are representative of the three domains: students, enterprise and disaster management. A sampling of representatives from each group was organised by SOCIETIES partners: Heriot-Watt University and ICCS liaised with the Student Groups, Intel facilitated the Enterprise User Group and DLR organised user interaction with Disaster Management Users. Requirements were gathered from each group using a variety of methods as described below.

The research activities undertaken for this requirements document were the users’ first introduction to the SOCIETIES project. We seek to create an open cooperative environment that is respectful of users’ wishes at all stages. Tailoring the methodologies to suit the users is considered more important than forcing all users to participate in all of T2.1 activities. In the case of SOCIETIES all users are participating on an entirely voluntary basis. They are not funded or participating to fulfil a course or work objective. Thus, planning for all interactions and engagement with these users necessitated utilising the SOCIETIES methodology in a flexible manner, in order to fit into the daily lives and context specific restrictions of users’ availability. Users are based in different locations around the world, which has also meant that some tasks and participation had to cater for remote access.

While generally the role of the archetypical ICT user is evolving from that of a passive consumer, to one of active creator, in the emerging social media and pervasive landscapes; this is not the case for all users. Our research gathers information, which may be used to indicate where the SOCIETIES users are situated in the continuum from passive to active users [53, 18, 42, 66]. As is usual with user groups, some users were more forthcoming and active than others. Many users are observed to be taking a passive role, or that of a non-user (which is not always passive – cf. Satchell & Dourish [60]), in some of our user requirements research activities. The SOCIETIES user research methodology created multiple participation points which gave users options, and also afforded researchers the opportunity to understand which approaches are most suited to each group of users.

As SOCIETIES is interested in how communities and groups of individuals act in social and pervasive environments, careful consideration is given to social factors, such as group norms, social identity, social influence and social cohesion. Social psychologists distinguish between common bond and common identity groups [59]. Common bond groups are those where there are strong links between individuals, whereas common identity groups are those where the attachment is related to identification with the whole group. We seek to understand how users are linked, and in which communities they are members. In all cases, the relationships between users in a given domain, is presumed to be context dependent. SOCIETIES user groups are predominantly common identity groups. The Student group are in the early stages of a course in University, and we can expect some patterns of strong ties to emerge between individuals who form friendships. The Intel Enterprise Group all work for the same organisation. Some users seem to already know each other, while others may begin relationships through sharing participation in the SOCIETIES user group, but their main common identity is through the shared activity of attending conferences. The Disaster Management Group is connected through the shared activity of organising and participating in training courses with the AMC. The leaders and organisers of this disaster management course have strong ties, but the participants are often strangers to each other prior to participating in the course.

Tasks and workshops for SOCIETIES, in T2.1 may already have begun to act as a catalyst for encouraging further links and activities between users, strengthening social ties between individuals and groups. We expect that the relationships and social cohesion between users in our groups will change over the course of the project, and perhaps may even be influenced by SOCIETIES communications and evaluation activities.
3.1 Student Group

Students have been chosen to take part in the user trials due to their ability to adapt to and accept new ideas and technologies. It is also the case that communication plays an important role in their lives as social networks are becoming an increasingly popular communication medium. Students are also less constrained in the way in which they may use a CSS compared with other user groups where the CSS must serve a clear purpose. It is hoped that the student group will identify new possibilities for CSS technology and students will be encouraged to develop their own CSS applications. Indeed, there is strong marketing potential for the future if CSSs can be designed to appeal to this type of user group. For this reason, a student user group is involved from the project outset in ascertaining what features and services would appeal to them. This will feed into the design process and will be used to produce prototypes that are robust and which meet the requirements of the student user group.

The HWU student user group consists of between 30 to 50 students (most of them 18yr olds) commencing their first year of a Computer Science or Information Technology degree at Heriot-Watt University. The following sections describe several means of engagement that have occurred with the student group. These include ethnographic observations and interviews, an online survey and a participatory design (PD) session that took place at HWU on 22nd November 2010, as illustrated in Figure 5 below.

There was also a second student group that was engaged exclusively in the online survey. This group consists of approximately 500 students of the School of Electrical and Computer Engineering of the National Technical University of Athens (NTUA) in Greece. Originally, about 1,500 students had been contacted, who were on their 1st, 2nd, 3rd, 4th or 5th year of their studies. Two email requests have been sent to these students, kindly asking them to participate to the online survey of SOCIETIES. One third of these students were interested and accessed the online survey. It is estimated that at least half of the remaining students, were mainly using email accounts that have not been created by the University and thus were not known to us. Therefore, they have not been informed on time to participate to the survey. It should be mentioned, that only 2% of the NTUA students that have been engaged in the survey were 1st year students, while 20% were 2nd year students, ~22% were 3rd year students, ~25% were 4th year students and ~28% were 5th year students.
The remaining 3% of the NTUA students that participated in the survey indicated that they had already received their first degree, and that they were master, PhD or post-doc students at that time.

3.1.1 Ethnographic Approach for Student Group - Description and Results

The ethnographic observation carried out at Heriot-Watt University included participant observation, which took the form of note-taking, sketching, informal observations, shadowing, and contextual enquiry in the form of informal conversations and semi-structured interviews with key informants. It was considered imperative to look at the user in their environment as a means to gain insight into their lifestyle. By engaging with the user on the field we gained an understanding of their everyday likes, dislikes and needs. This will ultimately be captured in our first CSS prototype design.

University students starting in first year Computer Science were selected as the SOCIETIES student user group. General observations about these students’ lifestyles on the campus were recorded unobtrusively, with particular focus on their environment, access to communications and information technologies, and their daily interactions at university, both social and academic. Also, as part of the ethnographic research a student, hereafter called X, agreed to act as an informant and be ‘shadowed’ during a typical day on the University campus. A UX researcher shadowed this student, participating in daily student activities, and informal conversations to gain understanding of the student users’ perspectives and experiences. Student X is an 18-year-old male, International Student, who lives on campus. He is observed to be studious and quite active in campus activities.

3.1.1.1 Student Ethnographic Vignette – Heriot-Watt Campus Life

All first year students live on campus, as this is mandatory. All students have their own laptops and mobile phones, while some students use higher specification devices than others. Students complained about being restricted to the university campus living quarters. Dorm rooms are basic, flat-mates can be messy and accommodation is expensive. Students currently find it difficult to find part-time employment to fund their studies and pay domestic bills. Each student has their own bedroom with a study desk but shares a living room and kitchen space with fellow first year students. Typically, one living and cooking space is dedicated to five dorm rooms.

In terms of academic life, students can access core lecture notes, as well as additional notes remotely. Students must be logged on to the Heriot-Watt University Vision site in order to do so. This site acts as a gateway between lecturing staff and students. Students can access grades from here and get class notifications and group assignments. All necessary course material is available, while access to computer labs is also provided through this site (HWU Vision). It is impossible for students to complete all course work during university hours. However, most students do not have all the necessary software to complete lab work remotely. A pain point for students is that when they go to the lab room they must key the door after them. Getting key access late in the evenings creates problems. Smart keys could be very beneficial here. Again when accessing student dorms, doors lock behind one and every door needs to be opened with a key. This is frustrating and irritating to students who are trying to rush to their lectures. First year computer science students do not use very many library books at the moment - currently just one. They expect this to change as the course progresses but they do consider this a hands-on course.

Student X’s day begins with a lecture. Students stand in the corridor and wait for students from the previous lecture to vacate the lecture hall. Students chat and complain about being evicted from the computer labs the previous night. There are set usage times for undergraduate students that are different to times allocated for postgraduate and PhD students, which is a bone of contention. It is now the last week of semester so the computer labs are very busy.

Today’s lecture is a revision lecture. There is a projection screen with a PowerPoint presentation at the top of the room. There is an old overhead projector at the side of the room. There is a TV and DVD player on a stand at the right-hand-side of the lecture room. Student X sits at the top of the room. Students collect and pass around lecture notes at the beginning of the class. The lecturer prepares all PowerPoint notes in advance. Notes are also available online, but students find printed notes to be quite helpful. The lecturer has great presence and the students pay attention. He tells funny stories and uses anecdotal evidence. Sometimes
the lecturer stands at top of the class with a projector on the left and blackboards on the right. Sometimes the lecturer is seated at a table at the top of room.

Most students in this class seem very eager to learn. Students are fresh-faced, refer to the notes on their desks and some have bottles of water beside them. Attendance is good considering it is the last week of term.

One student is using a laptop at the back of the class. Most students are carrying school bags or laptop bags. During the course of the lecture, one can hear the sound of pages turning. Thirty minutes into the lecture, one student is falling asleep. Nearing the end of the lecture student X is tired and not taking many notes due to having the handout. The lecture finishes and some students chat in their seats for a few minutes before heading to break. At break the student goes back to his dorm to check emails and take a rest. He chats to one of his fellow students as he crosses the university campus to the dorms located on the opposite side of the campus. Student X then gets lunch in the main canteen area, which is again located in another university building. When student X finishes his lunch he punctually heads to the computer lab session.

There is a queue for the computer labs and a second lab room is opened. The lab has a white board, notice boards and blinds. One student is checking his University emails on his Blackberry. Students are completing their ‘animated pets’ project. They are fixing final bugs before course assessment. There is a good sense of interactive learning as students use Google and refer to the Second Life wiki when trying to solve a bug. When necessary, students also refer to online course materials during the lab. As part of this learning experience, the students cooperate and help each other. They ask for assistance from each other by physically going over to one another's workstations. There is a language barrier among some International Students. The students perform peer-to-peer assessments on course assessment sheets. They then type the assessment into their online learning log using a table form.

This is student X’s first time living away from home in a foreign country. It is difficult to deal with language barriers and cultural differences at times. He misses home but keeps in touch with friends and family via SMS, Skype and social networking sites. Most of his roommates are untidy and at times flat sharing and university life is frustrating. Travelling home during University holidays is expensive and it can be difficult to get one’s desired travel dates and direct flights.

He is looking for part-time work. This is necessary to fund his education and he is willing to work in any available sector. He is actively seeking work by searching job sites as well as locally advertised jobs. However it is still very difficult to acquire employment in the current economic climate. The most difficult thing for him right now is accessing help for his coursework outside of designated computer lab time. He has a laptop but does not have a personal copy of all the software that is used in classes. Although students can access lab work remotely there is no point of contact if they require help, which is perceived to be problematic for some students.

3.1.1.2 Key Observations from Student Field Study

- First-year students have to share many living resources and environments and manage shared bills so domestic resource management tools would be beneficial.
- The Heriot-Watt Vision student website already provides useful information and services targeted to this group, and could potentially be extended to have more student to lecturer, and student to student interactivity with a CSS system.
- Students are irritated by having to use keys to move around campus. Potential to auto recognise environment access allowed, and auto open doors with (hands-free) CSS identification.
- Students would like to have access to remote help as well as lab help.
- Students may need to manage library resource sharing as course progresses.
- Students would like a fair visible system for managing computer lab resources.
- Students would like to have access to help for projects remotely, as well as in labs.
- Students like printed lecture notes, and face-to-face lectures.
- Students need to give peer feedback and log assessments online. Potential for rating service in CSS.
• Students need to collaborate easily for projects in real-time, in labs. Consider how to facilitate remotely.
• Some students might appreciate a language or translation assistance service.
• Some students might appreciate an automatic travel/flight notification service synched with their holidays.
• Some students might appreciate a job-seeking service synched with their coursework timetable.

3.1.2 Student Group Questionnaires - Description and Results

Two universities participated in the survey, Heriot-Watt University (HWU) in Edinburgh, UK and National Technical University of Athens (NTUA) in Greece. 81 HWU students of the department of computer science viewed the survey; 64 students started to complete the questionnaire and of those 64 students 30 of them completed it. The average questionnaire completion time was 19 minutes. 490 NTUA students from the School of Electrical and Computer Engineering viewed the survey; 400 students started to complete the questionnaire and of those 400 students, 194 of them completed it. The average questionnaire completion time was 24 minutes. The questionnaires (see Annex B.1 Heriot-Watt Student Survey and Annex B.2 ICCS Student Survey) were made available online, and questions specific to students were included.

The statistics presented in this section are based upon the answers collected from this user group. The statistics are grouped into several areas. These are: demographical analysis; analysis of use of technical tools, devices, sensors and pervasive aspects; social media analysis; community involvement analysis; analysis of student-specific part of the questionnaire.

3.1.1.1 Demographical analysis

Demographical analysis shows who the participants of the survey are. It covers the gender and age distribution in the sample of students interviewed, based on responses to SQ1 and SQ2.

**HWU students:** 78% of the interviewed HWU students were male and 22% were female. The sample is heavily skewed towards males (approximately 4 males per 1 female). Most participants (84%) are in the 18-24 age group. 11% of participants are between the ages of 25 to 35. 5% of participants are between ages 36 and 45. The sample of interviewed students is not representative with respect to the gender and age of the European population.

**NTUA students:** For NTUA students the results are very similar. 74% of the interviewed HWU students were male and 26% were female. Most participants (96%) are in the 18-24 age group, 4% are between the ages of 25 and 35, while the percentage of participants between ages 36 and 45 is insignificant (less than 0.3%).

3.1.1.1 Analysis of use of technical tools, devices, sensors and pervasive aspects

Participants were asked to specify how frequently they use different kind of computing devices in SQ3. The relative distribution of usage frequency for different kinds of devices is illustrated in Figure 6.

**HWU students (see Figure 6a):** From the relative distribution of device usage frequency it can be concluded that laptops are the most commonly used device among the HWU student group with 90% of respondents indicating they used their laptop either all the time or daily. Desktops were much less favoured with only 50% indicating that they used their desktop computer all the time or daily. Mobile phones are the next most popular device with 76% indicating they used their mobile phone all the time or daily. PDAs and smartphones were less popular with only 58% using them all the time or daily. Media players are quite popular, as 72% of the students use them all the time or daily. Games consoles are used all the time or daily by 35% of respondents, but the majority (55%) only use them on the weekly to monthly basis.

Considering other device usage on a weekly to monthly basis, 79% use printers, faxes and scanners and 72% use digital cameras. 47% use GPS or satellite navigation devices on a weekly to monthly basis, but 46% do not use such devices at all.
NTUA students (see Figure 6b): From the relative distribution of device usage frequency it can be concluded that mobile phones are the most commonly used device among the NTUA student group with 91% of respondents indicating that they used their mobile phone all the time or daily. PDAs and smartphones were much less popular with 66% indicating that they do not use PDAs or smartphones at all. Only 29% of respondents use such devices all the time or daily. Laptops are also very popular with 76% of respondents using them all the time or daily. Desktop usage was less popular with 49% using desktops all the time or daily, 32% using them weekly or monthly and 19% not using them at all.

Devices that are not commonly used on a daily basis include digital cameras (used by 75% of the respondents on a weekly or monthly basis) and printers, scanners and faxes (used by 72% on a weekly or monthly basis). Some devices split the group entirely. Media players are used all the time or daily by 64% of respondents, weekly or monthly by 19% or respondents and not at all by 17%. Overall, the least popular devices were GPS and satellite navigation devices and games consoles. The majority do not use GPS and satellite navigation devices (59%) or games consoles (58%) at all. Only 38% use GPS and satellite navigation devices on a weekly to monthly basis. This drops to 35% for games consoles.

Suggestions for Requirements Collection

Laptops and mobile phones are the most popular devices and hence should be the main target devices for the SOCIETIES system. Smartphones and PDAs are not as popular, but more so among the HWU students.

GPS and satellite navigation devices are not popular among both HWU and NTUA student groups and hence should not be a target device for the SOCIETIES system.

Next in SQ4 participants were asked to state what activities they used each particular device for. Table 1 illustrates how each particular usage activity (such as blogging, social networking, web surfing, etc) is distributed over different types of devices.
HWU students (see Table 1a): A careful look at Table 1a reveals that participants web-surf mainly using their laptops (87%), as well as via their desktop PCs (63%), their mobile phones (47%) and/or their PDAs (43%). Similarly, they use email applications mainly via their laptops (87%), as well as via their desktop PCs (57%), their mobile phones (37%) and/or their PDAs (47%). They use IM tools mainly via their laptops (67%) and their desktop PCs (37%), their mobile phones (37%) and/or their PDAs (37%). Participants use SNSs mainly via their laptops (80%), as well as via their desktop PCs (53%), their mobile phones (40%) and/or their PDAs (43%). 57% and 43% of participants use their mobile phones and/or their PDAs for their SMS/MMS activities. The gaming activities are mainly performed via game consoles (57%) and/or laptops (47%). Participants who blog mainly use their laptops to do so (43%) while participants who use VoIP mainly do so using their laptops (40%) and/or desktop PCs (27%).

NTUA students (see Table 1b): Table 1b indicates that most participants web-surf via their laptops (86%) and their desktop PCs (63%). Similarly, they use email applications mainly via their laptops (80%) and their desktop PCs (58%), while they use IM tools mainly via their laptops (58%) and their desktop PCs (41%). Participants use SNSs mainly via their laptops (57%) and their desktop PCs (40%). 72% of participants use their mobile phones for their SMS/MMS activities. The gaming activities are mainly performed via laptops (42%), desktop PCs (38%) and game consoles (32%). The few participants that blog, use mainly their laptops (21%) and/or desktop PCs (17%). Finally, the few participants that use VoIP do so via their laptops (22%), desktop PCs (19%) and/or mobile phones (15%).

Don't use VoIP Web Surfing E-mail IM/Chat SMS/MMS Games Social Nets Blogging
Mobile Phone 23% 13% 47% 37% 37% 57% 27% 40% 3%
PDA/SmartPhone 40% 3% 43% 47% 37% 43% 30% 43% 13%
Laptop 7% 40% 87% 87% 67% 17% 47% 80% 43%
Desktop PC 27% 27% 63% 57% 37% 13% 27% 53% 17%
Game Console 20% 10% 17% 7% 17% 0% 57% 13% 0%

Table 1. Share of participants that use specific devices to perform the listed activities (a) for HWU students and (b) for NTUA students

Suggestions for Requirements Collection

Games consoles are not often used for the activities listed. This enforces the outcomes gathered from the previous question highlighting that games consoles should not be target devices.

Most activities are performed evenly across all other devices including the target devices identified from the outcomes of the previous question, again enforcing the previous requirement suggestions.

Next, participants were asked to identify different types of sensors (ID sensors, Bio-Sensors, etc.) that they use on a daily basis, in SQ5.

HWU students (see Figure 7a): 10% of the survey participants do not use any sensor related feature, while 90% of participants use at least one sensor related feature on a daily basis. Figure 7a illustrates the different sensors and features, participants use on a daily basis. Light, audio and visual sensors are used the most frequently and were identified as being used on a daily basis by 73% of participants. Location sensors are
also important, as 57% of participants use them on a daily basis as well. The latter is followed by weight, force and touch sensors that are used daily by 50% of participants. The least used sensors are the biometrical sensors and weather related sensors.

**NTUA students** (see Figure 7b): 14% of the survey participants do not use any sensor based features, while 86% of participants use at least one sensor related feature on a daily basis. Figure 7b illustrates participants’ use of different sensors on a daily basis. Light, audio and visual sensors are used the most and were identified to be used daily by 74% of participants. Roughly 27% of participants use location sensors and weight force on a daily basis. The least used are ID sensors and biometrical sensors and weather related sensors.

![Figure 7. Daily use of features and sensors integrated in devices (a) for HWU students and (b) for NTUA students](image)

**Suggestions for Requirements Collection**

Both HWU and NTUA student groups highlighted that they use light, audio and visual sensors most often. Therefore, the SOCIETIES system should support such sensors.

Both HWU and NTUA student groups also use location sensors often. Therefore, the SOCIETIES system should support location sensors.

Next, participants were asked to identify the features they would like to enjoy when interacting with services, devices and resources in general, in SQ6.

**HWU students** (see Figure 8a): Only 7% of participants indicated that they would not like any of the suggested features, while the remaining 93% of participants indicated that they would enjoy at least one of the suggested features. Figure 8a illustrates the features that participants would like to enjoy when using devices and services. A positive response for all proposed features was mainly observed, as 53% to 73% of participants indicated that they would enjoy the proposed features.

**NTUA students** (see Figure 8b): 13% of participants indicated that they would not like any of the suggested features; while the remaining 87% indicated that they would enjoy at least one of the suggested features. Figure 8b illustrates the features that participants would like to enjoy when using devices and services. In comparison to HWU students, the positive response to the proposed features was weaker, as 34% to 59% of participants indicated that they would enjoy the proposed features. Only 3% of both, HWU and NTUA students have suggested other features they would enjoy as well. These features were captured as a free text question. One of the features mentioned was the Smart house scenario, in which the user’s devices could learn about user behaviour and proactively interact with almost everything in the house.
Suggestions for Requirements Collection

Both HWU and NTUA student groups indicated that having resources available all the time was their preferred feature. Therefore, the SOCIETIES system should support this feature.

The majority of HWU students also indicated that they would like all other suggested features. Therefore, the SOCIETIES system should aim to support all suggested features.

Next, in SQ7 participants were asked if they consider data synchronisation among all their devices and web spaces beneficial. Participants were told that they could access all their data and applications from anywhere.

**HWU students:** 35% of participants see a lot of benefits of device and web space data synchronization, 48% see some benefits and 17% see no benefits at all.

**NTUA students:** 29% of participants see a lot of benefits of device and web space data synchronization, 41% see some benefits and 30% see no benefits at all.

Suggestions for Requirements Collection

There is a strong indication from both HWU and NTUA student groups that they imagine webspace and device synchronisation to beneficial. Therefore, the SOCIETIES system should support such features.

In SQ8, participants were asked if they consider the sharing of resources and applications to be beneficial. This question was followed in SQ9 by an additional query into the importance of privacy when sharing. Student responses to both questions are analysed together as they are closely associated.

**HWU students:** 28% of all participants feel that they would allow sharing of resources and applications; while 55% feel that they may allow sharing. Together there are 83% of participants willing to share applications and resources under certain conditions. Only 17% are not willing to share their resources. All participants consider that enhancing privacy is an important factor for facilitating sharing of resources and applications. 28% of participants believe that considering appropriate privacy aspects is important, while the rest 72% feels that it is very important.

**NTUA students:** NTUA students are less trustful and not so willing to share resources and applications. 11% of all participants feel that they would allow sharing of resources and applications; while 45% feels that they may allow sharing. Together there are 56% of participants willing to share applications and resources under certain conditions. 44% are not willing to share their resources at all under any circumstances. Almost all participants consider that enhancing privacy is an important factor for facilitating sharing of resources and applications. 81% of participants believe that considering appropriate privacy aspects is very important, while 16% feel that it is important. The remaining 3% consider privacy to be of little or no importance in such frameworks.
Suggestions for Requirements Collection

Resource and application sharing should be supported by the SOCIETIES system.

The SOCIETIES system must provide adequate privacy support to encourage the sharing of resources and applications among users.

3.1.1.1 Social media analysis

Participants were asked to specify what social media they use (SQ10). The respective results are illustrated in Figure 9.

**HWU students** (see Figure 9a): The most popular social media are Facebook, YouTube and Skype. 93% of the survey participants use Facebook, 80% use YouTube and 60% use Skype. IM tools are a moderately popular social media with 40% of participants stating they used them. Twitter, Wordpress, LastFM and Flickr are used by 15-20% of participants while other social media are used by 13% of participants. 3% of participants do not use any type of social media. The social media that were mentioned by the survey participants as free text were the following: Ventrilo, fora, personal blogging site Drupal and Spotify.

**NTUA students** (see Figure 9b): The most popular social media are YouTube, Skype and Facebook. More specifically, 78% of the survey participants use YouTube, 66% use Skype and 64% use Facebook. Other moderately popular social media are IM tool, Blogger, Twitter and LastFM. 35% of the survey participants use IM tools, 15% use Blogger, 14% use Twitter and 10% use LastFM. Other blogging tools are used by 17% of participants and other social media are used by 12% of participants. The social media that were mentioned by the survey participants as free text were the following: Picasa web (Google), Windows Live Messenger (MSN), Ventrilo, Zino, ooVoo, Deviantart and Tumblr.

![Figure 9. Social media usage (a) for HWU students and (b) for NTUA students](image)
Next participants were asked how often they use social media (SQ11) with respect to the following social media categories: social networking sites ((Social Net), instant messaging (IM) and web logging (Blog). Social media categories are shown in Figure 10.

**HWU students** (see Figure 10a): Most often used social media are social networking sites. 40% of participants use it most of the day and 29% use them daily. Instant messaging comes second. 52% of participants use IM tools most of the day or on a daily basis. Blogging is the least used social media category. Usually it is used weekly or monthly. 27% of participants use it weekly or monthly and 44% do not use it at all.

**NTUA students** (see Figure 10b): Instant messaging is used most often. 47% participants use it most of the day and 22% use it daily. Social networking sites come second. 23% of participants use them most of the day and 36% use them daily. Blogging is the least used social media category of all. 35% of participants use it weekly or monthly and 26% do not use it at all.

**Suggestions for Requirements Collection**

This question has resulted in conflicting outcomes with the HWU students using social networking sites most often while the NTUA students use instant messaging applications most often. Therefore, the SOCIETIES applications and use cases should consider SNSs and IM tools as important social media categories.

The SOCIETIES applications and use cases should not consider blogging sites as important social media categories as both HWU and NTUA students use these applications least often.
Next participants were asked to indicate for which types of activities they use social media in SQ12. The results are illustrated in Figure 11 - Type of activities that social media are used for (a) by HWU students and (b) by NTUA students below.

**HWU students (see Figure 11a):** The activities for which social media are mostly used include keeping in touch with friends and colleagues, emailing and messaging, organising events, chat and instant messaging, posting status updates, sharing photos, videos and links and commenting on links and photos. 93% of participants use social media to keep in touch with friends or colleagues, 77% use it for emailing and messaging and 73% use it for organising events. Social media are used by 70% of participants for chat and instant messaging, posting status updates, sharing photos, videos and links and commenting on links and photos. Roughly half of participants (40-60%) use social media for birthday reminders, music, news and events, groups, sharing information, rating information, showing interest, making new connections and discovering interests and information. Social media are used when gaming by 37% of participants and for supporting a cause by 30%. For other activities the figures are less than 30% of participants.

**NTUA students (see Figure 11b):** The activities that social media are mostly used for are emailing and messaging, keeping in touch with friends, chat and instant messaging and music. 86% of participants use social media for emailing and messaging, 81% use it to keep in touch with friends, 74% use it for chat and instant messaging and 54% use it for music. Activities in which social media are moderately used include listening to music (54%), sharing photos/videos/links (50%), birthday reminders (46%), sharing information (44%), commenting on photos and links (38%), news and events updates (30%). Less than 30% of participants used social media for other activities.

![Figure 11 - Type of activities that social media are used for (a) by HWU students and (b) by NTUA students](image)

**Suggestions for Requirements Collection**

SOCIETIES use cases and applications should consider currently popular social media activities such as email, instant messaging, sharing photos/videos and organising events (to name a few).

SOCIETIES use cases and applications should consider semi-popular social media activities such as discovering...
interests/info, making connections, meeting like minded people and research (to name a few) to encourage such activities over social media.

The next question (SQ13) of the survey asked participants to indicate whether they have ever used or are aware of "location-aware social networking sites" and what was their experience with them.

**HWU students (see Figure 12a):** 28% of participants have not yet heard of location-aware SNS. The same percentage of participants has heard of them, but does not want to use them for privacy reasons. 3% of participants do not want to use them for other reasons. 41% of participants have heard of location-aware SNS and either have positive experience using them or wish to try them.

**NTUA students (see Figure 12b):** Roughly half of participants (52%) have not yet heard of location-aware SNS. 27% of participants do not want to use them because of privacy reasons, while 8% of participants do not want to use them for other reasons. 13% of participants have heard of location-aware SNS and either have positive experience using them or wish to try them.

![Figure 12. Awareness or usage of location-aware social networking sites (a) for HWU students and (b) for NTUA students](image)

**Suggestions for Requirements Collection**

A significant proportion of students from both HWU and NTUA would not use location-aware SNSs for privacy reasons. Therefore, the SOCIETIES system should aim to provide adequate privacy support to encourage further uptake.

The next question of the survey (SQ14) asked participants to indicate with whom and what type of personal information they share over Social Networking Sites.

**HWU students (see Figure 13a):** With regards to the personal information that participants would not share with anyone, location and contact details seem to be the most sensitive information. 35% of participants are not willing to share their location information and 24% their contact details with anyone. For other information this figure is less than 7%.

Regarding the information that participants would only share with some of their friends or with all their friends, 72%-90% of participants are willing to share all of their information, except location, with their friends. This includes photos (90%), videos (86%), profile information (83%), contact lists (79%), page likes and interests (75%), status updates (72%) and contact details (72%).

With regards to the types of data that participants are willing to share in a broader scope or even publicly, the percentage of participants that are willing to share with their groups, the entire social network or publicly their page likes and interests is 25%, their status updates is 24%, their profile information is 17%, their contacts/friends lists is 14%, their photos and location is 10%, their videos is 7% and their contact details is 3%.

**NTUA students (see Figure 13b):** With regards to the personal information that participants would not share with anyone, location and contact details seem to be the most sensitive information. 41% of participants are
not willing to share their location information and 39% their contact details with anyone. For other information this figure is less than 15%.

Regarding the information that participants would only share with some of their friends or with all their friends, 60%-88% of participants are willing to share all of their information, except location, with their friends. This includes photos (88%), videos (87%), status updates (83%), profile information (82%), page likes and interests (79%), contact lists (75%) and contact details (60%).

Less than 13% of participants are willing to share any type information with their groups, the entire social network or publicly. This includes profile information, photos, videos, page likes/interests, contact lists, status updates and of course location and contact details.

Suggestions for Requirements Collection

Different types of personal information have different sensitivity levels. The SOCIETIES system should support the multi-level sensitivity of personal information and manage access to such information accordingly.

The next question (SQ15) asked participants to indicate how satisfied they are with the available privacy settings in social media.

**HWU students (see Figure 14a)**: 41%, 31% and 24% of participants are either satisfied or very satisfied with the privacy settings available in instant messaging and chat applications, social networks and blogging sites respectively. Participants are the least satisfied with privacy on social networks with 31% of participants unsatisfied or very unsatisfied with the privacy settings available in SNSs. No one is very satisfied with the privacy settings available in SNSs. The percentage of participants who are unsatisfied with the privacy settings available in blogging sites and instant messaging and chat applications is the same (10%) and no one is very unsatisfied.

**NTUA students (see Figure 14b)**: Participants are mostly satisfied or very satisfied the privacy settings available in instant messaging and chat applications (44%), while they are less satisfied with the privacy...
settings available at other social media. Thus, only 20% and 26% of participants are (very) satisfied with the privacy settings available at social networking sites and blogging sites respectively. Finally, 37%, 13% and 9% of participants stated that they are (very) unsatisfied with the privacy settings available at social networking sites, at instant messaging & chat applications and at blogging sites respectively.

![Satisfaction Levels](image)

**Figure 14. How satisfied are (a) the HWU students and (b) the NTUA students with the available privacy settings in social media**

### Suggestions for Requirements Collection

Privacy settings and support in the SOCIETIES system should be an improvement over that currently provided in SNSs to encourage system usage.

### 3.1.1.1 Community involvement analysis

The next question (SQ16) asked participants how they prefer communicating with the different groups.

**HWU students (see Table 2a):** Communication with current friends and family is mostly face-to-face, via voice calls and via texting. 93% of participants contact current friends and family face-to-face, 80% of participants contact current friends via voice calls and texting. 77% of participants contact family via voice calls and 57% via texting. Other common methods for contacting current friends are social networks (63%), instant messaging (60%) and emailing (40%). Discussion fora are rarely used for communication with current friends (13%).

- Family is contacted via email by 33% of participants, via instant messaging by 27% and via social networks by 20% of participants, while discussion fora are usually not used for this purpose (3%).
Old friends are mainly contacted through social networks by 70% of participants, via email by 67% of participants and via texting by 57% of participants. Quite commonly used methods for communication with old friends are also face-to-face (33%), instant messaging (27%) and voice calls (23%).

Sport clubs are contacted via email by 33% of participants, 27% face-to-face, 30% through social networks, while 20% use texting and voice calls.

Groups with the same hobbies and interests are contacted via social networks by 47% of participants, face-to-face by 37% of participants, via email and discussion fora by 33% of participants and via texting by 20% of participants.

Groups sharing the same beliefs and religion are mainly communicated with via discussion fora (33%), through social networks (23%) and face-to-face (17%).

Communication with co-workers is mainly face-to-face (63%), as well as via voice calls (43%) and emails (43%).

The main channels of communication with online contacts that are not known offline are social networks (63% of participants), instant messaging (53%) and email (47%). Worth mentioning are also discussion fora with a 33% share and texting with a 27% share of participants.

**NTUA students (see Table 2b):**

Current friends are mostly contacted face-to-face. This method was chosen by 94% of survey participants. Other commonly used methods for contacting friends are voice calls (58%), texting (46%) and instant messaging (40%). 28% of participants use SNS and only 5% use discussion fora to contact their current friends.

Family is contacted via face-to-face meetings by 88% of participants, via voice calls by 51% of participants and via texting by 19% of participants. Other methods are used by less than 10% of participants.

Old friends are contacted through social networks by 47% of participants, via face-to-face meetings by 36% and via emails by 36%. 24%-29% of participants communicate with their old friends using texting, instant messaging and voice calls, while only 2% of participants choose to contact their old friends using discussion fora.

Sports clubs are contacted via face-to-face meetings or discussion fora by 25% and 23% of participants respectively. 18% of participants contact their sport clubs using SNSs, 15% using emails and less than 6% using other communication channels.

Groups with related hobbies and interests are communicated with via face-to-face meetings by 34% of participants, via discussion fora by 31%, via SNSs by 26%, via emails by 22% and via other communication means by less than 10%.

Groups sharing beliefs and religion are communicated with via face-to-face meetings by 29% of participants, via discussion fora by 27% of participants, via email by 13% of participants and via SNSs by 11% of participants.

Communication with co-workers is mainly face-to-face and through email. 63% indicated face-to-face and 54% indicated email. Of the other communication channels, voice calls and texting are used by 32% and by 23% of participants respectively.

The main channels of communication where online contacts are not known offline are SNSs (34% of participants), instant messaging (34%) and emails (24%).

<table>
<thead>
<tr>
<th></th>
<th>Face-to-face</th>
<th>Email</th>
<th>Texting</th>
<th>Social Nets</th>
<th>Voice Calls</th>
<th>IM</th>
<th>Discussion Fora</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Friends</strong></td>
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<td>40%</td>
<td>80%</td>
<td>63%</td>
<td>80%</td>
<td>60%</td>
<td>13%</td>
</tr>
<tr>
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<td>33%</td>
<td>57%</td>
<td>20%</td>
<td>77%</td>
<td>27%</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Old Friends</strong></td>
<td>33%</td>
<td>67%</td>
<td>57%</td>
<td>70%</td>
<td>23%</td>
<td>43%</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Sports Clubs</strong></td>
<td>27%</td>
<td>33%</td>
<td>20%</td>
<td>30%</td>
<td>20%</td>
<td>0%</td>
<td>13%</td>
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<tr>
<td><strong>Hobbies/Shared Interests</strong></td>
<td>37%</td>
<td>33%</td>
<td>20%</td>
<td>47%</td>
<td>13%</td>
<td>17%</td>
<td>33%</td>
</tr>
</tbody>
</table>
Table 2. Preferred communication means with different groups in life (a) for HWU students and (b) for NTUA students

Suggestions for Requirements Collection

Preferred communication channels are dependent on who the user is communicating with. The SOCIETIES system should support this dependency and tailor communication channels accordingly.

The next question (SQ17) asked participants to rank their preferred mode of discussion for groups.

**HWU students (see Figure 15a):** Face-to-face is the preferred method for group discussions for 86% of participants. Texting and voice calls are the next most preferred discussion methods for communication with groups. These are followed by email and SNSs. Finally, instant messaging and discussion fora are the least popular methods for group discussions.

**NTUA students (see Figure 15b):** Face-to-face is the preferred method for group discussions for 91% of participants. Voice calls, texting, instant messaging and emails are the next most preferred discussion methods for communication with groups. Social networks and discussion fora are the least popular method for group discussions.
Suggestions for Requirements Collection

The SOCIETIES system should attempt to emulate aspects of face-to-face meetings during remote communications between group members.

Immediate/rapid response communication methods seem to be preferred for group discussions. The SOCIETIES system should support immediate/rapid response communications.

The next question (SQ18) asked participants to indicate whether they accept suggestions to make new friends made by SNSs.
HWU students (see Figure 16a): 69% of participants that answered the question do sometimes accept such invitations. 28% of participants that answered the question never accept such invitations and 3% of participants would always accept invitations to connect with new friends.

NTUA students (see Figure 16b): 38% of participants that answered the question do sometimes accept such invitations. 33% of participants that answered the question never accept such invitations and 28% do not use SNSs. One of all participants that answered the question would always accept invitations to connect with new friends.

Suggestions for Requirements Collection

Very few participants indicated that they would always accept invitations to connect with new friends. Therefore, it is important that the SOCIETIES system alerts to the user to such proposals or allows the user to specify strict acceptance criteria.

The next question (SQ19) asked participants about the most significant criteria for joining a new group.

HWU students (see Figure 17a): “Other members should already be my friends” is the most important criterion when joining a new group for 48% of participants. The next most important criteria are “Other members should have the same interests as me” and “Other members should be friends of contacts that are already my friends”. The least important criterion is “Other members should spend some time in areas close to me”.

NTUA students (see Figure 17b): The question was answered by 79% of the survey participants. “Other members should already be my friends” is the most important criterion when joining a new group for 57% of participants. The next most important criteria are “Other members should have the same interests with me” and “Other members should be friends of contacts that are already my friends”. The least important criterion is: “Other members should spend some time in areas close to me”.

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Figure 17. Significance of criteria based on which one accepts to join a new SNS group (most important criterion ranked by 1 and least important by 4) (a) for HWU students and (b) for NTUA students

Suggestions for Requirements Collection

Both HWU and NTUA student groups ranked the criteria for joining new groups identically. These criteria and their rankings should be input to the design of algorithms for automatic group/community suggestions.
3.1.1.1 Analysis of student-specific part of the questionnaire

Additional questions were asked to gain more student related insight. Question SQ20 asked participants about their circle of friends since they began University.

**HWU students (see Figure 18a):** 77% of participants associate with people from the course and 57% with people they know from school. 37% of participants associate with people with whom they share halls. The least number of participants (27%) associate with people they have met through student groups or clubs and 17% of participants have some friends that originate elsewhere.

**NTUA students (see Figure 18b):** 68% of participants associate with people they know from school and 65% with people on their courses. 40% of participants associate with people they have met through student groups or clubs. The least number of participants (16%) associate with friends with whom they share halls and 11% of participants have some friends that originate elsewhere.

![Figure 18. Nature of friends since the beginning of University studies](a) for HWU students and (b) for NTUA students]

**Suggestions for Requirements Collection**

These findings should input to the design of student specific use cases and applications related to building networks of contacts.

The next question (SQ21) asked participants how they communicate with other students or members of the university community.

**HWU students (see Figure 19a):** The most common way for participants to communicate with other students or members of the university community is on course lectures requiring physical presence, via face-to-face meetings, via phones and via hardcopies/lecture notes with 80% of participants communicating in these ways. University online services are used by 60% of participants, while 30% of participants use a community on a social networking site where everything is published online. 3% of participants use other means of communication. The means of communication that were mentioned by the survey participants as free text are the following: friends of friends, out of University, people I knew beforehand but not from school, people from local area, friend from when I was younger.

**NTUA students (see Figure 19b):** The most common way for participants to communicate with other students or members of the university community is on course lectures requiring physical presence, face-to-face meetings, via phones and via hardcopies/lecture notes with 81% of participants communicating in these ways. University online services are used by 35% of participants, while 19% use a community on a social networking site where everything is published. 7% of participants use other means of communication. The means of communication that were mentioned by the survey participants as free text are the following: different types of fora, phone, messages, instant messaging and “no friends”.

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Figure 19. Means of communication with fellow students or other members of the university community
(a) for HWU students and (b) for NTUA students

Suggestions for Requirements Collection

Immediate/rapid response communication methods are most commonly used among students and the university community. Student use cases and applications should consider such communication methods.

Online services are significantly used for communication among students and the university community. Student use cases and applications should also consider these communication methods.

The next question (SQ22) asked participants how often they interact with other students or members of the university community online.

**HWU students (see Figure 20a):** 59% of participants who answered the question interact online with other students or members of the university on a daily basis, 38% of participants interact online on a weekly basis and 3% of participants interact online with other students or members of the university on a monthly basis.

**NTUA students (see Figure 20b):** 56% of participants who answered the question interact online with other students or members of the university on a daily basis, 34% of participants interact online on a weekly basis and 10% of participants interact online with other students or members of the university once a month or less.

Figure 20. Frequency of interaction with fellow students or other members of the university community via the Internet
(a) for HWU students and (b) for NTUA students

Suggestions for Requirements Collection

Although the last question identified that online services are not the preferred method of communication between students these results show that university community interactions are most frequently performed over the internet. Therefore, the SOCIETIES system should look to improve these frequently used internet-based communication channels with the aim of enhancing their popularity to that comparable with face-to-face meetings and phone calls.
The next question (SQ23) asked participants about the reasons they interact with other members of the university community online.

**HWU students (see Figure 21a):**
Participants mostly interact with other members of the university community online for socialising, entertainment and to communicate (73% of participants for each) or to share views, information, multimedia material and experiences (70%). 63% of participants interact with other members of the university community online for purely educational or studying purposes. Quite large percentages (30-40%) of participants interact to keep in touch, to meet new members of the university community, to keep up to date with university news and to plan university events.

**NTUA students (see Figure 21b):** Participants mostly interact online with other members of the university community for purely educational or studying purposes (75% of participants). A high percentage (59-64%) interact with others online for socialising or entertainment; to share views, information, multimedia material and experiences; to communicate and to keep up to date with university news. 41% of participants interact with other members of the university community online to keep in touch or meet new university community members. They interact least online to plan university events (18%).

![Figure 21. Reasons for online interaction with other members of the university community](image)
(a) for HWU students and (b) for NTUA students

**Suggestions for Requirements Collection**
There is a noticeable difference between the HWU and NTUA answers to this question. In contrast with NTUA...
students, HWU students mostly communicate with each other for social, entertainment and non-educational purposes. This interesting outcome should be considered in student use cases and applications.

The next question (SQ24) asked participants about the importance of attending lectures if all material is available online and the lecturers are contactable via mail.

**HWU students (see Figure 22a):** 72% of participants who answered the question believe it is important to attend lectures, although the lecture material is available online and lecturers are contactable via mail, while 24% of participants are not sure about that. Just one participant believes that attending lectures is not needed anymore.

**NTUA students (see Figure 22b):** 64% of participants who answered the question believe it is important to attend lectures, although the lecture material is available online and lecturers are contactable via mail. 10% of participants believe that attending lectures is not needed anymore, while 26% of participants have no clear opinion on this.

![Figure 22](a) (b)

**Figure 22.** Importance of attending lectures on campus, when lecture material is available online and lecturers are contactable via email, (a) for HWU students and (b) for NTUA students

### Suggestions for Requirements Collection

Interestingly, both HWU and NTUA students significantly believe it is important to attend lectures. This reflects the result that most students prefer to communicate through face-to-face meetings. The SOCIETIES system should consider this finding in use cases and applications with the aim of enhancing remote learning applications with aspects of physically attending lectures.

The next question (SQ25) asked participants to state how often they use online services for University processes and activities.

**HWU students (see Figure 23a):** 79% of participants who answered the question use online services for University processes and activities on a daily basis, 21% of participants use them weekly and no participants use them less than once per week.

**NTUA students (see Figure 23b):** 58% of participants who answered the question use online services for University processes and activities on a daily basis, 35% of participants use them weekly and 7% of participants use them once or twice per month or less.
Suggestions for Requirements Collection

A significant proportion of students use online services for University processes on a daily basis. Therefore, the SOCIETIES system should consider and support such popular online University services.

The next question (SQ26) asked participants about ways of gaining the appropriate knowledge to solve some computer problem.

**HWU students (see Figure 24a):** Searching the web is the most popular way of gaining the required knowledge for 76% of participants. Asking a friend is the second most popular way, while borrowing library books or buying books are the least popular options.

**NTUA students (see Figure 24b):** Searching the web is the most popular way of gaining the appropriate knowledge for 74% of participants. Asking friends and borrowing library books are the next preferred options, while buying books is the least popular way of gaining the appropriate knowledge.
Suggestions for Requirements Collection

The web is the most common source of knowledge for students. The SOCIETIES student use cases and applications should consider this finding.

The second last question (SQ27) literally read “When you first came to the University, would you have found it useful if your mobile phone automatically put you in contact with other like-minded people?” The cumulative answers to the question are visualized in Figure 25. Perceived utility of automatically been
brought in contact with like-minded people by mobile phone when first coming to the University (a) for HWU students and (b) for NTUA students.

**HWU students (see Figure 25a):** 38% of participants who answered the question believe it would be useful if their mobile phone automatically put them in contact with other like-minded people, while 41% of participants are not sure about that. 21% of participants who answered the question believe it would be not useful if their mobile phone automatically put them in contact with other like-minded people.

**NTUA students (see Figure 25b):** 24% of participants who answered the question believe it would be useful if their mobile phone automatically put them in contact with other like-minded people, while the remaining 76% of participants believe it is not useful or are not sure about that.

![Figure 25. Perceived utility of automatically been brought in contact with like-minded people by mobile phone when first coming to the University (a) for HWU students and (b) for NTUA students](image)

**Suggestions for Requirements Collection**

Interestingly a large percentage of HWU students would find this functionality useful. Therefore, the SOCIETIES system should support this. However to satisfy the majority who are unsure or dismissive of this functionality the SOCIETIES system should carefully handle automatic connections between users by providing adequate prompting when required.

Free Form Responses: In this survey there were 8 questions, where students could answer (also) in free text form to express their opinions. As expected, students replied with a variety of answers to these questions. However some of these answers demonstrated some common characteristics, which are summarized in the rest of this section.

(SQ7) “If you could synchronise all of your devices and web spaces so that you could access all your data and applications from anywhere would you see any benefits to this?” The most popular answers were instant access to a lot of vital information, no waste of time and no need to carry many devices.

(SQ8) “Would you allow others to access some of your applications and resources in return for access to some of their applications and resources?” While most students have serious privacy concerns, some are willing to share applications and data if a high level of trust has been built between the student and the other party and in case there is a certain known scope regarding the usage of the disclosed information (such as to support cooperative work for example). Many students also believe that sharing applications and resources can be valuable regarding the exchange of ideas and knowledge.

(SQ13) “Have you ever used or are you aware of location-aware social networking sites (L-A SNS) such as Foursquare and/or Facebook Places?” The responses indicate that many of the students have never heard about four-square or Facebook places. In general, the students are not willing to share their location. Students that agree on sharing their location prefer a more abstract location information disclosure and prefer avoiding the disclosure of the exact place they are located at.

(SQ18) “Do you accept any suggestions made by the Social Networking Site about connecting with new friends?” The responses indicated that students tend to be very cautious in accepting SNS friend suggestions. Most of them prefer to have a real personal relationship with a person before starting a virtual interaction.
with him/her. It was also evident that students are not willing to let the SNS take full control of their actions and choices.

**(SQ20)** “Who makes up your main circle of friends since you began University?” The most popular answers were friends of friends, people met during an activity related to sports or other hobbies, and people sharing the same beliefs or ideas.

**(SQ24)** “Do you think it’s important to attend lectures on campus if all the lecture material is available online and the lecturers are contactable via email? Please explain your answer” The majority of students indicated that they believe that it is important to physically attend lectures, as during the face-to-face lectures students get additional valuable information. Students indicated that they better comprehend the new topics that are taught when the lectures are given by a tutor.

**(SQ27)** “When you first came to the University, would you have found it useful if your mobile phone automatically put you in contact with other like-minded people? Please explain your answer” The responses indicated that many students doubt that a software system is capable of identifying the “like-minded” people. However there are some students who believe that such a service would be quite useful as it would make it easier to meet new students, make new friends and thus to feel less lonely.

**(SQ28)** “How do you envisage that future communication/computing technologies will assist every day academic tasks, making your life easier around campus?” The answers converge to the following.

(i) Study material should be shared freely and be accessible from everywhere. For example, lectures should be streamed and be accessible for students that can’t physically attend. Perhaps even previewing upcoming lessons would be quite useful.

(ii) New technologies should be exploited in full in the academic environment and should be easily accessible by the members of the academic community. Information should be accessible in a simple and straightforward manner.

(iii) The notion of groups should be more widespread in order to support various tasks such as sharing new innovative ideas, working on projects online and cooperating with other students. Additionally, the formulation of groups is believed to support collaboration among individuals who may be unable to physically meet and thus it enables the creation of new business and academic opportunities.

3.1.1.1 Student Group Participatory Design (PD) Workshop - Description and Results

Heriot-Watt and TSSG organised a participatory workshop at Heriot-Watt University on Tuesday 22nd November 2010. Over thirty 1st-year Computer Science and Information Technology students attended. The aim of this participatory workshop was to introduce the Student User Trial Community to the SOCIETIES research project. It was also intended to encourage users to generate ideas, as an interface between pervasive and social technologies that they believe would be useful to them as students.

An agenda was drawn up by Heriot-Watt and TSSG, which comprised of a variety of activities designed to encourage participation with the students. This agenda can be viewed in Annex A. Some of the earlier activities required very little interaction, and allowed the students to watch videos, and learn about some examples of pervasive technology, which might otherwise have been strange to them. As the workshop progressed the activities became more demanding of the students culminating in the students acting out their visions for a SOCIETIES CSS scenario. Each role-play was given an immediate evaluation through feedback from other workshop participants.

Prior to the PD workshop the same student group had completed our student questionnaire, 59 students had viewed the questionnaire and 20 students had completed the questionnaire. We had already begun to build a picture of the students’ experiences with social media, technology and community groups. As we felt students did not have a clear understanding of pervasive technology - we decided to give them an introduction at the beginning of the workshop. The group were given a general overview to the SOCIETIES project and general definitions of pervasive technology.

Videos demonstrating pervasive technology were also viewed during this session; video 1 visualised the transfer of voice call to video; while video 2 depicted transfer of voice call to a car (navigation/route data, parking, video call). We did not push set ideas of pervasive technology and communities on students.
Pervasive is described to students as ‘adding intelligence to everyday dumb networked devices’. Real examples of pervasive technologies are also described to students e.g. the intelligent fridge - letting you know there’s no milk left in your fridge by sending an alert on your smartphone as you stroll past your local Spar supermarket. Another example of Pervasive technology is also given; your smartphone recognises you are attending a meeting or lecture and goes into silent mode. This is because you have subscribed lecture timetables and calendar information to your smartphone. Our SOCIETIES CSS scenario is also communicated to students at this point.

When asked about social media usage at the beginning of the session almost everyone confirms that they use social networks. They also confirm that they have no clue as to what pervasive technology actually is. After the group hear the intelligent fridge analogy they inform us that they are in fact familiar with pervasive technology. This reiterates the fact that using the correct language with our user groups is imperative. We should not use technical language that alienates the user; this kind of language creates boundaries where there should be none.

In order to prepare a successful PD workshop that would engage our entire user group, we endeavoured to use interactive techniques. These methods included; brain-writing in small groups (we split the group into seven groups of five); brainstorming to push the boundaries of core ideas; and finally role-playing where students became both the object and the actor. This brought conceptual scenarios to life and caused much laughter and discussion among peers. We were very pleased with the level of engagement within the group. This seemed to create a buzz and spark ideas especially when users were divided into smaller groups. Everything from using smart technology to locate the most appropriate shop to helping allocate and schedule study time in relation to exam schedules were suggested and acted out by our eager student group. There were also suggestions for applications that would help one prepare breakfast, de-ice ones car and get dressed in the morning. Another suggestion was to monitor heart rates, which could help log different situations and events. For more information on scenarios and concepts suggested by the student user group please refer to Annex A.1.2.

### 3.1.1.1 Scenario Communicated with Student User Group at Participatory Design (PD) Workshop

The following SOCIETIES scenario was presented to the students during the PD workshop. The objective was to provide inspiration and to demonstrate some potential uses for CSS technologies. This scenario was one of several methods, which we used to engage the user and encourage collaborations for independently created scenarios.

**Students start the term with their new SOCIETIES devices and add friends to their contact lists as they meet.**

*One day a student, Arthur, decides to go see the movie “The Town” directed by Ben Affleck. He uses his SOCIETIES device to arrange a group of nearby friends who like Ben Affleck’s movies and suggests they join him. Using their SOCIETIES devices, they all agree on where and when to meet.*

*Arthur finds he has different groups of friends who like to do different things. He finds it best to make separate communities in his device for them to do certain regular events; for example, several of his friends are members of the HWU Taekwondo society. For spontaneous, unplanned events, he and his friends simply create temporary communities on the fly to arrange them. Arthur enjoys fishing, so when he feels like doing this, he makes a group that automatically invites all his friends who also like fishing.*

*In this term, Arthur is in a group coursework project. His group has formed a community, and uses it to arrange meetings. One day Arthur forgets he has a meeting; fortunately, the university has screen monitors and directed speakers dotted around the buildings that recognise this. Arthur carries an activity sensor that detects his direction of movement. His SOCIETIES device alerts him that he’s moving opposite of where the meeting is held and alerts him by making use of the directed speakers: “Arthur, you have a meeting in EM2.52 at 11:00.” The closest monitor shows Arthur the shortest route to get to room EM2.52 and as he starts walking towards the room, the directions are shown on his SOCIETIES device. He heads for the meeting.*

*His 3-hour meeting left Arthur frustrated and so, later in the day, he heads to the local park for a chance to unwind. As he walks along, his SOCIETIES device alerts him that some friends of his are nearby, all*
clustered around the same area. When he goes to this area, he finds they are all having a game of football, so he joins in.

The university has allocated some budget for improvements in the CS department and students are being asked to suggest areas they would like to see improvements. All CS students are part of the MACS community and they use the SOCIETIES devices to vote their preference.

Later in the term, exams approach and it’s now crunch time for studying. His SOCIETIES device alerts him that he’s been invited to a “Learning Buddy” Community dedicated to studying and sharing knowledge about one of his modules. He joins the group and soon the community is buzzing with activity, sharing useful notes and anecdotes of discussions with the lecturer about certain things such as what material is examinable. Some of the members of the group have face-to-face sessions and meet at a student flat while others unable to be there physically use their SOCIETIES devices and participate via video conferencing technology. The lecturer even joins in the community and helps with any questions the students have.

3.1.1.3 Novel Student Scenarios Generated From Participatory Design (PD) Workshop

Student’s scripts were completed for each of our seven groups. By the end of the workshop our user group had independently created CSS scenarios from a student’s perspective. These conceptual scenarios reflect what students feel would benefit their everyday activities. The storyline from each group's role-play is briefly described below. See Appendix A2 for full transcripts of the note sheets collected from each student group.

Group 1 want to create a new type of Augmented Reality technology that aids you in the purchase of whiskey! This smart technology recognizes location context via your smartphone. As you walk down the street and pass the whiskey shop it quickly reminds you that today is John’s Birthday. It quickly beeps a second time to let you know that the shop across the road actually sells cheaper whiskey.

Group 2 want to create pervasive technology that will create a smart study timetable based on their exam timetable. It would also identify groups or students in classes that are studying similar subjects. Finally it will identify books available in the library. In the case of books not available it will identify the local source and cost of the books. This is a clever idea that prioritises student study time as per the scheduling of exams.

Group 3 are interested in smart GPS technology for boats and convertibles. They act out a scene where one is driving a convertible and a storm cloud comes from behind. The driver does not notice but the clever technology raises the roof of the car before disaster strikes. This means the driver does not have to pre-determine weather conditions or pull over. Again this works in reverse when the sun is shining.

Group 4 address smart security technology. You set your burglar alarm via your phone. You receive updates if you are out and your burglar alarm is activated. It also contacts the police.

Group 5 are interested in a medication tracking smart application. When you go to your GP and get a prescription all medication details are entered and saved to this device. It then alerts and reminds you at every instance you need to take your medication via your smartphone. It also tracks and remembers every time you do take medication. It then sends an SMS back to your phone to remind you of the most recent consumption of medication. This ensures you do not overdose on prescribed medication.

Group 6 are interested in smart weather forecasting technology that will let you know in advance what you can or should wear on any particular day. This is pre-determined by the weather conditions for that day. If you suffer from asthma or have any other medical condition that is affected by weather conditions this clever technology gives you a warning to wrap-up before you leave the house!

Group 7 focus on GPS smart technology. In this case the university is their chosen destination. By using smartphones the user knows how many minutes it will take to get to their destination, to get in the car and to calculate traffic time. It provides a final alert alarm when it’s time to leave your house. All in all this device limits being late and reduces stress while increasing time management efficiency.

3.1.2 Student User Research Conclusions

We have shadowed a first year studious International student named X for one day, so as to observe a typical day in a student’s life at HWU. Observations include a lecture course, in which X participated, the overall living and study circumstances of first year students and also students’ interactive assessment in a computer
lab. We gained an understanding and insight into university life, campus activities and students’ experiences. Students’ frustrations with accessing computer labs and their personal dormitory space indicate a need for smart key technology in a CSS. Students also have a clear need for accessing help when completing course assignments at home. An interactive learning environment that is supported by a CSS system could enhance university experience. This could support students’ academic tasks both on and off campus. First year students need to adapt to University life, make friends and often relocate so there is certainly potential for the SOCIETIES project to help students form alliances, join clubs and societies and organise study groups. Over the duration of their four year course students’ priorities and interests may change so the CSS system needs to be intuitive, expressive and acclimatise to the users’ environment.

A total of 571 university students participated in the survey held in HWU and NTUA. The survey results reflect diverse human behaviour characteristics regarding the usage of technical devices and tools, the usage of social media and community involvement. After the demographic questions the next section of the questionnaire focussed on the use of technical tools, devices, sensors and pervasive aspects. The most commonly used devices among students were laptops and mobile phones. It was interesting to note that the uptake of smartphones and PDAs was much greater by UK students. Contrary to stereotypical assumptions of students spending lots of time playing computer games, games consoles were the least commonly used devices.

Before the survey it was unclear to the SOCIETIES team the extent of sensor use among the student group. Reassuringly, most students were familiar with different sensors, the most common being light, audio and visual sensors with location sensors following behind.

When asked about features that the students would like to see provided by the SOCIETIES system, the significant preference was that resources would be available all the time. It was also reassuring to note that the students were not strongly adverse to any of the proposed features and the majority saw the benefits that could be provided by synchronising web-spaces and devices. When asked specifically about the feature of resource/application sharing most students were a little hesitant raising privacy issues as their main concern. Indeed, privacy issues were a common concern raised in various places throughout the questionnaire.

In terms of social media interestingly Facebook, YouTube and Skype emerged as the most popular social media for both UK and Greek students. However the student groups were divided with regards what social media they used most often. HWU students use social networking sites most often while NTUA students prefer instant messaging applications. There was a common disinterest in blogging sites. With regards the activities that the students performed using social media, these were diverse and numerous with the most common activities being email, chat, photo/video sharing and organising events. However, there is scope here for SOCIETIES to encourage other activities over social media including discovering interests/info, making connections, meeting like-minded people and research as these activities are already semi-popular among students.

When queried about location-aware SNSs the students raised privacy concerns however, there was a significant proportion of students who had either already used such SNSs with positive results or who would be keen to try them. Privacy concerns were also raised in further questions regarding the sharing of personal information. The results confirm that individuals regard some items of personal information as being more sensitive than others. Students regard contact details and location as most sensitive. Interests and likes are regarded as least sensitive. It is interesting to note that most students are not satisfied with privacy support in current SNSs and hence SOCIETIES must aim to exceed such privacy support to encourage system use.

When queried about community involvement it emerged that the preferred method of communication within a community is dependent on who is in the community. Predictably more direct methods of communication such as face-to-face and phone calls are preferred within communities of family and close friends while indirect methods such as SNSs and email are preferred within communities where not all members are personally known to the user.

Regarding social invitations, most students filter new friend requests although surprisingly a small minority stated they would accept all new friend requests. Additionally most students have certain criteria for joining new groups. Both HWU and NTUA students agreed that knowing people in the group (or knowing them through friends) was the most influential joining factor. Not surprisingly students were least likely to join groups where they only had locations in common with members.
The student specific questions were less related to technologies and devices, aiming to gather information about student life. It was interesting to learn how most students created their friend networks when they joined University. Most students stated their University friend networks grew from school friends and people on their course. When asked if students would like their mobile phone to automatically connect them with like-minded people the majority were apprehensive of this functionality but a large proportion did state they would be interested.

Within the University community direct methods of communication were preferred to indirect. This may go some way to explaining why most students stated they thought it was important to attend lectures even though all material was available online. Although direct communication is preferred, interaction commonly occurs over the Internet but students were divided over the reasons for online communication with University communities. Interestingly the UK students usually communicate with each other online for social, entertainment and non-educational purposes whereas Greek students usually communicate with each other online for purely educational reasons.

Online University services proved to be popular among students with many using such services on a daily basis for University related processes. Indeed it appears that online tools such as search engines are the main source of knowledge for current students. According to the results it is much less common for students to use the library to gain necessary knowledge.

In addition to a questionnaire, a PD session was organised with first year computer science students at HWU. The aim was to encourage students to generate ideas for aids at the interface between pervasive and social technologies. The session followed a five step agenda including an introduction to SOCIETIES and pervasive computing, brain-writing, brainstorming, body-storming and role-playing, while participants were separated into seven groups to complete designated tasks. During this session the students proposed seven scenarios. They included a smart study timetable, GPS based bad weather alerts, weather-aware dressing recommendations, smartphone based shopping reminders, burglar alarms using smartphones, medication tracking and reminders, traffic-aware alerts and path planning based on smartphones. Full transcripts of the group outputs can be found in Appendix A.

The PD session organisers were encouraged to see how engaged the students were during this PD session, especially during the body-storming session where many interesting ideas were role-played. The session organisers found it challenging to introduce the students to the concepts of pervasive computing and the SOCIETIES project without influencing their ideas, but they stoved to do so in the future brainstorming and brain-writing activities. The ideas generated by the students during these activities do not completely match any of the presented material but some ideas are obviously influenced by it. This is not a negative outcome as all students’ role-played ideas that they felt would be useful to them in everyday life and hence this session has been a valuable exercise for extracting student service requirements. In general the session organisers received a largely positive response from the students with regards the concept of pervasive computing and the aims of the SOCIETIES project.
3.2 Enterprise Group

The enterprise group is comprised of Intel employees who are researchers, managers, support staff, and office staff. These individuals were selected because they have recently attended an Intel conference or are likely to do so in the future. They are all part of multiple communities within the larger enterprise organisation located in 48 countries worldwide and with over 79,000 employees across the numerous geographical locations. The specific methods, from the SOCIETIES User Research Methodology, that have been used with this group for user research are: participant observation, shadowing, contextual enquiry; scenarios; online community forum, group discussion and questionnaire (see Figure 26 - User research methodology: enterprise group methods). The descriptions and analysis for these research activities are presented in subsections below.

Figure 26 - User research methodology: enterprise group methods

3.2.1 Ethnographic Approach for Enterprise Group - Description and Results

3.2.1.1 Situation Analysis

The enterprise user group includes a diverse range of users who form a community in their participation in a shared cultural context of an ICT conference. These users typically spend their working days in the office but attend conferences occasionally to learn about new technologies or research areas, disseminate their own work to other colleagues or third parties and for professional networking to meet other attendees sharing common interests. The challenges of negotiating a new environment, finding colleagues, discovering useful information and making relevant contacts are all experiences that could potentially be supported and enhanced by integrated pervasive and social technologies. The conference context presents an appropriate situation for collecting feedback and trialling the SOCIETIES prototype software with technology advanced users who will have access to a range of both current and future smart devices.
3.2.1.2 Enterprise Group Observation and Contextual Interviews

Qualitative ‘quick and dirty’ and ‘focused’ ethnographic methods were employed in the field studies to gain insight into the world of conferences and attempt to understand it from the perspective of conference attendees. Focused ‘hunt questions’ were chosen to limit the field of study to only consider aspects of participants behaviour most relevant to communications, including personal, social, community and technologies, along with using two researchers, as ‘time-deepening strategies’ [43].

Two UX researchers attended the conference. They used ethnographic participant observation techniques to gain access to the conference culture. Three different enterprise users from Intel’s enterprise user group, agreed to act as ‘informants’ to the conference culture. Hunt questions were defined, to seek data about users' behaviour in terms of communications, technology devices, orientation, ‘pain points’ and interactions with others; at home, in the office and at the event.

Over the course of two days, the researchers observed patterns in users’ behaviour in the conference setting. These enterprise users were ‘shadowed’ by researchers throughout the day as they partook in conference activities. Contextual inquiry style interviews were also informally conducted with these users. An informal chat with a key conference organizer was also informative.

Photographs and audio recordings were used in the data collection process to serve only as memory aides for reference after the event. No personal identifiable information was recorded about the 'shadowed' users.

At different periods, throughout the conference, the UX researchers retreated from the enterprise users and took time to explore the demonstration stands and general environment. They observed and listened using the eLabs Activity, Environment, Interaction, Object, User (AEIOU) observation framework [25] to collect data on; activities, environments, interactions, objects and users. This enabled the researchers to gain a ‘broad brush’ understanding of the culture of ICT conference events.

The three enterprise users who acted as ethnographic informants are described briefly below.

User A is an Intel engineer with a customer focus. He does not regularly attend conferences, but this event is relevant to him and gives him a chance to ‘up-skill’ and stay ‘ahead of the curve’. He uses a laptop for work, to check emails, surf the Internet and download software. He uses a touch-screen smartphone for personal messaging and calls.

User B is a lead engineer for hand-held services with Intel and is also responsible for some IT support. This user is business orientated and regularly checks emails and phone messages. He also uses iPad applications such as the text editor for note taking during the various conference sessions.

User C is a senior engineer. He has travelled from abroad and is attending the conference in addition to other business meetings, in the region. He uses a smartphone for note taking and occasionally he uses a net book device or pen and paper.

3.2.1.3 Enterprise Ethnographic Vignette - Conference Culture

Over 1100 attendees, from 51 different countries, attended the selected ICT conference. This audience was predominantly male. The large multifunctional event space, where the conference is happening, has been transformed by conference branding. The purpose of this conference was to promote a new software platform for multiple devices.

As the conference opens, the atmosphere is one of expectation and discovery. People are milling about and queuing up to register. They include conference attendees, conference speakers, event organizers, facilitators, catering staff, audio-visual people, and security staff. Attendees are chatting as they queue and mill about in the entrance lobby - making calls, drinking coffee and eating snacks. They greet colleagues they know, colleagues they are meeting for first time and contacts from other organizations. On occasions old college acquaintances say hello. Attendees form long orderly queues to register. On registration each attendee receives a purpose printed plastic conference brand pack with a t-shirt, umbrella, notebook and pencil and printed invitation ticket to the conference social event. Attendees put on their nametags. This gesture symbolizes the attendees officially becoming part of the conference community.

On posters, quotes, signs, windows and the multitude of screens, the conference brand’s distinctive logo and graphics claim ownership of the event. Attendees are all promised a free technology device – a net-book, at
the keynote opening address. This causes some excitement with most attendees concerned about getting access to a device.

The keynote talks take place in a large room with a large raised platform for speakers and multiple screens mounted on pillars and walls. These screens are used both for showing slides and for projecting live video of the speaker to the back of the room. This video is shot from another platform. There are special lights for the cameras. There are also branded light pillars on each side of the stage. All talks are thus digitally amplified in real time across the space of the room and recorded for access post event. Most key sessions are streamed live from the conference website so that additional audiences, who were unable to attend, could follow the live presentations and discussions.

There are rows of chairs laid out before the main stage. Further back in the room chairs are positioned around tables. Water bottles, bowls of hard-boiled sweets, pencils, pens and notebooks are provided on tables throughout the event. People gather at the room entrances, stopping just outside or inside to look around. The contents of the conference packs are examined by attendees and put away.

Laptops, net-books and smartphones are opened by a large majority of attendees at least for part of the session and people engage in communication, which sets the pattern for technology use by attendees throughout the event. There is some silent ‘space-making’ as people make room for others and some silent non-verbal communication, nodding and slight eye contact to check availability as seats are taken. Throughout the opening keynote people continue to stream into the room, look about the room for seats and/or colleagues and walk about. Some latecomers sit on the floor. Most people are alone although some are with colleagues or friends.

As the current speaker welcome the following speaker there is clapping. Speakers shake hands with each other. Occasional laughter communicates that a joke from the speaker is appreciated. Open screens reveal email tools where messages are read and written. Some people are tweeting or blogging as people link up to the network. Some people make telephone calls. Some people get up and move about to take photographs. Others chat quietly throughout the session. Leaning forward to read slides is a constant reoccurrence in these busy conference room sessions.

In the large entrance lobby some people are having a meeting. Another person is sitting cross-legged on the floor in a quiet corner on a conference call. One woman is intently typing, focused on her laptop. A group of four have plugged their laptops into a charging station. They sit on comfortable couches smiling, joking and chatting informally. The provision of equally distributed access to WIFI and energy charging stations is a requirement for these conference attendees. Most users have more than one device that sometimes requires both energy and connectivity.

User A’s main reasons for attending this event is to ‘up-skill and prepare’ for new projects. He likes to be ahead of the curve. User B feels pressure to ‘keep up’ with work in the office, by checking email regularly. These users have predefined itineraries, which have been pre-organised with colleagues to gather information with a plan to share reports with the team once back in the office. User B is planning to post blog reports to an enterprise social network in order to share information and opinions with other colleagues. User C waits until he ‘lands down’ (i.e. arrives in the conference country) before checking the agenda details.

User A takes notes on his laptop. He has a touch-screen smartphone, which he uses to make personal calls. He notes that the charges of using web access on the phone are off putting and that in any case he prefers to keep different, distinct devices for work and personal use. His personal contacts do not use social media or email. User B uses a tablet device for note taking, to ‘experiment’ with having a lighter device. User C uses a smartphone mostly, but occasionally uses a notebook device.

Signs, and maps are very important in supporting the users as they navigate the new physical environment, however many users strain to use them on the move in addition to carrying coats and bags. Brochures, both printed and online versions are essential to making sense of the conference environment, both as spatial and information guides. One user notes that maps give relative distance but no real indications of optimal routes or the time required to get to a chosen destination. This user would like personalized directions integrated with his mobile. User C mentions that he refers to the conference web agenda prior to registration to validate whether attending is relevant to his work, and to communicate relevance to co-workers and managers but he prefers to use the agenda on a smartphone once he has arrived at the conference. He checks the larger printed brochure if connection is poor, or more detailed information is required.
Users carry their portable offices everywhere with them throughout the day including laptop bags, coats, cameras, phones, coffee cups or ice-cream cartons. They are sometimes weighed down by all their ‘stuff’.

There are several lunch stations. All are busy. Staff direct conference attendees where to go. All options are the same on each station but some stations run out of a particular option first. There is no means of knowing what lunch menu options are available at which stations until attendees arrive at the top of the queue. Seating is limited at lunch. Some people organise some space on the floor. Many more stand with their plate in one hand and fork in the other with no hands free to manage mobile devices.

After lunch, attendees drift into afternoon sessions, clutching coffees and eating ice cream. The tables and surfaces are now littered with disposable coffee cups. Once seated, attendees return to browsing screens on phones and on laptops. Attendees are listening but slow to participate when invited by the speaker to do so. Laptops are put away. Phones are taken out. Calls are made. Phones are put down and laptops are taken out again. Pencils are picked up and twiddled when no device is in hand. Devices are a ‘shield to the world’ notes one participant. While some checking of emails is essential it appears that being seen to be busy is important for maintaining status.

A speaker, scanning the audience for raised hands, selects feedback questions after his talk. The audience noticeably perks up at the potential for interesting interaction. Some attendees fail to capture the speaker’s attention and speakers sometimes find it difficult to queue questions.

“Let’s finish up now” says Speaker 1.

“One more”, says Speaker 2, “I like questions – they’re so much more fun”.

User C notes: “The guy sitting over there could have some very similar problems he’s working on (to those relevant to my work), but we would never know”

User A is pleased to encounter a work colleague at a shared session. They chat informally. He notes that he is “gleaning information”.

User C suggests that some conferences (but not the one we are attending) use bulletin boards to good effect, which enables attendees to post specific topics for impromptu mini meetings that participants with a particular interest could attend. He suggests that having an electronic business card could also be useful at conferences to avoid having to carry physical ones.

While a variety of devices are used to record conference sessions; pencil and paper is still popular with many users. When asked would they rather take notes online one user says ‘pencil and paper may be a step above googling’.

“Programmer(n): An organism that turns caffeine into code” reads one poster.

Many attendees counteract the tiredness (caused by travelling long distances outside of their normal commuting route to be present) with caffeine to stay alert. Free tea and coffee stations are readily accessible at all times.

User B makes an observation about improving opportunities for making connections at conferences.

‘Technical people aren’t extrovert we need a technical aid/tool to get them interacting’.

Experienced mature conference attendees have a different approach to meeting others compared with attendees at the beginning of their careers. Conference ‘newbies’ are eager to make new contacts while expert attendees are much more discerning about gathering more contacts. One user notes that when several colleagues are present they form ‘a clique’ and are unlikely to interact with anyone from another organisation. Conferences present opportunities for users to share cross-organisation information, and have face-to-face time which can shortcut unwieldy communications chains. Some comments indicate that these face-to-face informal chats and meetings serve communication purposes not easily facilitated by email: “Let me email him, he’s a good friend of mine.” (In reference to a difficulty one user was having with a business contact from another organisation.)

Users interviewed informally also state that they usually know whom you are meeting from other companies in advance. They may have already communicated with them online or on the phone. Users refer to audio conferences and how difficult it is to listen in and work on a laptop. As one user puts it ‘men can’t multi-task!’
Most discussions seem to take place at the end of sessions or in between sessions. Users seem to be opportunistic and use this time to network and form partnerships. At times during sessions it is evident that many one to one conversations take place between users sitting at the same table or side by side. There is a mixture of casual conversations and business conversations. Some users take opportunities to have coffee breaks with others. People stand around in groups talking.

Some users are so busy maintaining existing contacts that they are not eager to make new ones unless they can be identified as very relevant to their business or research interests. One user expects to see people he knows at some conferences (through simultaneously attending those conferences over the years) but nobody he knows at others. If the subject of a conference is outside of his core special interest he doesn’t aim to meet any new people at that conference.

Social events are an important aspect of conferences. Local meet-ups are being encouraged in the 24hr hacker lounge/hang-out room. User C notes that there is little cross-over between work and personal contacts although he also notes that it is more likely for people to cross the divide from work contacts to personal contacts in a different stage of career or life.

Conferences present opportunities for members of active online communities, associated with the main conference subject, to meet in person. These communities use wiki-based sites, not social networks to communicate. A key conference organiser is interviewed and she notes that good documentation and guidelines for community participation are essential tools to facilitate the establishment and development of online development communities.

New members to the online community are provided with an ‘easy-in’ with instructions and requests for simple involvement. Analysis of communities' activities is done with tools but is mostly based on ‘gut feeling’ gained from deep daily involvement with an online community. Fringe events outside the scheduled agenda are popular with some attendees. Attendees, who were already active community members for the platform that the conference was promoting, tend to get more involved at the conference, volunteering where necessary.

As the day comes to a close, conference participants are clearly tired. Some users cross their arms. There are examples of users mirroring each others’ behaviour in the room: rubbing foreheads with hands, yawning, and stretching. One user appears to take a nap with their eyes closed.

3.2.1.4 Key Observations from Enterprise Field Study

- Getting information about WIFI access is a priority for users.
- Managing the availability of WIFI connections where many myriad devices are in use is a challenge.
- Users want to know where, and when to access energy charging stations.
- Orientating and navigating a new environment even with a static map is often frustrating.
- Participants behaviour is modified by the presence of colleagues – less likely to network – more likely to discuss ‘office business’.
- A physical sign like name tags mark users’ roles as attendees at the event.
- Users want distinctly clear identities for work and personal use.
- Users would like to be able to access slides and videos from other sessions during the event.
- Users want flexibility in how to access key information in the conference brochure, in particular: maps, and the conference agenda.
- Users' familiarity with brand, and positioning of brand marks boundaries, and reassures users they are in the conference space.
- Orientating the strange landscape of a new event can be challenging. Users are dependent on maps, but maps are not able to provide relevant information on the best routes for a particular destination, from a user's current location.
• Users need clear, easily accessible agenda information in a variety of reinforced media and materials, including printed brochures, online documents, signs and agendas for each physical location where sessions are taking place.
• Users feel ‘weighed down’ by carrying devices and bags everywhere.
• Users would like lunch options to be known prior to joining queues.
• Speakers and attendees are familiar with audio visual and recording equipment in the environment.
• Users would like to have access to presenters’ slides in advance or during event.
• Users are already struggling to maintain and manage communications for existing work and personal contacts.
• Users are only interested in new contacts; that are highly relevant to their own work focus.
• Users use a variety of devices and techniques to capture notes and details about the conference.
• Users intend to share information with colleagues who are not in the same session or at the conference. Social networking tools are being used by some in this case.

3.2.2 Enterprise Group Survey and Results

36 enterprise employees have viewed the survey, 28 started filling in the questionnaire and 20 of them completed it. The average questionnaire completion time was 9 minutes. Questions specific to enterprise users were included. The questionnaire (see Annex B.3 Enterprise Survey) was offered to some users during a participatory meeting, and then made available online to a wider group of users.

The statistics presented in this section are based upon the answers collected from this user group. The statistics are grouped into the following areas: demographical analysis; analysis of use of technical tools, devices, sensors and pervasive aspects; social media analysis; community involvement analysis; analysis of enterprise-specific part of the questionnaire.

3.2.2.1 Demographical analysis

Demographical analysis covers the gender and age distribution (EQQ1 and EQQ2) in the sample of the 20 participants that were interviewed in the survey. 86% of the interviewed participants were male and 14% were female. The sample is heavily skewed towards males (approximately 6 males per 1 female). A third of participants (33%) are aged between 25 and 35, 38% are aged between 36 and 45, a quarter (24%) are aged between 46 and 54 and only 5% are aged between 55 and 64. The sample of interviewed participants is not representative with respect to the gender and age of the European population.

3.2.2.2 Analysis of use of technical tools, devices, sensors and pervasive aspects

Participants were asked to specify how often or how frequently they use different kind of computing devices (EQQ3). The relative distribution of frequency of usage of different kinds of devices is shown in Figure 27. The most outstanding fact is that 100% of interviewed enterprise users use their laptops/net-books all the time. PDAs and smart phones are used either all the time or daily by 85% of participants. 58% of participants use their mobile phone all the time, while 37% never use their mobile phone. Game consoles are rarely used by the enterprise users: 89% of participants either do not use game consoles at all or only use them on a monthly basis. Desktop PCs are used daily or all the time by 42% of participants, while 37% of participants never use a desktop PC. Digital cameras are rarely used by the enterprise users, with 90% of participants use a digital camera either on a weekly or monthly basis. Printers, scanners and faxes are used either, weekly, monthly or not at all by 86% of participants. Satellite navigation and GPS are rarely used by the enterprise group: 68% of all participants use them either monthly or not at all while 26% use GPS and satellite navigation daily or weekly.
The ‘other’ devices that were mentioned were: “SkyBox & Sky Online”, “iTunes TV programs, Movies & Podcasts”, “Television”, “Aertel (teletext)”, “cycle computer”, “servers”, “network appliances & routers”, “Tablets”, “iPod Touch” and “iPad”. Most of the people who indicated that they use other devices use them on a weekly basis (57%) while 28% use them either all the time or on a daily basis.

**SUGGESTIONS for the requirements collections:**

- Because of the ubiquity of laptop and smartphone usage among the enterprise users, these should be target devices for the SOCIEITES applications, 3rd party services and the core platform
- Game consoles should not be used as a target device for Enterprise

**SUGGESTIONS for collecting input from the users in the future:**

It would be useful to identify the rate at which enterprise users are switching from mobile phones to smartphones to be able to predict when all the participants will switch from mobiles to smartphones.

It would be useful to investigate how often participants use touch based tablet and slate computers to find whether this emerging device segment may be interesting for the development of 3rd Party SOCIEITES services.

a. GPS and satellite navigation devices, printers, scanners and cameras are used rarely (on average monthly) by the enterprise group meaning that there is potential for smart integration of these devices. It would be useful to investigate whether this means that: there is room for business enabling 3rd party services and applications that make use of unused devices in an integrated way and deliver business productivity improvements or
b. societies 3rd party services would not consider/support these rarely used devices and sensors for delivering applications

Next participants were asked to state the activities for which they are using each particular device (EQQ4). Table 3 shows how each particular usage activity (such as blogging, social networking, web surfing, etc) is distributed over different types of devices.

Table 3 indicates that most participants web-surf via their laptops (86%) and their desktop PCs (63%). Similarly, they use email applications mainly via their laptops (80%) and their desktop PCs (58%), while they use IM tools mainly via their laptops (58%) and their desktop PCs (41%). The participants use SNSs mainly via their laptops (57%) and their desktop PCs (40%). 72% of participants use their mobile phones for their SMS/MMS activities. The gaming activities are mainly performed via laptops (42%), desktop PCs (38%) and game consoles (32%). The few participants who blog mainly use their laptops (21%) and/or desktop PCs (17%) for this purpose. Finally, the few participants who use VoIP, do so using their laptops (22%), desktop PCs (19%) and/or mobile phones (15%).
Table 3. Share of the participants that use specific devices to perform the listed activities enterprise user group

<table>
<thead>
<tr>
<th>Activity</th>
<th>Mobile Phone</th>
<th>PDA/SmartPhone</th>
<th>Laptop</th>
<th>Desktop PC</th>
<th>Game Console</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don't use</td>
<td>35%</td>
<td>10%</td>
<td>0%</td>
<td>30%</td>
<td>20%</td>
</tr>
<tr>
<td>VoIP</td>
<td>20%</td>
<td>45%</td>
<td>70%</td>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td>Web Surfing</td>
<td>30%</td>
<td>75%</td>
<td>90%</td>
<td>55%</td>
<td>55%</td>
</tr>
<tr>
<td>E-mail</td>
<td>30%</td>
<td>90%</td>
<td>95%</td>
<td>45%</td>
<td>5%</td>
</tr>
<tr>
<td>IM/Chat</td>
<td>5%</td>
<td>25%</td>
<td>80%</td>
<td>30%</td>
<td>0%</td>
</tr>
<tr>
<td>SMS / MMS</td>
<td>40%</td>
<td>80%</td>
<td>20%</td>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td>Games</td>
<td>15%</td>
<td>35%</td>
<td>15%</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td>Social Nets</td>
<td>5%</td>
<td>40%</td>
<td>60%</td>
<td>35%</td>
<td>0%</td>
</tr>
<tr>
<td>Blogging</td>
<td>5%</td>
<td>10%</td>
<td>25%</td>
<td>15%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 3 indicates that most participants web-surf via their laptops (90%), PDAs (75%), desktop PCs (55%) and/or mobile phones (30%). Similarly, they use email applications mainly via their laptops (95%), PDAs (90%), desktop PCs (45%) and/or mobile phones (30%), while they use IM tools mainly via their laptops (80%) and their desktop PCs (30%). Participants use SNSs mainly via their laptops (60%), their PDAs (40%) and their desktop PCs (35%). 80% of participants use their PDAs and/or their mobile phones (40%) for their SMS/MMS activities. The gaming activities are mainly performed via game consoles (50%), PDAs (35%) and desktop PCs (30%). The few participants that blog, use mainly their laptops (25%) and/or desktop PCs (15%). Finally, participants who use VoIP, do so via their laptops (70%) and/or PDAs (45%).

SUGGESTIONS for requirements collections:
- Because of the ubiquity of laptop, netbook and smartphone usage for all activities, these devices should be selected as target devices for the SOCIETIES applications, 3rd party services and the core platform
- Game consoles should not be used as a device platform that should be targeted by SOCIETIES 3rd party services for Enterprise since gaming does not immediately appear as an activity of interest to enterprise scenarios

Next participants were asked to identify different types of sensors (ID sensors, Bio-Sensors, etc.) that they used on a daily basis (EQQ5). Only, 10% of participants do not use any sensor based features at all. The other 90% of participants use at least one sensor related feature on a daily basis. Figure 28 shows participants' usage of sensors on a daily basis.

Figure 28. Daily use of features and sensors integrated in devices for enterprise user group

Location sensors are used the most and were identified to be used daily by 75% of participants. These are closely followed by weight, force and touch based sensors with 60% of participants using them on a daily basis. This is followed by light, audio and visual sensors, used daily by 40% of participants with movement and acceleration sensors used by 35% of participants. The biometrical sensors and presence/proximity related sensors that may use social networks as a context source are not used at all.
Next participants were asked to identify the features they would like to enjoy when interacting with services, devices and resources in general (EQQ6). 100% of participants indicated that they would enjoy at least one of the suggested features. (See Figure 29 for more)

![Figure 29 Features that participants would like to enjoy when using devices and services for enterprise user group](image)

The most favourable feature was continuous availability of resources with 85% of participants indicating that they would enjoy this proposed feature. The next most popular features were that all resources could communicate with each other and adapt to the user’s current situation and preferences. These features were preferred by 70% of participants. The least favoured features were that resources would be invisible and available everywhere (55% of participants were in favour of this feature) and that resources would automatically (proactively) adapt (only favoured by 45% of participants). In general each one of the proposed features was liked by at least one third of participants.

Other features were captured as a free text question. Under other features participants mentioned a smart car scenario that would proactively remind the driver to start the journey so as not to be late for a meeting.

Next participants were asked if they considered the synchronisation of all devices and web spaces beneficial (EQQ8). Participants were told that they could access all their data and applications from anywhere. The exact question was worded as follows: “If you could synchronise all of your devices and web spaces so that you could access all your data and applications from anywhere would you see any benefits to this?”

94% of participants indicated that they could see a lot of benefits while 6% indicated that they could see some benefits from the synchronization of devices. None of the participants indicated that he or she would not see any benefits from synchronization.

**SUGGESTIONS for requirements collections:**
- Device and web cloud data synchronization should be indicated as an end-user requirement. It could either be a requirement for the enterprise related 3rd party services and applications or for the platform (depending on the response of other target user groups)

Next participants were asked if they considered the sharing of resources and applications to be beneficial (EQQ9). The question was the following: “Would you allow others to access some of your applications and resources in return for access to some of their applications and resources?” 24% of all participants felt that they would allow sharing of resources and applications while 59% felt that they might allow sharing. Altogether, 83% of participants would be willing to share applications and resources under certain conditions. Only 17% are not willing to share their resources.
24% of all participants felt that they would allow sharing of resources and applications while 58% felt that they may allow sharing. Altogether, 82% of participants would be willing to share applications and resources under certain conditions. Only 18% are not willing to share their resources.

This was followed by an additional question regarding the importance of privacy when sharing resources and applications. The additional question (EQQ10) was the following: “With regards to the last question, how important would you consider the privacy aspects of this?” The results are presented in Figure 30.

All participants felt that enhancing privacy is an important factor for facilitating the sharing of resources and applications. 6% felt that it is somewhat important, 29% believe that it is important while the rest (65%) felt that it is very important.

SUGGESTIONS for requirements collections:

- Resource sharing should be supported and should be stated as a end-user requirement for the enterprise group
- Solving privacy issues in an optimal way is very important to ensure the adoption of resource sharing.

SUGGESTIONS for collecting input from the users in the future:

Investigate resource sharing further:
- What kind of resources might be shared (projectors, public screens, computing power, memory, printers or services?).
- In what situations will resources be shared?

How many people would opt into resource sharing if privacy is sufficiently addressed?

Which privacy issues are relevant and should be addressed and how should privacy be sufficiently addressed in their opinion?

It would be interesting to investigate if trust is also a resource sharing enabler and if participants may be concerned about trust in addition to privacy issues

3.2.2.3 Social media analysis

Participants were asked to specify what social media they use (EQQ12). Figure 31 illustrates what social media is used by the enterprise group
The most popular social media are IM tools, Facebook, and LinkedIn. 70% of survey participants use IM tools, 65% use Facebook and 60% use LinkedIn. YouTube, Skype, special interest social networks and Twitter are also popular with 50% of survey participants using YouTube, 40% using Skype, 20% using special interest social networks and 15% using Twitter. Other social media are used by less than 15% of participants. The social media mentioned by survey participants as free text were Pandora, Planet Blue (Intel internal), Yelp, Yahoo groups and Google groups.

**SUGGESTIONS for requirements collections:**

- Social networking sites relevant for integration with SOCIETIES platform are Facebook and LinkedIn, in the case of the enterprise group, since they are the most popular.

Next the survey participants were asked how often they use social media (EQQ13) with respect to the following social media categories: social networking sites (SNS), instant messaging and blogging. The frequency of social media usage with respect to social media categories is shown in Figure 32.

**Figure 32. Usage of Social Networking Sites, Blogging sites and Instant Messaging applications for enterprise user group**

Instant messaging is used most often with 80% of participants using it most of the day. Social networking sites come second with 44% of participants using them either daily or most of the day. Additionally, 50% of participants use social networking sites on either a weekly or on a monthly basis. Blogging is the least popular social media category. Only 15% use it daily or a couple of times a week, while 55% of participants use it weekly, monthly or do not use it at all.
SUGGESTIONS for requirements collections:

- Blogging social media category is not to relevant for enterprise users and 3rd Party Enterprise applications and use-cases should not make use of it.

Next the enterprise participants were asked to indicate the types of activities for which they use social media (EQQ14). The activities that social media are used for by the enterprise user group are shown on Figure 33.

![Figure 33. Type of activities that social media are used for by enterprise user group](image)

The activities that social media are mostly used for are keeping in touch with friends (60%), emailing and messaging (50%), chat and instant messaging (50%), as well as sharing of videos and photos (50%). The moderately popular activities include professional networking (40%), sharing information (35%), research (25%), commenting on photos and links (25%), organising events (20%), groups (20%) and posting status updates (20%). Less than 15% of participants use SNSs in other activities.

SUGGESTIONS for requirements collections:

- Business related activities that are moderately popular (such as Professional Networking, Sharing information, research, and organising events) could be types of activities that enterprise scenarios, use-cases and applications/3P services should be aiming to support and improve.

The next question (EQQ15) asked participants to indicate whether they had ever used or were aware of location-aware social networking sites and if so, what was their experience with them. The question read “Have you ever used or are you aware of location-aware social networking sites (L-A SNS) such as Foursquare and/or Facebook Places?”

- 19% of participants have heard of location aware SNSs and have either used them with positive experiences or would like to try them.
- 25% of participants do not want to use them because of privacy reasons.
- 25% of participants do not want to use them for other reasons.
- 31% of participants have not yet heard of them.

SUGGESTIONS for requirements collections:

- Solving privacy issues in location aware SNSs in an optimal way would raise the share of enterprise users keen to use location aware SNSs from 15% to 35% and would more than double the share of enterprise participants that are willing to use location aware SNSs. Perhaps this can be interpreted as beneficial and packaged into a privacy related requirement.

- Solving privacy issues in location aware SNSs in an optimal way is also very important for end-users. Perhaps the requirement for societies is to improve location privacy management.
The next question (EQQ16) asked participants to indicate what type of personal information they share over Social Networking Sites and with whom. The question read “Who would you share the following personal information within a Social Networking Site?” Figure 34 visualizes their responses to this question.

Firstly, consider the personal information that enterprise participants stated they would not share with anyone. Location appears to be the most sensitive piece of information since 38% of participants are not willing to share it at all. This is followed by status updates (33% of participants would not share their status updates with anyone), contact lists (21% of participants would not share contact lists with anyone) and contact phone numbers (17% of participants would not share contact phone numbers with anyone).

Secondly, regarding how participants are willing to share different types of data with both their specific friends and friends in general. Videos, photos, profile information, and contacts’ email addresses are examples of information types that 71% to 91% of participants would be willing to share with specific and/or general friends.

Thirdly, regarding the types of data that participants are willing to share in a broader scope (i.e. with all their groups, the entire SNSs or even publicly), 25% of participants are willing to share their page likes/interests and their status updates in such a manner, 21% their profile information and less than 15% all other information.

The next question (EQQ17) asked participants to indicate how satisfied they are with the available privacy settings in social media. The question read: “How satisfied are you with the available privacy settings in social media?”
Only 15% of participants answered the question above regarding blogging sites. This may be because the enterprise group is not active in blogging activities. 67% of participants that responded are neutral regarding existing privacy settings while 33% are satisfied.

A poor response was also noted for instant messaging and chat applications, as only 20% of participants answered this question. 25% of those are neutral regarding existing privacy settings while 75% are satisfied. In general the enterprise survey participants were more satisfied with the privacy settings of instant messaging applications than they were with the privacy settings in blogging sites.

Social networks received the highest response rate with 70% of survey participants answering the question. 29% were dissatisfied with the privacy settings available, 50% were neutral and 21% were satisfied with the available privacy settings in social networking sites.

**SUGGESTIONS for requirements collections:**

- Privacy settings and privacy practices in the SOCIETIES platform should be improved over the existing SNSs to encourage more people to use the SOCIETIES platform over SNSs

**SUGGESTIONS for collecting input from the users in the future:**

Identify how privacy settings and practices should be improved. What would users like or find useful?

### 3.2.2.4 Community involvement analysis

The next question (EQQ18) of the enterprise survey asked participants how they prefer communicating with different groups. The question read: “How do you prefer communicating with the different groups in your life? For each group, please tick all that apply”. Table 4 visualizes how participants prefer communicating with the different groups.

<table>
<thead>
<tr>
<th></th>
<th>face-to-face</th>
<th>Email</th>
<th>Texting</th>
<th>Social Nets</th>
<th>Voice Calls</th>
<th>IM</th>
<th>Discussion Fora</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Friends</strong></td>
<td>65%</td>
<td>65%</td>
<td>65%</td>
<td>40%</td>
<td>55%</td>
<td>30%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Family</strong></td>
<td>65%</td>
<td>50%</td>
<td>60%</td>
<td>5%</td>
<td>65%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Old Friends</strong></td>
<td>15%</td>
<td>45%</td>
<td>20%</td>
<td>50%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Sports Clubs</strong></td>
<td>30%</td>
<td>30%</td>
<td>15%</td>
<td>25%</td>
<td>5%</td>
<td>0%</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Hobbies/Shared Interests</strong></td>
<td>15%</td>
<td>40%</td>
<td>5%</td>
<td>30%</td>
<td>0%</td>
<td>0%</td>
<td>30%</td>
</tr>
<tr>
<td><strong>Shared Beliefs/Religion</strong></td>
<td>10%</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>15%</td>
</tr>
<tr>
<td><strong>Work</strong></td>
<td>60%</td>
<td>65%</td>
<td>50%</td>
<td>25%</td>
<td>60%</td>
<td>60%</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Online Contacts</strong></td>
<td>0%</td>
<td>40%</td>
<td>0%</td>
<td>35%</td>
<td>10%</td>
<td>25%</td>
<td>30%</td>
</tr>
</tbody>
</table>

Table 4. Preferred communication means with different groups in life for enterprise user group

Current friends are mainly contacted either face-to-face, via email or via texting. Each of these methods was selected by 65% of survey participants. Voice chats are used by 55% of participants to get in touch with their current friends, while social networks and IMs are used by 40% and 30% respectively.

Family members are contacted face-to-face by 65% of participants, via voice calls by 65% of participants, via texting by 60% of participants and via emails by 50% of participants. Other methods are used by less than 10% of participants.

Old friends are contacted through social networks by 50% of participants and via emails by 45%. 15%-20% of participants communicate with their old friends via texting and face-to-face meetings, while only 5% of participants choose to contact their old friends via voice calls, IMs or discussion fora.
Sports clubs are contacted via face-to-face meetings or via emails by 30% of participants, via social networks or via discussion fora by 25% of participants, via texting by 15% of participants and via voice calls by 5% of participants.

Groups with related hobbies and interests are communicated with via emails, social networks or discussion fora by 40%, 30% and 30% of survey participants respectively and via other communication channels by less than 15% of participants.

Groups sharing beliefs and religion are communicated with only via discussion fora, face-to-face meetings or emails by 15%, 10% and 5% of participants respectively.

Communication with co-workers is mainly conducted via emails (65%), face-to-face meetings (60%), voice calls (60%), IMs (60%) and texting (50%). Communication channels worth mentioning are also social networks and discussion fora, used by 25% and by 20% of participants respectively.

Finally, participants communicate with their online contacts via emails (35%), social networks (35%), discussion fora (30%), IMs (25%) and voice calls (10%).

In the next question (EQQ19), participants were asked how they prefer communicating with different groups. The question read “Please rank your preferred mode of discussion for groups (1-7 where 1 is the most important, 7 is the least important)”. The question was answered by roughly two thirds of enterprise survey participants.

face-to-face is the preferred means of discussion for 79% of participants and its importance scores 1.6 on average. Emails, Voice calls and instant messaging are also important discussion mechanisms for communication with groups. Their average importance scores from 3.4 to 3.8, where 4 is midway between the most and least important ranking possible and can be perceived as neutral. Finally, texting, social networks and discussion forums are in the least important group. Their average importance scores from 4.8 to 5.4. These tools are perceived as rather unimportant for group discussions.

In the next question (EQQ20), participants were requested to indicate whether they accept suggestions to make new friends made by SNSs. The question read: “Do you accept any suggestions made by the Social Networking Site about connecting with new friends?”

67% of participants that answered the question sometimes accept such invitations, 20% of them never accept such invitations and 13% do not use SNSs. None of the participants (0%) indicated that they would always accept invitations to connect with new friends.

The next question (EQQ21) of the enterprise survey asked participants about the most significant criteria for joining a new group. The question read “In cases when you are proposed to join a new SNS group, which are the most significant criteria in order to join the new group? Please rank from 1-4 with one being most important to you and four the least important”. The results are shown in Figure 35.

![Figure 35. Significant criteria in order to join a new SNS group.](image-url)
Figure 36. Significance of criteria based on which one accepts to join a new SNS group (most important criterion ranked by 1 and least important by 4) for enterprise user group

The question was answered by roughly half of the enterprise survey participants (9 out of 20). The most important criterion for joining a new group is for other group members to be friends already. The next most important criterion for joining a group is other group members being friends of friends or other group members having the same interests. The least important criterion for joining a new group is that other group members spend significant time in close proximity.

**SUGGESTIONS for requirements collections:**
- Use these findings as input to the design of algorithms for automatic group/community suggestions.

### 3.2.2.5 Analysis of enterprise-specific part of the questionnaire

Additional questions were asked at the end of the survey to gain more enterprise specific insight. The questions relate to the initial enterprise conference scenario. The first question (EQQ22) asks the following: “Please rank your goals at a conference? Starting with most important = 1 and least important = 4”. The results of the question are visualized on Figure 37.

![Figure 37. Ranking of conference attendees’ goals.](image-url)
Education is the most important goal for enterprise users when they attend conferences. 13 participants out of 20 (65%) answered the question. Of these, 60% picked ‘1’, the rank of highest importance, with the average importance of the education goal being 1.38. Networking is the next most important goal, with 50% of the 14 participants that answered this question choosing ‘2’, the second most important rank. The average importance of the networking goal is 1.93. Dissemination and showcasing is the least important goal for enterprise users when attending conferences, with 55% of the 11 participants that answered this question picking ‘3’, the second least important rank. The average importance of the dissemination goal is 2.36. Finally, participants were asked to state any other goals they might pursue at the conferences. No other goals were mentioned by the survey participants.

At the end of the questionnaire participants were asked a couple of open questions. Below we describe the questions and answers provided by the enterprise group.

**EQQ21: “Which Intel conferences did you attend this year?”**

12 out of 20 participants (60%) answered the question. The answers are separated by commas and ordered by the frequency of mentioning:

MeeGo, OSTS , ERIC, TLD Japan Linux Symposium/LINUXCON, Linux Plumbers Conference, Linux Kernel Summit, Intel Project Management Conference, iCAP CEO Summit, Telematics, IT Leadership Conference , ISMC (Virtual conference)

**EQQ23: “What information would be useful for you to have in advance of a conference?”**

13 out of 20 participants (65%) answered the question. The answers included schedule, conference programme and topics, travel directions to the location, attendees (who's there and what do they do, attendee information filtered based on participant’s interests, attendee's context), local amenities, expected outcome, free time, allow for organisation of other events e.g. pre-workshop, presentations already posted to think of questions in advance, searchable DB of attendees, detailing areas of interest.

**EQQ26: “What information would be useful for you to have updates of during a conference?”**

12 out of 20 participants (60%) answered the question. The answers included schedule/room change, network access for slides, presenter’s email, upcoming important topics, schedule and events, urgent email, urgent personal events, conference twitter, ideas and attendee's thoughts, local events, tourist attractions, real-time access to content and market directions, key/influential attendees (matched to participant’s needs), key Q&A in other presentations that participant cannot attend, top rated presentations, space availability in rooms, announcements, recommendations, details of walk-in attendees, activity updates for key areas of interest, real-time copies of presentations, etc. - with ability to mark-up with own notes, automatic logging of contact details (and context) of people I interact with.

**EQQ27: “What information would you like to receive updates about after attending a conference?”**

2 out of 20 participants (10%) answered the question. The answers included “who else attended?” areas the participant was interested in, record of Q&A sessions, informal exchanges.
EQQ28: “What community based services would you see as useful at a conference?”

11 out of 20 participants (55%) answered the question. The answers included virtual rooms (interest groups, pervasive connectivity), electronic session notebook that is editable, IRC/IM channels per presentation for background discussion in real-time, bulletin board for problems looking for solutions, people match-making for shared interests, attendees job role, (e.g. analysts, project managers), Twitter (see what is being said and seen by others), sports, fun events, local amenities, visit something local, get to know the area, add some value to the local community.

SUGGESTIONS for requirements collections:

- These findings should be used as input when selecting the right domain for the third party enterprise services that are to be developed in WP6. If enterprise 3rd Party services will enhance education and networking they will address the goals the participants feel are most important when attending conferences.

3.2.3 Enterprise Participatory Design (PD)

The participatory design (PD) engagement with the enterprise user group occurred in two sessions, using a different approach for each. The first session occurred during a face-to-face meeting where a subset of the user group containing those who had recently attended the conference that was used for the observation and contextual inquiry interviews, as described in section 3.2.1, was present. This first PD session involved an open discussion on experiences as an enterprise user and the opportunity for improvements. The second session occurred over a four-week period using an enterprise social network group. Users were asked to join the group where initial scenarios were posted based on the theme of ‘pervasive communities for conferencing’. Each post was focused on a particular perspective and included questions to prompt a discussion with the users. The approach and results from each PD session are discussed in more detail below.

3.2.3.1 Enterprise PD – Face-to-Face Open Discussion with Users and Results

A subset of the enterprise user group who previously participated by completing the survey questionnaire were invited to have an unstructured discussion regarding their experiences as enterprise users. The discussion was not driven by any focus except that the users were asked to share their opinions on the opportunities for improving the techniques, tools for work processes and general experiences as enterprise users. The session lasted for a twenty-minute period due to users’ time constraints.

3.2.3.1.1 The results have been grouped into relevant areas as follows: Information Sharing & Content

The topic of information sharing was discussed within the group. It was suggested that within a large organisation there is lots of useful information but due to strict and generic security models access is restricted to information that might be relevant but not necessarily confidential in nature. A solution could be to create information communities where information could be shared and accessed at a community level.

This discussion continued on the topic of accessing content in general. There are many tools for sharing and searching content but much content and knowledge are stored in emails due to traditional work practices. In addition to reduced search capabilities there is a potential risk of a single point of knowledge. This content needs to be shared more. Although the counter risk of this is that users could have an information overload so there is also a need for more personalisation.

3.2.3.1.2 Communication & Collaboration Methods

There are many new and useful tools for communication and collaboration within a large organisation, as discussed by the group, but while the wide selection of tools provides much choice there doesn't seem to be much consistency in how users use the tools due to different work practices or different requirements. For example Instant Messaging tools are used by some for just quick messages with the expectation of getting a
quick response. Email is generally used for more detailed messages but there is not an expectation for an immediate response. Another issue within a large organisation is that it may be difficult to discover people with certain knowledge or to connect with the right internal groups.

3.2.3.1.3 Meetings

From the discussion it seems that there is much interest is developing new approaches for meeting support. It was suggested that there can be much loss of productivity when setting up a meeting takes longer than expected, resulting in a reduction in the time available for conducting the business of the meeting itself. Other issues come from individuals trying to track their action points from across many meetings from different projects due to no common approach or tool for action point tracking.

3.2.3.2 Enterprise PD – Online Social Network Discussions Regarding Initial Scenario

The online PD session occurred over a four-week period using an enterprise social network group. Intel has an internal social media platform called Planet Blue where employees can connect with each other. Planet Blue allows users to create private and public groups, have virtual networks of colleagues from across the organisation, maintain a user-centric home page and share ideas, comments, content and media with everyone or specific groups. One of the more popular features of Planet Blue is the blogging feature.

A dedicated public group was set up for the SOCIETIES project and users were asked to join the group where initial scenarios were posted based on the theme of ‘pervasive communities for conferencing’. Each post was focused on a particular perspective and included questions to prompt a discussion with the users. The following sub-sections include the series of posts that were published and the user feedback corresponding to each one. The feedback from the users were analysed and user requirements were extracted, as discussed in section 4.X

3.2.3.2.1 Enterprise PD – Post & Feedback - Part 1

“As part of a user requirements process in the SOCIETIES project, we are attempting to conduct an online user participatory discussion based around a set of scenario proposals called ‘Pervasive Communities for Conferencing’. This set of scenarios are a starting point for developing how the SOCIETIES project can research and develop new ways to explore the needs of enterprise users through pervasive and social computing techniques focused on improving the user experience at conferences or meetings.

The scenarios have already been adapted based on input from a user questionnaire and user observation sessions. Please add any comments or feedback based on how you would like to change or improve the scenario below to fit your needs from previous experience. All feedback will be included in the further development of this scenario and thus will impact the future research and development of this project leading to user software trials at a future Intel conference.

*Pervasive Communities for Conferencing - Part 1*

“Day one of the conference, you leave your hotel for the conference venue in a taxi which was pre-ordered by a car pooling service offered by the conference. Your journey was identified as similar to that of 3 other attendees so you all received an invitation to share a taxi.

“[Would you accept the invitation to share this journey? Would you require information about the other attendees before sharing the taxi? Do you see any other implications?]

“You arrive at the venue and your device auto registers you with the conference registration service and downloads the welcome pack. The welcome pack includes all relevant information about the conference including access to session information, services and other attendees. The topics and sessions were suggested and previously agreed by the conference community and your preferences and interests have been used to determine which sessions would be most suitable for you. A personalised agenda is now presented on your device and it guides you to the first session.

“[Do you like this idea? How could this be extended to benefit you more? What concerns would you have about the auto registration and personalisation features, if any?]

“Attendees will be able to check in to a service that registers their location and activity. This information is then made available to other attendees or a selected community of attendees. Pre-identified networking linkages based on common interests are presented to the user, as digital business cards, when the other linked attendees check in. Linkages are also created dynamically based on updated or new attendee information, thus suggestions for adhoc meetings will be presented to the user. The suggested meetings are dependent on each user’s calendar of preferred sessions and existing
meetings. Linkages can also be triggered by users themselves as they scan the list of current attendees. The meetings may occur in open public areas or in private meeting rooms where extra facilities are setup on demand.

“[Would you like to be able to find people more easily at conferences? Would you like to be discovered more easily by others?]”

Discussion & Feedback from Post 1: User A: “I would be open to sharing a taxi with another attendee but the payment and getting a receipt might cause an issue. If the fare could be automatically split and added to our hotel bill then that might be easier.

“I like the idea of a personalised agenda and being able to discover other attendees more easily. I don’t see issues with privacy once I have control over what information is shared”

User B: “1. Car pool - I’d certainly be interested in it. Would be nice to know who I’d be travelling with in advance but would not be necessary for signing up for this service, once I know they have registered for the conference too. There is a possible issue if somebody doesn’t turn up - there would have to be an understanding that taxi will leave hotel at a certain time no matter what. Maybe people would be charged for the taxi in advance to discourage no-shows. I.e. conference goers are invited to reserve car pool space in advance for EUR 10, prepaid. The alternative is they make their own way, which they are informed might be EUR 40 from their hotel.

“2. Would like to see presenters (including mugshot), and registered attendees/affiliation if possible, when reviewing sessions I might attend. 'Guiding me to the session' should explain how to physically get to the room in question (GPS navigation, follow the blue arrows, whatever).

“3. I don’t like the idea of an automatic meeting being suggested between me and someone else - they may be offended if I decline the invitation for some reason - but how about a system that analyses the areas of interest of the attendees and comes up with the key ones - e.g. like a tag cloud analysis - and then zones are set up in the general mingling areas / public areas / eating areas for the different topics. Zones could have electronic signs hanging from the ceiling or these could be defined and printed off based on an analysis just before conference kicks off. During the conference people head towards those zones of most interest to them, and mingle with people with similar interests. Maybe the system recognises people who physically (or virtually?) enter the 'zone' and allow everyone in the zone to see details of others in the zone, including mugshot (to facilitate introductions).

“LinkedIn is popular for business networking in the circles I mingle - I would prefer any networking use that social network rather than create a parallel social network. E.g. if I chat with someone at the conference my device should ask me 'do I want to send a LinkedIn invite to <TheirLinkedInAccount>?'”

3.2.3.2.2 Enterprise PD – Post & Feedback - Part 2

(Part 1 focused on the arrival to the conference on day one and the establishment of personalised agendas and networking opportunities. Part 2 will now discuss the activities and interactions of users within active sessions.)

“The conference is in full swing and many parallel talks have begun. Two other colleagues from your organisation are also attending the conference as most aspects of it are very relevant to your current set of projects. In order to cover as many session talks as possible you agree to split up and follow separate sessions throughout the day. You and your colleagues use a provided service to capture notes and share comments during the sessions. The service provides additional information about the session topic, the speaker and related sessions. Users can use this service to add private notes, to share these notes with community friends, to provide feedback to the presenters and post public comments on the session e.g. linked to Twitter.

[Would you find this service useful? What other information would be of interest to share during a session?]

“During the session you are also able to do a survey of the other attendees to see the common areas of interests, represented organisations and attendees that are already linked to your professional networks. This enables you to approach the people most relevant to you after the session, although if you do not want to be approached then, due to your privacy settings, the service will not display your attendance to others at that particular session.

[Would you use this feature? Would you like others to see your details in order to be approached after the session?]

“All private, shared and public notes, along with the presentation slides, videos and public feedback will be available to you and your colleagues after the conference so that you can analyse the information when you return to your office. The contact details of those involved will be available for follow on contact.”

[What other tools or services would you find useful during a session?]

Discussion & Feedback from Post 2: User A: “Hello again. Personally I would prefer not to use a service provided by a 3rd party to share private notes between work colleagues at a conference. For that conversation I could be referring to sensitive things and would like to keep the data internal to my company. If the solution had one UI but two
back ends - a company hosted one and a conference hosted one for example - with easy and obvious differentiation between private and public comments, then that might work.

"Re the survey - just to clarify I hope it does not mean questionnaire - it would be annoying if all the attendees start bombarding all the other attendees with questionnaires.

"I would find the aggregated session content and attendee list useful for post conference reference.

"It could also be useful if there was a list of people I had conversations with and when / where I had the conversations. Perhaps a UI could allow me to 'replay' the connections I made over the couple of days in case I wanted to reconnect with someone but only remembered the location / time I met them rather than their name."

Moderator A: “Thanks User A for your feedback. Just to clarify regarding the survey piece... I was trying to say that a service would automatically gather information (from users' context, profiles etc) for a session, e.g. common interests, attendees/companies present, and then just present that information to each user in a personalised view. Users could potentially contact each other during the session, but you could opt to block any attempts to contact you, if you wished.”

3.2.3.2.3 Enterprise PD – Post & Feedback - Part 3

Part 2 focused on the activities and interactions of users within active sessions at a conference. Part 3 is aimed at conference organisers and coordinators.

"The 'committee for research and innovation' agree to host a conference on their key research strategies for 2011. You, as the elected coordinator, start organising the conference and open the invitation to participants. Although the theme of the conference is based around the research strategies, other matters such as: the specific topics, presenters and showcasing groupings, are not agreed at this point so you open these up for discussion to the conference social network. Participants that register an interest in the conference are automatically suggested to (register an interest in) areas in the open discussion where they might have an opinion, based on their expertise and previous conference engagement, thus the conference communities are already forming before the conference officially starts. In addition to contributing to the conference topics, attendees supply details of their research domains, interest areas for networking and collaboration, and their arrival/departure times to help with transport logistics. Linkages between attendees of similar interests are created and opportunities for engagement are suggested. The conference support services (e.g. catering) are also receiving relevant information about the attendees so they can plan ahead.

"[Would you see this automated approach as useful when organising a conference? What other features would you like to have available in advance of a conference?]

"Closer to the event, registered attendees are provided with a personalised information application that includes travel directions, local amenities, the event programme, a list of other attendees/represented companies, and presentations/session information to allow for the preparation of questions. The users will be provided with suggested personalised session agendas based on their interests, preferences and priorities for the event. This allows them to see what free time they may have for networking with other attendees. It also allows you to see more information in advance, such as numbers of attendees for each session, catering numbers and transport requirements.

"[From the perspective of an organiser, what other information or services would you see as useful during a conference?]

Discussion & Feedback from Post 3: User C: “So here is (sic) my initial comments on your scenario.

"You mention that "Participants that register an interest in the conference "

"[Generally participants are requested to REGISTER thus confirming their attendance so in this scenario participants have an additional option to state that they are interested but not as yet to confirm their attendance at this point. PRO – Good for the participant –in keeping their option open – enabling them to explore content etc but obviously there will come a point where they must book travel / accommodation to secure their attendance. CON – for the coordinator who generally wants participants to confirm their attendance asap to maximize the numbers up to the limits of the conference facility.

"...are automatically suggested to (register an interest in) areas in the open discussion where they might have an opinion, based on their expertise and previous conference engagement, thus the conference communities are already forming before the conference officially starts.

"[Good – I like it... participants generally want to know if their specific area of interest /issues will be addressed at the conference and how they can engage in that section – so based on the output of this e-discussion the organizer may customize the agenda to facilitate specific interest groups. However people also attend conferences when a specific superstar is speaking and so it can be a little 'chicken and egg'... – You don't want to secure a superstar speaker until you know what is the interest of the participants and you won't secure participation until you secure a superstar
speaker. So your proposal would require earlier planning and preparation to ensure that this discussion can take place and the follow actions & speakers confirmed. This may also have implication for the conference venue – AV equipment, presentation facilities etc.

"..In addition to contributing to the conference topics, attendees supply details of their research domains, interest areas for networking and collaboration, and their arrival/departure times to help with transport logistics.

"[Great - That would be really helpful – if the technology is intelligent and knows where the user will be [home] and it can present options as to how to get to the venue – car, planes and trains schedules and routing and cost info and local transportation and accommodation facilities – this is a related but separate and very complex problem.

"..Linkages between attendees of similar interests are created and opportunities for engagement are suggested. The conference support services (e.g. catering) are also receiving relevant information about the attendees so they can plan ahead.

"[This piece is very interesting and valuable to the coordinator – to get input / delegate preferences on the format and structure of the conference in advance – what is overall preferred structure for the formal presentations, Q&A sessions, workshops, open discussions/debate, brainstorming and how much time should be allocated to each. Should there be poster session showing 'state of the art' current research in the conference themes. The organiser also want to know food requirements {gluten free, kosher, vegetarian etc} and also want to know if the person has arrived at the event. Could registration be semi /fully– automated – i.e. on arrival the system “knows” who the user is and they have arrived and enrolls them and creates their custom itinerary what talks/presentation at what time in what room and how to get there – Also notifying them that their friend/colleague has also arrived / or en-route...Or if there was a change in the schedule due to a keynote speaker being sick / not available.

"On arrival delegates may wish to contact their office, connect to the Internet so seamless Internet access would be useful. Also enabling them to see the full conference booklet online – read speaker bios or related material would be a useful feature if the user had a tablet device. Obviously from an ILE (Intel Labs Europe) perspective knowing that specific individuals have expertise, interest in or are researching on specific topics means that they may be potential research partners for collaborative research.

"A primary objective of folks attending conferences is their desire to network – to share and learn ideas and build relationships, contacts for future engagement –any capabilities that can be developed to facilitate / accelerate this would really be a "killer application" for business in general and the research community in our domain.

"Finally the coordination wants to get feedback from the delegates as to what worked well /poorly and what can be improved so capturing real-time feedback – knowing who attended what session and their views would be really useful."

3.2.3.2.4 Enterprise PD – Post & Feedback - Part 4

Context Awareness + Social Networking: How would you like to use these?

We would like to open out the discussion with a general question:

How would you like to use context awareness and social networking within your daily working or personal life? Are there any applications or services, simple or complex, that you would like to see available?

Discussion & Feedback from Post 4: User D: “For me a useful feature will be able to have a "log" of all my previous context, kind of like the ideas that were explored with "My Life Bits" and many other research systems/prototypes of the time, that included GPS, photos, sms, emails, documents, and anything digital that can leave a trace in the physical or the virtual world.

My preferences could be then data mined from my history. However when it comes to social network, then privacy will be an important factor. ”

3.2.3.3 Updated Enterprise Scenario based on Participatory Design (PD)

The scenario that was presented to the enterprise users has been revised based on the feedback collected as shown below.

Pervasive Communities for Conferencing - Part 1

Day one of the conference, you leave your hotel for the conference venue in a taxi which was pre-ordered by a car pooling service offered by the conference. Your journey was identified as similar to that of 3 other attendees so you all received an invitation to share a taxi. Through the car pooling service it is possible to see in advance who you will be sharing a taxi with or even change your booking in order to accompany travellers that you may know. The service requires a pre-payment to avoid 'no shows and departure times
are listed. Payment can be made via your hotel or through the online service so that individual receipts are available for business travellers.

You arrive at the venue and your device auto registers you with the conference registration service and downloads the welcome pack. The welcome pack includes all relevant information about the conference including access to session information, services and other attendees. The topics and sessions were suggested and previously agreed by the conference community and your preferences and interests have been used to determine which sessions would be most suitable for you. A personalised agenda is now presented on your device and it guides you to the first session with the option of overlay venue maps and directions allowing you to quickly get to the correct location.

Attendees will be able to check in to a service that registers their location and activity. This information is then made available to other attendees or a selected community of attendees. Pre-identified networking linkages based on common interests or existing social networks, e.g. LinkedIn connections, are presented to the user, as digital business cards, when the other linked attendees check in. Linkages are also created dynamically based on updated or new attendee information, thus suggestions for ad hoc meetings will be presented to the user. The suggested meetings are dependent on each user's calendar of preferred sessions and existing meetings. Linkages can also be triggered, by users themselves, as they scan the list of current attendees. The meetings may occur in open public areas or in private meeting rooms where extra facilities are set up on demand. If automatic meeting suggestions are not your preference and if invitation declines may cause difficulties, then networking zones are available for users of common interests to locate and network. The theme of each zone is established based on the pre-defined most common interests of the attendees, and these themes and their networking zones are communicated to users as they are activated.

Overlay virtual signposting can direct attendees to the correct zone.

Pervasive Communities for Conferencing - Part 2

The conference is in full swing and many parallel talks have begun. Two other colleagues from your organisation are also attending the conference as most aspects of it are very relevant to your current set of projects. In order to cover as many session talks as possible you agree to split up and follow separate sessions throughout the day. You and your colleagues use a provided service to capture notes and share comments during the sessions. The service provides additional information about the session topic, the speaker and related sessions. Users can use this service to add private notes, to share these notes with community friends, to provide feedback to the presenters and post public comments on the session e.g. linked to Twitter. Due to potential privacy issues for internal organisation conservations, a service hosted by the employee's company can be plugged in so that any sensitive data can be securely shared between colleagues and that the data is stored and controlled by the organisation.

During the session you are also able to do an analysis of the other attendees to see the common areas of interests, represented organisations and attendees that are already linked to your professional networks. This enables you to approach the people most relevant to you after the session, although if you do not want to be approached then, due to your privacy settings, the service will not display your attendance to others at that particular session.

All private, shared and public notes, along with the presentation slides, videos and public feedback will be available to you and your colleagues after the conference so that you can analyse the information when you return to your office. A conversation history could also be available, thus enabling an attendee to review any conversations they had including such information like the people involved, location, time and topics. The contact details of those involved will be available for follow on contact.

Pervasive Communities for Conferencing - Part 3

The 'committee for research and innovation' agree to host a conference on their key research strategies for 2011. You, as the elected coordinator, start organising the conference and open the invitation to participants. Although the theme of the conference is based around the research strategies, other matters such as: the specific topics, presenters and showcasing groupings, are not agreed at this point so you open these up for discussion to the conference social network. Participants that register an interest in or confirm their attendance for the conference, are automatically suggested to areas in the open discussion where they might have an opinion, based on their expertise and previous conference engagement, thus the conference communities are already forming before the conference officially starts. In addition to contributing to the conference topics, attendees supply details of their research domains, interest areas for networking and
collaboration, and their arrival/departure times to help with transport logistics. Linkages between attendees of similar interests are created and opportunities for engagement are suggested. The conference support services (e.g. catering) are also receiving relevant information about the attendees so they can plan ahead.

Closer to the event, registered attendees are provided with a personalised information application that includes travel directions, local amenities, the event programme, a list of other attendees/represented companies, and presentations/session information to allow for the preparation of questions. The users will be provided with suggested personalised session agendas based on their interests, preferences and priorities for the event. This allows them to see what free time they may have for networking with other attendees. It also allows you to see more information in advance, such as numbers of attendees for each session, catering numbers and transport requirements. During and following the conclusion of the conference, the organisers will be able to get real-time feedback from the attendees as to what worked well/poorly, opportunities for improvements and knowing who attended what sessions.

3.2.4 Enterprise User Research Conclusions

From the initial engagement of an enterprise user group, we can see that enterprise users are at the cusp of technologies breaking into the marketplace and are willing to try new technologies but only if they are highly relevant to their work life and/or personal life. These users are concerned about trust and security issues and in particular how privacy in social media can impact their working environments. They can see benefits in potential pervasive and social services that could help enable better collaboration and information sharing within enterprise settings.

The observation and contextual inquiry section provided an insight to conference culture and how users interacted during the various stages of a conference, with devices and with other users. Qualitative ethnographic methods were used and selected users were shadowed and interviewed during the conference. Some interesting observations and user thoughts were discovered and presented. These included:

- Orientating and navigating a new environment even with a static map is often frustrating. Users need clear easily accessible to agenda information in a variety of reinforced media and materials, including printed brochures, online documents, signs and agendas for each physical location where sessions are taking place.
- Users would like to be able to access information from other sessions during the event and some users intend to share information with colleagues who are not in the same session or at the conference. Social networking tools are being already used by some in this case.
- Users would like lunch options to be known prior to joining queues, so perhaps meal and other preferences of the community could help optimise conference services and user experience.
- Users are only interested in new contacts that are highly relevant to their own work focus. Personalised networking suggestions could help might this requirement.
- Users use a variety of devices and techniques to capture notes and details about the conference. Interoperability and the use of standards is an abstracted requirement from this.

The survey and results section reported on the participation by 28 enterprise users in an online questionnaire. All 100% of interviewed enterprise users use their laptops and netbooks all the time. PDAs and smart phones are used either all the time or daily by 90% of participants. Satellite navigation and GPS are rarely used by the enterprise group: 68% of all participants use them either monthly or do not used them at, while 26% use the GPS and satellite navigation daily or weekly. The survey also reveals that web surfing and e-mail and web surfing usage activities are the most performed activities and are mostly performed on laptops, netbooks and smart phones. Location sensors are used the most and were identified to be used daily by 28% of participants. These are closely followed by weight, force and touch based sensors and 23% of participants use them on daily basis. Due to the ubiquity of device usage both laptops, netbooks and smart phones among the enterprise users these should be target devices for the project software trials. The GPS, Satellite navigation, printers, scanners and cameras are used rarely by the enterprise group, meaning that there is potential for smart integration of these devices.
Solving privacy issues in an optimal way is also very important for successful adoption of resource sharing. There is potential to get more than half of users interested in using resource sharing. Solving privacy issues in location aware SNSs in an optimal way would raise the share of enterprise users keen to use such services.

In relation to use of social media, business related activities such as professional networking, sharing information/research and organising events could be types of activities that enterprise scenarios, use-cases and applications should be aiming to support and improve.

The enterprise user PD sessions, both physical and online, have provided us with some initial feedback to our scenarios based on pervasive communities for conferencing, and thus the scenario has been updated as shown in section 3.2.3.3. The feedback, although very useful for our scenario development, was limited due to time constraints at the physical session and low engagement during the online sessions but this does provide the project with a good foundation of user engagement to enable us to drive towards more detailed scenario and use case development, and thus towards more successful paper and software trials, while maintaining continuous interaction with our enterprise users.
3.3 Disaster Management Group

The SOCIETIES disaster management user group consists of disaster management professionals, who participate in international disaster relief missions. They form a very strong community with very specific characteristics for various reasons; among them: the number of persons involved in this field is limited, these experts meet each other on many different courses, trainings and exercises, and they have often worked together under very intense, sometimes even traumatic conditions. These professionals have been selected as one of SOCIETIES core user groups, since the technology to be developed in SOCIETIES has significant potential to increase their effectiveness in disaster relief missions. These users are involved in the Assessment Mission Course (AMC), part of an EU mechanism that has been supporting international cooperation in civil protection since 2002. The AMC has been chosen due to the long-term relationship with one of the partners in Societies (DLR) and strong support for such research activities by course organizers.

The disaster management user group includes senior experts involved in the European Civil Protection Mechanism. In particular, the project focuses on so-called assessment missions, during which, these experts are tasked to assess the needs for support of an affected country or region directly after the disaster has occurred. The European Commission has established a detailed curriculum of courses, trainings and exercises that help to qualify these experts for this task. All of these experts are drawn from member states and are fully trained professionals in their field of expertise. Depending on the national structure, their backgrounds are often in firefighting; logistics; urban search and rescue; water purification; or other related fields. In several European countries civil protection agencies are part of the countries’ military structure and experts often hold officer’s ranks. As a result, the disaster management culture is an interesting blend of both military and humanitarian working styles.

Figure 39 – User research methodology – disaster management group methods
3.3.1 Disaster Management Group Observation and Interview

3.3.1.1 Disaster Management Group Background

DLR has been participating in a number of Assessment Mission Courses (AMCs), carried out by an international consortium on behalf of the European Commission in Cyprus; as part of their work in previous EU research projects on the Disaster Management Tool (DMT). DLR participated in the AMCs to instruct participants in the use of the DMT and teach some background knowledge about satellite communication, navigation and imaging. As such, DLR is an accepted partner on these AMCs and regularly supports the teams during their days in the field; as well as their “left-behind” information managers, that liaise with the local emergency management agency (LEMA) and the European community. In this case the Cyprus Civil Defence (CCD) and the Monitoring and Information Centre (MIC) in Brussels which is represented by a former MIC duty officer who is on-site to train but also acts as the MIC, reachable by phone and e-mail.

The AMC participants are generally sent by the 30 member states that participate in the European Civil Protection Mechanism, some also by the United Nations Disaster Assessment and Coordination (UNDAC). Around 20 participants (not all member states are able to send participants to all courses) are grouped into 4 teams. The resulting teams have the typical size, composition and equipment of real assessment missions.

The AMC trainers are very experienced experts and have carried out a multitude of international assessment and disaster relief missions, both in the European and United Nations organizational structure. Many have military background (ranks typically ranging from Majors up to General).

Staff members are often younger personnel from civil protection organisations that provide numerous support functions such as organization, logistics and IT support.

3.3.1.2 Disaster Management Group Field Study Report, November 2010

In November 2010, DLR has sent a team of three to participate in the AMC in Cyprus. As part of their mission they gathered user requirements specifically relevant for the SOCIETIES project. From previous experience, it was expected that most information would arise from close observation of participants and, where possible appropriate, detailed interviews and discussions with staff, trainers and participants. The course has a particular reputation as being “as close to reality as possible”. Part of this is the concept of mostly avoiding classroom lessons and the emphasis on learning by doing. As such, the course is very strenuous for participants, since they have to carry out a wide range of tasks under significant time pressure.

Participants to the AMC were assigned to teams by the coordinators. These teams are then given specific assessment tasks, such as the assessment of the status of an airport, or a power station, or a dam. They work autonomously during their individual missions. Their activities during this phase consist of different types of tasks, such as a team member interviewing the local responsible for the power station and trying to identify the status, operational capacity, limitations, and development prognosis for the power station. This is followed by taking and annotating photographs or measurements, and direct assessment based on experience. In one example, the operational capacity of an airstrip was assessed as to whether or not it could allow aircraft of certain weight or landing characteristics to land there; which involved contacting an experienced pilot in central Europe, and discussing photographs with him to gain a second professional opinion. Towards the end of the day the teams reconvene and their material is collated to make the latest assessment report; this is then the basis for the next day’s assignments.

The atmosphere during the AMC is stressful and intense but the participants try to operate professionally and with their best possible efficiency. A strong focus is put on maintaining respect when interacting with affected persons or groups, or when personal data of affected people is disseminated. This goes as far as promoting certain terms with respect to describing affected persons, and discouraging the use of others. Professionalism is the key, in contrast to sensationalism. AMC members operate with a high emotional, cognitive and physical load: working hours are long and are preceded by travel to the location; there are only short rest periods during the operations; and climatic influences such as heat – to which the members are usually not well adapted - are intense.
3.3.1.3 Key Observations from Disaster Management Group Field Study

- Users are working in teams; organised to distribute workload and combine expertise.
- Teams are from different countries and their background is from national bodies such as NGOs, specialised government funded and coordinated bodies, fire-fighting departments, or similar.
- The AMC is a training course directed at individual members of such teams and these persons convey the material learnt during the AMC to their national colleagues. These course participants are selected only if they are experienced members within their own groups.
- Users span a wide range of (English) language proficiency levels. The AMC language is English and English is used to coordinate communications and interactions between teams.
- Users originating from different countries and professional backgrounds need to become efficiently performing teams in a very short time period.
- Tasks are assigned outside the framework of any formal ranks and are based on previous experience and training.
- Users struggle to cope with the pace of events and the enormous amount of information being given to them.
- Users have to span an enormously wide field of expertise.
- Users have to handle unforeseeable situations.
- Users often lack crucial background information for a task at hand.
- Users often need to improvise.
- Users have significant problems (car) navigating in a foreign environment under time pressure.
- Users have to meet their reporting deadlines (e.g. 16:00 hours, Brussels time).
- Users have to assign responsibilities within a team (driver, navigator, team lead, safety & security, media handling), and one person often has to cover several roles.
- Users need to coordinate their appointments with strong time constraints and spatial spread resulting often in long drives.
- Users are intermittently sitting in very concise meetings, then on the move, for example driving to the next meeting.
- Users mostly discuss, sort out matters, organize their information while they are on the move, i.e. in the car.
- Users often have problems expressing empathy or making proper introductory statements due to their stress level.
- Users are challenged by taking care of their (electronic) equipment (e.g. charging, bringing all cables).

3.3.2 Disaster Management Group Survey

In addition to the observations and interviews, the disaster management community at its Assessment Mission Course (AMC) in November 2010 in Cyprus, were invited to participate in a SOCIETIES survey. This questionnaire was comprised of the same questions used for the user survey in the enterprise and student user groups, except for some questions particular to the disaster management context.

We observed that disaster management professionals’ participation level was very low. We assume that this was mainly caused by the following factors: the questionnaire being viewed by users as low priority, additional, non-essential activity in the context of an already taxing schedule; a mix of very basic questions related to disaster management, and questions related to research issues in pervasive and social computing, which these users weren’t able to relate to; and by technical problems with the online survey provider. In consequence, from the 36 users that initially viewed the survey, 25 started to fill it out and only 2 completed...
it. It is important to point out that in contrast the same users were willing to discuss details and problems of previous missions, e.g. to Pakistan or Haiti in detail.

From this we concluded that close interactions, observations and discussions with disaster management group members are preferable methods for obtaining information from them. However, in order to achieve a certain level of compatibility in methods between the three use cases Enterprise, Students and Disaster, a revised and reduced survey was sent, at a later date, to organizers, trainers, participants and some staff members of the last AMC courses. They are mainly German, but also from Slovakia, Belgium, Denmark, Sweden, Austria, Cyprus, Ireland, Estonia, Paraguay, and the United States. Some of them are working for their national agencies, some also for the United Nations.

The statistics presented in this section are based upon the answers to the revised survey (see Annex B.4), and collected from this user group. In this survey 27 disaster experts had viewed the survey, 21 started to fill it out and 9 have completed it. The statistics are grouped into the following areas: demographical analysis; analysis of use of technical tools, devices, sensors and pervasive aspects; social media analysis; community involvement analysis; analysis of disaster management-specific part of the questionnaire.

### 3.3.2.1 Disaster Management Group Demographical Analysis

Demographical analysis covers the education level, gender, age distribution and the experience in disaster management (DMQ1 to DMQ4) in the sample of the 9 participants that were interviewed in the survey. The sample is heavily skewed towards males, as all interviewees were male, which is not representative but reflects correctly the tendency that the large majority of the user group is indeed male. A large percentage (45%) of the participants of the survey are of age 25-35, 22% are between ages 36 and 45, 22% are aged between 46 and 54 and only 11% were between ages 55 and 64 (see Figure 40b). The education level was higher than the European average. 37.5% had higher-level education or a degree, a quarter even a postgraduate degree (see Figure 40a).

![Figure 40. Distribution of education level (a) and age (b) of disaster management user group](image)

The experience in disaster relief is however more relevant for identifying the requirements and restriction for technical support in disaster management than the pure age of the members of our user group. The majority of our survey participants have between 5 and 15 years of experience (see Figure 41), which is particularly interesting in combination with the relatively low age distribution in our sample of the user group.
3.3.2.2 Analysis of use of technical tools, devices, sensors and pervasive aspects

Participants were asked to specify how often or how frequently they use different kinds of computing devices (DMQ5). The relative distribution of frequency of usage of different kinds of devices is shown in Figure 42.

It is obvious that technical devices are commonly used in our sample of the user group (see Figure 42). As can be expected, mobile phones, laptop or notebook computers, smartphones and desktop computers, are most commonly used where more than 50% of the survey participants described their usage as “All the time”. While printer, scanner and fax are also frequently used although slightly less than the first group, and media players are still used daily to weekly, usage of sensors (like GPS, cameras or radio devices) differs significantly. Although Digital Cameras and GPS are part of standard equipment in disaster management, their usage in daily life is limited and does not amount to more than “Once or twice weekly”. Also radio equipment like Tetra, Tetrapol or PMR is part of disaster assessment equipment, but is not used by every survey participant. Dictaphones or recording devices are almost never used. A mere 14% use it once or twice a month.
Facebook with 44%, whereas LinkedIn, special interest social networks and Virtual OSOCC of the United Nations (mentioned as “Other”) still receive 11% usage. Wordpress is used by 22% of participants and Flickr by 11% for sharing content, while the survey participants do not use Blogger, Twitter or Couchsurfing.

![Figure 43. Social media usage for disaster management user group](image)

We asked in addition more specifically, for which emergency actions a specialised social network would be useful. 56% would use it to find posted announcements for trainings, 44% of participants would use it for exchanging best practices, 33% for promoting contacts and 11% for distributing information to media. Hence a narrow majority would see a benefit in having a specialized social network.

### 3.3.2.4 Community involvement analysis

For the community involvement analysis we asked, how the survey participants communicate with colleagues. This question has to consider two distinct points of view, as communication in normal life differs considerably from communication with colleagues during a disaster relief mission, where stress levels are extremely high, time is critical for saving lives and communication has to be extremely efficient and structured, while maintaining a high level of privacy and respect for people affected by the disaster. Communication during disaster relief mainly includes communication with the On-Site Operations Coordination Centre (OSOCC), the Information Officer (IO) and Non-Governmental Organisations (NGO) on site, while also including connections back home.
We can see from the analysis shown in Figure 44 that standard means of communication usage is often quite similar both in everyday life and during disaster relief missions. Almost all survey participants mentioned mobile telephony in their (free text) answers and a large majority email, around 50% use Skype and landline phones. Where available or possible, people also use face-to-face communication or other computer applications, like for instance SharePoint.

As expected, a main difference was found in the usage of communication technologies that are not part of daily life. During disaster missions, the survey participants also use cost intensive satellite connections for data communications, where it cannot be avoided, and personal mobile radio (e.g. TETRA, VHF radio), which is only rarely used outside of disaster missions. A clear majority of the interviewees also use satellite phones during missions – which are not used in normal situations either. One survey participant concluded that during disaster relief, every possible means of communication is used, even if it is a very expensive one. In general we have found that computer applications are used a little bit less in disaster relief missions than in normal life, which is probably due to extremely limited infrastructure availability, and expensive bandwidth for data connections via satellites.

We remarked that none of the survey participants explicitly mentioned social networks, whereas the consortium knows that they are used in this community, infrastructure permitting, even during disaster missions. Obviously it is however not present enough or not well enough recognised as a valid option for general communications.

### Analysis of disaster management-specific part of the questionnaire

At the end of the survey we asked eight questions directly related to disaster management to gain more direct insight. The survey starts with two closely related questions referring to features and tool usage, before asking six open questions to allow more freedom for users to convey their most urgent requirements. We asked the participants which functionalities they could imagine using in software for disaster management support.

1. Tracking your position and keeping other team members informed about it;
2. Communicating your current activity to team members or mission control;
3. Support for logistics and resource management.

All three options seem to be highly important for the target user group. (1) Was marked by every participant, while (2) and (3) were marked by all but one participant. Hence, all three should be taken into account for the SOCIETIES system.
When we asked for the technologies used or seen to be useful for disaster management, we received the answers represented in Figure 45. We see in Figure 45 that digital cameras, email and GPS receivers are already used during missions by all. Instant messaging, video calls, video cameras and digital barometers are partially used; and some users indicate they have potential to be useful. On the other hand, internet relay chat (IRC) is seen as not useful (given the existing instant messaging mechanisms). Biosensors, such as heart rate monitors or inertial measurement units, represent an interesting case. They are not used so far in disaster management support, but 75% of participants can imagine that it would be useful. The latter is in agreement with the large majority or disaster management users surveyed, seeing use in “communicating the current activity of team members or mission control”, (option (2) of the first disaster management related question DMQ9). The reason why instant messaging, video calls and video cameras are not commonly used today may lie again in the limited internet connection and bandwidth in disaster zones. Reducing this problem would consequently open up new opportunities for communications within this community.

When we asked, which other technologies the participants rated as useful, the responses suggested a desired integration of radio communications (PMR, VHF, etc.) and ASIGN (Adaptive Satellite-based system for Image Communications In Global Networks) Geopictures\(^8\) in a disaster management support tool.

Focusing again on the means of communication, we asked participants what is the most adequate means of communication during the unprecedented event of a disaster. The agreed response was that this depended on the type of disaster and the availability of communications; mentioning radio, mobile telephony, internet and satellite communications. Also here, ASIGN Geopictures seems to be a valuable option, as it can connect via satellite communication or the GSM network directly to the OSoCC.

Hardware that SOCIETIES would integrate into systems for disaster management support has to be small, light, easy to use and robust in outdoor environments. Also long battery life is a major requirement, and a reduction of devices is desired. If possible it should only be one device that is carried along by disaster helpers.

Information exchange between all devices and technologies is widely seen as an advantage. Information exchange is regarded as crucial for disaster management, as it saves time, money and energy. Particularly advantageous, would be the option to route radio signals to a WLAN, Internet, GSM or SAT Phone to extend the range. Again we can see here, that network management, intelligent routing and ad-hoc peer-to-peer networks should be a major focus of the underlying Societies system to ensure it is relevant and useful for disaster management.

The survey also investigated in which situations participants could imagine addressing a worldwide community to help solve disaster relief problems and to what extent they would rely on disaster relief related information (such as road status or road maps) coming from a worldwide community, with regard to the scenario communicated with the disaster management user group (as outlined in 3.3.3.1). The responses showed that most participants would be interested in including such an option; in particular in the chaos phase immediately after disasters like earthquakes or tsunamis. This information would be useful to get an overview and general information about the situation on site. This user community could also be incorporated for sending the requested and needed relief goods. The reliability of information coming from

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\(^8\) http://www.geo-pictures.eu/situational-awareness/
such an unknown community is however seen as a critical factor. While some participants would “rely a lot” on such information, the majority is undecided to what extent it can be trusted.

Hence it must be an objective of the SOCIETIES system, to take care to include steps which will increase the trust of disaster relief workers in the reliability of such information, either by mechanisms which rate the kudos of members of the worldwide helper community, or by including intermediate layers, where trusted relief helpers would evaluate the responses collected.

3.3.3 Disaster Management Group Participatory Design (PD) – Description and Results

The scenario communicated with the Disaster Management user group is based on a fictional earthquake in Cyprus. This scenario is also used during the Assessment Mission Course (AMC) inside the European Civil Protection Training Programme.

The scenario outlined in section 3.3.3.1 was discussed with participants, trainers and organizers of the AMC. The feedback of these individuals has been carefully taken into account and has been used to create an updated version of the scenario given in section 3.3.3.3.

A list of issues that were identified through cooperation and discussion with users is presented in section 3.3.3.2. This list was used as a basis, for SOCIETIES researchers to modify the initial scenario. The modified scenario is presented in section 3.3.3.3.

3.3.3.1 Initial Scenario Communicated With Disaster Management User Group

An earthquake measuring 7.2 on the Richter-Scale occurred in the eastern Mediterranean Sea (latitude 34.25 N, longitude 33.38 E). The shock waves were felt all over the island and caused major damage on the southern coast and inland (affected cities: Lemesos, Larnaka), and damage in the western (affected city: Paphos), northern (affected city: Lefkosia) and eastern part of the island. Other Mediterranean Countries struck by the earthquake: Egypt, Israel, Lebanon, Palestinian Territory, Syria and Turkey and to a lesser extent Greece and the North-East of Libya.

In addition, a tidal wave emerged at the epicentre and spread concentrically throughout the Mediterranean Sea. The maximum lift of the wave was up to six metres, compared to normal sea level, and moved with a speed of about 80 km/h. The tsunami-like wave hit the southern coast of Cyprus approximately one hour after the earthquake. In flat coastal areas the water expanded up to 900 metres inland and caused additional destruction to the preceding earthquake.

The local response capacity is exceeded and the government of Cyprus has requested International assistance. The United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) deployed several United Nations Disaster Assessment and Coordination (UNDAC) Teams to Egypt, Israel, Lebanon Palestinian Territory, Syria and Turkey. In coordination with the Monitoring and Information Centre (MIC) of the European Commission in Brussels, it has been decided to send a European Civil Protection Assessment Team to Cyprus, which started immediately to assess the current situation on Cyprus.

As no specific incidents about the security situation have been reported, with the exception of isolated looting activities in the bigger cities so far, the area of Cyprus has been declared UN Security Phase 1.

The team deployed by the European Commission is composed of disaster management experts from different European countries: a civil protection and logistics expert from the Danish Emergency Management Agency (DEMA), a civil engineer who is employed at the Portuguese Fire Rescue Service, a medical expert from the Swedish Civil Contingencies Agency (MSB) and a communication and coordination expert from the German Federal Agency for Technical Relief (THW) for technical assistance and support. Thereby, Community orchestration mechanisms have helped to assemble the teams as fast as possible, matching the assessed requirements with the team members’ expertise and availability.

After the team meets in the Monitoring and Information Centre (MIC) in Brussels, it is briefed, equipped and departs to Cyprus by airplane. Upon arrival in the country, the experts start to assess the situation; collecting information about damage; the need for water; food; medical support; shelter; and the state of the critical
infrastructures such as communications or the electric power distribution network [see Figure 46, Figure 47, Figure 48, Figure 49 below]

The assessment team is equipped with Cooperating Smart Space (CSS) enabled disaster management toolkits, and wearable sensors that report and log their activities and interactions. This personal information is shared at a first step only with the mission controller, by an automatically created CIS; while the information is assessed, it is also shared with all partners (see Figure 46, Figure 47 Figure 48, Figure 49). With the assistance of the CSS the assessment team is able to request support for their operations on site, such as translation of Greek letters on road signs or special skills for remote controlling equipment like Unmanned Aerial Vehicles (UAV). Such a request for assistance from the Disaster Area is sent via the CSS, which automatically selects the appropriate community and/or community member to fulfill each particular task.
Additionally to the on-site response; the Center for Satellite based Crisis Information (ZKI) has been activated to support the relief work on Cyprus. Based on satellite imagery they provide situation and damage maps for the current situation on Cyprus.

Several satellite images have been received, and the ZKI needs to extract from this huge amount of data, which parts of the original infrastructure are still intact, and where the disaster has caused most destruction. The images are separated into tiny pieces, which are sent out to the “Check Satellite Images for the Cyprus Relief” volunteer “living-room” community. These community members start to rate these small detailed satellite views by only choosing if the image content contains a destruction or not. Out of this mass community input the ZKI can generate an overview map (see Figure 51 - Damage Map of Mari power plant),
which is derived from the tiny images with the highest rating. As a result the ZKI concentrates its efforts on these areas.

3.3.3.2 Issues Related To Disaster Management Initial Scenario

- Need for specialised social network. - Experts have expressed their opinion that social networks (SNs), such as Facebook, Twitter or similar, are useful for activating “volunteers” (a brief discussion of terminology follows later) and to keep people aware and interested. They expect that information coming from volunteers via such generic SNs would be very difficult to filter, and suggest the need for more specialized/structured/controlled channels for information that comes from the volunteers.

- Filter/quality control. - The need for filter and quality control mechanisms is significant. Supposedly, some of the data crowd-sourced and published via USHAHIDI during their support in the response to the Haiti earthquake had been taken three years before, after an Earthquake in Japan. Such events can cause a very bad reputation. Technical approaches to solve this problem, such as keeping track of IP-addresses or Metadata of the images, such as coordinates or dates in EXIF-Headers are suggested.

- Partitioning and naming of user groups. - Experts felt unhappy with the term “living room community” and suggested to use the terms “volunteers” or “supporters” (maybe further qualified as “internal” and “external”). In Societies we need to find a clear model for this and the other groups such as the affected people or professional responders.

- Availability of devices. - Devices are needed for volunteers within the affected region to contribute their information. Experts discussed the kind of devices they would expect to be available to the affected people to collect data. It was found that different locations may vary strongly in their characteristics. The extremely poor Port au Prince and the “gadget-rich” San Francisco were given as examples. Unfortunately the most vulnerable societies are the ones with the poorest availability of expensive devices and an example of poor countries in Africa, such as Ethiopia is given.

- Value of additional coverage. - Everybody with a digital camera or smartphone can add valuable information and has the potential to improve the response. A significant gap of 24h to 48h exists following an event, where media mainly performs coverage. Since media coverage is often driven by the media’s need for “interesting” pictures, biases towards the visually more dramatic areas is introduced and thus such media coverage is often of limited use for the decision-making processes of responders.

- Caveats. - Untrained volunteers who more or less randomly take images, without any training about what is relevant, may not be particularly useful. Especially, when they are personally affected, their performance will be no match for trained professionals. Experience has shown that affected people will be fully occupied in the first one to three hours and will not be able to feed valuable information in this time.

- Need for and value in training. - Even a very basic training would make a significant change (in analogy to first aid training).

- Need for structuring. - It is necessary to pose simple questions that the volunteers would be asked and probably be able to answer. It is necessary “to constrain the creativity” of the volunteers.

- Simplicity - The user interface needs to be extremely intuitive to use (not only for IT experts); a comparison to an Apple iPhone that both very young and very old persons have no problems using, was made.

- Cross-checking and validation of information - It is important to cross-check the results. The combination of satellite images with images taken on the ground should allow to cross-check the (geo-referenced) information coming from smartphones or cameras.

- Registry of expertise - A database of the volunteers that lists their expertise would be necessary to task them for specific information requests. The example of the need to assess whether a bridge is still safe after an earthquake is given. A layman would not be able to judge, but a retired civil engineer would be able to.
- Censorship - Reporting of facts related to disaster situations by individuals could worsen the situation in some countries, where states with totalitarian tendencies might even restrict communication channels to prevent such information to flow in an uncontrolled way (examples have been given). Unfortunately some very vulnerable countries have these tendencies.

- Multi-level approach - Experts believe that the main use of volunteer generated-information will be to better target professional assessment missions. As an example volunteers’ information can be used for recognising hotspots, such as a collapsed supermarket or hospitals to direct further assessment.

- Suggestions for testing - Testing of such ideas/systems might be done on Cyprus, based on the excellent involvement of volunteers in civil protection issues. Furthermore, Cyprus is a very compact country with all structures of a sovereign state.

3.3.3.3 Updated Disaster Management Scenario – Based On Participatory Design (PD)

Shortly after the earthquake has been detected, by the global seismic network, a first GDACS (Global Disaster Alert and Coordination System) alert has been issued and mailed to GDACS subscribers. Since the event was classified as “red”, an instance of a CSS has been automatically generated. Registered users are notified and invited to immediately update their context. Users are split into two primary groups: The first group is potential volunteers outside of the affected area (“offsite volunteers”). The second group is potentially affected individuals that may report facts from inside the affected area (“onsite volunteers”).

All volunteer users are specifically asked to state their degree of availability and willingness to help in this event. Since it becomes clear that Cyprus is heavily involved, and the system searches for Greek language experts, a large number of Greek volunteers express their willingness. Within the first three hours after the earthquake approximately 20,000 volunteers have actively stated their availability to assist, with detailed information upon their possible timeslots. In addition to Greek volunteers living in Greece, Greek-speaking volunteers in the US are particularly wanted; due their availability to assist in a different time-zone. All these users are given timeslots for duty. While the offsite volunteers are mostly asked to stay back for the next 12-24 hours and to prepare for a very active phase after this period, the onsite volunteers cannot be reached, since the earthquake affects the public communication networks, including the mobile networks.

Nevertheless, most of these onsite volunteers have received some basic training and know that they are supposed to collect pictures and report on collapsed buildings and a range of infrastructures using a very simple to-use application on their smartphones that automatically geo-references all inputs with GPS-coordinates. They further know that they are supposed to come with their phones to the Cyprus Civil Defence (CCD) posts; which operate local hotspots, which the application on the smartphones automatically accesses to offload the collected information to the local CCD CSS. CCD in turn operates a number of satellite links that are used to forward the data to the automatically generated CSS. From the incoming data, it quickly becomes clear that the cities on the southern coast are heavily affected. High-resolution imaging satellites are tasked to gather data from these areas to feed into the rapid mapping process.

Bilingual (Greek/English) offsite volunteers start to transcribe the inputs from the onsite-volunteers to English.

Upon arrival of the designated assessment team at Pafos airport, a large group of offsite volunteers is ready to support the team. While many are using their smartphones, the majority use their laptops, or desktop computers, since they know from basic training that often questions coming in, need very fast answers and that a keyboard and a mouse allows them the fastest possible interaction.

The assessment team was supposed to be met by a CCD-liaison officer at the airport but due to a misunderstanding, the team is expected at Larnaca airport, where the OSoCC is supposed to be set up. While the team starts to organise a car and to pack the equipment into the car, the team’s Information Manager quickly types a number of questions into his CSS-enabled Disaster Management Tool. He knows that he needs to be fast, since they won’t have data transmission while they are driving and he wants good directions for the drive to Larnaca before they start. He then sets up his BGAN terminal (a commercially available bi-directional satellite communications terminal) and the questions are transmitted. He knows that the time window for the answers closes after 300 seconds, and his team leader is already urging him to board the car.

The offsite volunteers act rapidly to provide a good and effective description. Moreover, they are allowed only 200 seconds, since the remaining 100 seconds are needed by a group of more senior volunteers to
consolidate the inputs and generate a consistent answer. The system transfers the driving instructions to the team within the specified time window. In addition to these instructions, the system transfers a compiled version of the reports from the onsite volunteers to the team. The team begin their drive towards Larnaca. During the drive, the Information Manager discovers that a major hotel complex in the city of Lemesos may have collapsed with potentially hundreds of tourists being trapped. Since Lemesos is on the way, the team decides to invest one hour in assessing the situation. They take numerous pictures at the site of the collapsed hotel and task the CSS to find out all available background information. They give the community an indicated time-window of one hour. Upon their arrival at Larnaca, the community of offsite volunteers has gathered data from travel agencies that allow the system to accurately give the number of tourists that were present in the hotel. The community has even found the Greek architect who designed the hotel and she was able to give specific information on where heavy equipment should be used. The team discusses the findings with CCD and agrees to request two heavy urban search and rescue teams. The USAR teams are already on standby and have followed the incoming information. Both team leaders are already in discussion with the architect of the hotel.

Since the road network is severely affected by landslides; the teams direct a request for rapid mapping of the post-disaster state of the road network to their CSS. The rapid mapping centre immediately puts their newly acquired imagery into the CSS. A special application divides the large images into small tiles of 200 by 200 pixels or 100x100 meters. These tiles are presented to the increasingly large crowd of offsite volunteers with the task to trace roads on these tiles and to specifically mark blockings. The several thousand volunteers manage to fulfil the task within less than an hour for the entire south coast region of Cyprus. Due to an intricate system of cross-checks the quality of the post disaster state of the road network updated to the rapid mapping centre and the disaster management teams via the CSS system is excellent.

3.3.4 Disaster Management User Research Conclusions

We have described how observational methods have been used to assess the requirements of the disaster group; with a focus on assessment mission experts - sent in to assess the situation immediately after a large disaster. To achieve this, an on-site field study was performed in November 2010. The disaster management users’ requirements were further elicited by a questionnaire and participatory design (PD) group discussions on current and possible future scenarios.

From our observations, we learned that users are operating under stress and time constraints in the disaster management assessment courses. These users are expected to use intuition and experience to deal with unpredictable problems in the course of their missions, and often need to access a vast amount of information in a timely fashion. They are a very professional group, formed from a selection of experienced military and civil first responders, who prioritise professional codes of conduct and organisation in the field. Users are under considerable time pressures, and have many factors competing for their attention. Interaction modes for the CSS system thus need to be intuitive, responsive, with good feedback to ensure reliability.

Access to users is limited at the AMC. However, the disaster management users who engaged with SOCIETIES questionnaire and discussions, represent the groups willingness to share expert opinions to inform the system design, and are interested in utilising all means of communications which can be of real and practical assistance in the event of a disaster.

After the initial effort of obtaining user requirements it became obvious that the potential of SOCIETIES - enabled technology in the disaster management realm is huge. However, it also has become clear that the disaster management user group is extremely pragmatic. They are often very early adopters of technology, if they see its use, but virtually never use technology for technology’s sake. Furthermore they are willing to try out new things, but may be quick to decide that something is not suited for their mission (yet). Therefore it is very important to invest heavily into SOCIETIES prototypes that provide as much robustness, and immediate tangible benefits, as possible. From previous experience working with this group of users, SOCIETIES researchers observe that that it is particularly important to show full commitment to the mission of these users and not see them as “yet another test group”. As such, they appreciate little but continuous improvements steps upon their feedback and always give direct and valuable feedback.
It is important at this stage to differentiate the "when", "how" and "where" we will be able to engage the disaster management user group with new experimental SOCIETIES prototypes. In early stages we will use low fidelity prototypes such as paper trials, walk-through demonstrations, and periods of experimentation, within but also outside the context of the demanding AMC assignments. Apart from the AMCs, where prototypes can be demonstrated and gradually introduced into the workflow, users may be invited to use earlier developments during national training events, such as the national training events of the German THW organisation, where constraints are less severe.

The disaster user-case also includes the group of people in the field of “at home” who can act as volunteers. This group has not been addressed in this document because we need to start extracting the scenarios from the expert disaster management stakeholders’ point of view firstly, and only then can we move to add use-cases aligned to the capabilities, wishes and restrictions of the volunteers. After specifying a subset of core scenarios within WP2 we will identify suitable groups of users within the volunteer group and interact with them to produce working models for their possible contributions in real-world disaster scenarios. We cannot do any in-situ observational studies with this group now – as it had not yet been formed, and it is essential to begin exploring the possibilities of volunteer contributions as seen from the classical experienced disaster management user-group, as presented in this document.
4 User Requirements

After conducting the research described in section 3 for each user group, results were analysed, and formulated into tables of requirements. Interpretation and reduction were a necessary part of this process, as it was felt that having tables of requirements was a step, which would facilitate their reference and use in other SOCIETIES work packages. The requirements listed in this section, are those identified from analysis of initial observations, interviews, questionnaire responses and participatory activities with a sample subset of users, from the Student Group, the Enterprise Group and the Disaster Management Group in T2.1. It is expected that these requirements in D2.1 will need to be extended or revised, during the course of the SOCIETIES project, based on further interaction and participation with these users as part of Work Package 8, Task 8.3 user evaluation activities.

4.1 User Group Requirements Tables

The following tables list the requirements elicited for each user group from the user research undertaken in T2.1. For each category the requirements are described along with a number of attributes.

- **Priority** dictates how necessary it is that the Societies platform meets this requirement and is specified as High, Medium or Low. High indicates the requirement is a “must have”, medium denotes “should have”, and low indicates “could have”.

- **Research Method** details the method used to obtain the requirement. For the student requirements this can either be ISS (Initial Scenario Student), PD_S (Participatory Design Session Students), SEM (Student Ethnographic Methods) or (SQx) Student Questionnaire Question x.

- **Remarks** detail any other relevant information about the requirement.

4.1.1 Student User Requirements Table

These student requirements were identified by ITSUD, ICCS, and HWU, from the research results presented in 3. In this section, the user requirements that have been extracted from the student user group questionnaires, from both HWU and ICCS students, along with the observations and participatory workshop coordinated with the HWU students.

<table>
<thead>
<tr>
<th>Requirement Description</th>
<th>Priority</th>
<th>Research Method</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>The system should support desktop and laptop computers, as well as, PDA/Smartphone devices.</td>
<td>High</td>
<td>ISS, SQ4, SQ6</td>
<td>Not all students have PDA or smart phones.</td>
</tr>
<tr>
<td>The system should interact with peripheral computer devices, such as display screens, speakers, printers, scanners and faxes etc.</td>
<td>High</td>
<td>ISS, SQ3, SQ6</td>
<td></td>
</tr>
<tr>
<td>The system should integrate various context sensors, such as light, audio, visual, location, etc.</td>
<td>High</td>
<td>ISS, PD_S, SQ5, SQ8</td>
<td></td>
</tr>
<tr>
<td>Feature</td>
<td>Importance</td>
<td>SQ</td>
<td>Notes</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------</td>
<td>----</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>The system should make it possible for resources to be available all the time.</td>
<td>High</td>
<td>SQ9</td>
<td>This was the feature that most students preferred in the results of the survey.</td>
</tr>
<tr>
<td>The system should support invisible and available resources.</td>
<td>High</td>
<td>SQ9</td>
<td>This was a significantly preferred feature in the results of the survey.</td>
</tr>
<tr>
<td>The system should be adaptable to the user's preferences.</td>
<td>High</td>
<td>SQ9</td>
<td>This was a significantly preferred feature in the results of the survey.</td>
</tr>
<tr>
<td>The system should automatically adapt resources.</td>
<td>Medium</td>
<td>SQ9</td>
<td>This feature was preferred by the majority of survey respondents.</td>
</tr>
<tr>
<td>The system should support communication between resources.</td>
<td>Medium</td>
<td>SQ9</td>
<td>This feature was preferred by the majority of survey respondents.</td>
</tr>
<tr>
<td>The system should support synchronisation of webspaces and devices.</td>
<td>High</td>
<td>SQ10</td>
<td>A significant proportion of the students saw benefits in this feature.</td>
</tr>
<tr>
<td>The system should support resource and application sharing.</td>
<td>High</td>
<td>SQ11</td>
<td>According to the survey results the majority of students would use this feature.</td>
</tr>
<tr>
<td>The system should provide adequate privacy support for the end user, preventing access to sensitive information when appropriate.</td>
<td>High</td>
<td>SQ11, SQ15, SQ17</td>
<td>According to the results of the survey, privacy was the main issue raised against the concept of resource and application sharing. Privacy reasons were also raised with regards using location aware SNSs. This support should be an improvement over that currently provided by SNSs.</td>
</tr>
<tr>
<td>The system should support multiple levels of data sensitivity allowing the user to control what data is shared with whom.</td>
<td>High</td>
<td>SQ16</td>
<td>The survey results show that in current SNSs, students share different data (with different levels of sensitivity) with different people.</td>
</tr>
<tr>
<td>Users should be able to exchange basic profile information (and other information selected by the individual user) with each other.</td>
<td>High</td>
<td>SQ16</td>
<td></td>
</tr>
<tr>
<td>The system should aim to integrate with the most popular social media such as Facebook, YouTube and Skype.</td>
<td>High</td>
<td>SQ12, SQ13</td>
<td>According to the results of the questionnaire, these are the three most popular social media among the student group. Of these three social media the HWU students use SNSs most often while NTUA students use IM tools most often.</td>
</tr>
<tr>
<td>The system should support popular social media activities such as email, instant messaging, sharing photos/videos and organising events.</td>
<td>High</td>
<td>SQ14</td>
<td></td>
</tr>
<tr>
<td>Requirement</td>
<td>Score</td>
<td>SQ</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>-------</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>The system should aim to support semi-popular social media activities such as discovering interests/info, making connections, meeting like-minded people and research.</td>
<td>Medium</td>
<td>SQ14</td>
<td></td>
</tr>
<tr>
<td>The system should support multiple context dependent communication channels.</td>
<td>High</td>
<td>SQ18</td>
<td></td>
</tr>
<tr>
<td>The system should attempt to emulate aspects of face-to-face meetings during remote communications between group members.</td>
<td>Low</td>
<td>SQ19, SQ23</td>
<td></td>
</tr>
<tr>
<td>The system should allow the end user to filter invitations to connect with new friends.</td>
<td>High</td>
<td>SQ20</td>
<td></td>
</tr>
<tr>
<td>The system should consider how well the end user knows the members of a group before suggesting they join.</td>
<td>High</td>
<td>SQ21, SQ22</td>
<td></td>
</tr>
<tr>
<td>The system should consider if the end user has interests in common with group members before suggesting they join a group.</td>
<td>Medium</td>
<td>SQ21</td>
<td></td>
</tr>
<tr>
<td>The user should be able to add friends to contact lists within the system.</td>
<td>High</td>
<td>ISS</td>
<td></td>
</tr>
<tr>
<td>The system should be able to suggest students to communicate based on shared interests or similar studying subjects.</td>
<td>High</td>
<td>ISS, PD_S, SQ27, SQ12, SQ18-20, SQ28, SQ29</td>
<td></td>
</tr>
<tr>
<td>The system should be able to automatically invite users to join a community based on user-community matching.</td>
<td>High</td>
<td>ISS, PD_S, SQ28</td>
<td></td>
</tr>
<tr>
<td>The system should be able to create ad-hoc communities for some purpose based on context, task and profile information.</td>
<td>High</td>
<td>ISS</td>
<td></td>
</tr>
</tbody>
</table>

The survey results show that the preferred communication channel within a group is dependent on who the communication is with.

Immediate/rapid response communication methods (such as face-to-face or telephone) are preferred by students when communicating within a group.

Very few respondents to the survey indicated that they would always accept invitations to connect with new friends.

Both student groups ranked the criteria for joining a new group identically. Knowing group members (or knowing one of their friends) ranked highest.

According to the results of the questionnaires, when users aim to achieve a particular task (e.g. having to solve a computer problem for a class module) they tend to search the web or ask a friend. A combination of those two may result in this requirement.

Many students also stated that they would find it useful if their mobile phone automatically put them in contact with like-minded people.

Based on free text answers of question 28, a significant percentage of students are concerned about the criteria of user-community matching, and the way these are defined.
<table>
<thead>
<tr>
<th>Requirement</th>
<th>ISS</th>
<th>PD_S</th>
<th>SQ</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>The system should be able to detect various types of user context information, such as location, activity and encounters.</td>
<td>High</td>
<td></td>
<td>SQ5</td>
<td>Other context data types that are considered to be useful in everyday tasks are Light, Audio, Visual, Weight, Force, or Touch.</td>
</tr>
<tr>
<td>The system should be able to provide context sharing scheme at intra/inter community level.</td>
<td>Medium</td>
<td></td>
<td>ISS</td>
<td></td>
</tr>
<tr>
<td>The system should provide access to user data and applications via any of their system-enabled devices.</td>
<td>Medium</td>
<td></td>
<td>SQ7</td>
<td>Allowing other students to access data, applications and resources in return for access to some of their applications and resources is faced with a lot of scepticism, mainly due to the privacy issues that arise. (Q8) However face-to-face meeting is still preferable in many cases.</td>
</tr>
<tr>
<td>The system should be able to provide multi-agent interoperation mechanism.</td>
<td>Medium</td>
<td></td>
<td>ISS</td>
<td></td>
</tr>
<tr>
<td>The system should be able to decide about the user’s availability based on the user’s real-time context.</td>
<td>High</td>
<td></td>
<td>PD_S</td>
<td>Very important for organisation of ad-hoc meetings.</td>
</tr>
<tr>
<td>The system should support user location tracking.</td>
<td>High</td>
<td></td>
<td>PD_S, SQ13</td>
<td>More than ~65% considers location tracking to be a matter that raises significant privacy issues. However, many of the scenarios generated by the student user group involved location tracking to some extent.</td>
</tr>
<tr>
<td>The system should record user history operations and adapt its behaviour accordingly.</td>
<td>S_EM</td>
<td></td>
<td></td>
<td>Key locking -</td>
</tr>
<tr>
<td>The system should provide a context-aware information broadcast scheme at intra and inter community level.</td>
<td>Medium</td>
<td></td>
<td>PD_S</td>
<td>Many user groups assumed this functionality for ad-hoc creation of groups, e.g. a spontaneous football match.</td>
</tr>
<tr>
<td>The system should be able to recognize the user and guide him/her to a specific location.</td>
<td>Medium</td>
<td></td>
<td>PD_S</td>
<td></td>
</tr>
<tr>
<td>A route recommendation service should be provided that considers trajectories of other community members.</td>
<td>Medium</td>
<td></td>
<td>ISS</td>
<td></td>
</tr>
<tr>
<td>The system should be able to support the creation of smart study timetable based on students’ exam timetable.</td>
<td>Medium</td>
<td></td>
<td>ISS</td>
<td></td>
</tr>
<tr>
<td>The system should support students to find books in school library and local bookstores.</td>
<td>Medium</td>
<td></td>
<td>SQ28</td>
<td></td>
</tr>
<tr>
<td>The system should utilize GPS and local weather services to alert users that rain/bad weather is imminent.</td>
<td>Low</td>
<td></td>
<td>PD_S, SQ13</td>
<td>One student group bodystormed a scenario during the PD session that highlighted this requirement.</td>
</tr>
<tr>
<td>Requirement</td>
<td>Importance</td>
<td>PD_S</td>
<td>Scenarios</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>------------</td>
<td>------</td>
<td>---------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>The system should be able to recommend users what they should wear according to the current/foreseen weather conditions.</td>
<td>Low</td>
<td>PD_S</td>
<td>One student group bodystormed a scenario during the PD session that highlighted this requirement.</td>
<td></td>
</tr>
<tr>
<td>The system should be able to support context-aware shopping, medication reminding, etc.</td>
<td>Low</td>
<td>PD_S</td>
<td>One student group bodystormed a scenario during the PD session that highlighted this requirement.</td>
<td></td>
</tr>
<tr>
<td>The system should be able to calculate travel time according to users’ current location and destination.</td>
<td>Low</td>
<td>PD_S</td>
<td>One student group bodystormed a scenario during the PD session that highlighted this requirement.</td>
<td></td>
</tr>
</tbody>
</table>
4.1.2 Enterprise User Requirements Table

This section integrates the enterprise requirements identified by IBM, TI, PTIN, and Intel. Following are the user requirements that were extracted from Enterprise user group sections: 3.2.1 Observation and Interviews (marked as O below), 3.2.2 Survey and results (marked as S below) and 3.2.3 PD session (marked as PD_E below) in the context of the enterprise. The requirements are partitioned into different categories.

<table>
<thead>
<tr>
<th>Requirement Description</th>
<th>Priority</th>
<th>Related Section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>The system should allow user to set their preferences.</td>
<td>High</td>
<td>EQ, PD_E</td>
<td></td>
</tr>
<tr>
<td>Users should be able to define the level of networking they are interested in, e.g. only interested in new contacts that are highly relevant to their own work focus.</td>
<td>High</td>
<td>E_EM</td>
<td>This was observed behaviour of users in the conference</td>
</tr>
<tr>
<td>The system should be able to dynamically adjust the networking level according to user preferences' and user activity.</td>
<td>High</td>
<td>E_EM</td>
<td></td>
</tr>
<tr>
<td>Users want distinctly clear identities for work and personal use.</td>
<td>High</td>
<td>E_EM</td>
<td>Enterprise users seldom mix work and personal contacts</td>
</tr>
<tr>
<td>The system should include a service that enables a user to indicate whether it is allowed to register his/her location and activity.</td>
<td>High</td>
<td>PD_E</td>
<td></td>
</tr>
<tr>
<td>The system should support a variety of mobile devices: smartphone, iPad, laptop, tablet computer, notebook device.</td>
<td>High</td>
<td>EQ, E_EM, PD_E</td>
<td></td>
</tr>
<tr>
<td>All devices should support as many services as possible; if some service cannot be supported in the normal way, a specific device profile that supports a subset of the functionality should be available.</td>
<td>High</td>
<td>E_EM</td>
<td></td>
</tr>
<tr>
<td>The system should be available all the time (offline and online).</td>
<td>High</td>
<td>EQ</td>
<td>Continuous availability of resources is the most desired proposed feature</td>
</tr>
<tr>
<td>The system should obey privacy rules.</td>
<td>High</td>
<td>EQ, PD_E</td>
<td>Privacy is a paramount concern</td>
</tr>
<tr>
<td>The system should allow communicating via community social net, community email (or private area), SMS/MMS.</td>
<td>High</td>
<td>EQ</td>
<td>Enterprise users pick different forms of communication for different tasks and groups, so all should be supported.</td>
</tr>
<tr>
<td>The system should be able to connect and pass to core and 3rd party services information on various sensors like location, touch... etc.</td>
<td>High</td>
<td>EQ, PD_E</td>
<td></td>
</tr>
</tbody>
</table>
The system should connect people who have similar interests (e.g. are confronted with similar problems at work).

Users would like to be able to access slides and videos from other sessions during the event.

The system should allow exchanging resources and using others application within the community but with privacy considerations.

Privacy is the main point of concern when it comes to sharing.

The system should provide support to enable users to ad-hoc create and publish mini-meetings and fringe events which participants with particular interests could attend. A bulletin board is one such example.

This is a common occurrence in conferences, and using a CSS would facilitate this.

The system should support automatic registration to service once a CSS enabled device enters an event venue.

The system should allow accessing community related information after the community has ended.

The system should support feedback placing on a target (ratings and comments).

Attendees find the static maps insufficient.

The system should provide personalized directions.

Attendees find the static maps insufficient.

The system should allow a conference to provide community oriented information for better education of participants.

This is desired both by attendees and the organizers.

The system should allow a conference to provide Electronic Information Kit (EIK) and match with his/her interests to recommend sessions to attend.

The system should integrate agenda and maps of the EIK with the participant’s device.

Users want flexibility in how to access key information in the conference brochure, in particular maps, and the conference agenda.

Users would like key information to be available in different formats, according to their needs – e.g. large overview agenda for planning. Map with agenda points overlaid for during the event.

The system should enable to exchange electronic business cards.

The system should be able to show personalized event information on user device once he is registered.
<table>
<thead>
<tr>
<th>Feature Description</th>
<th>Importance</th>
<th>Technology</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>The system should support individual billing for a joint transaction, for example a shared taxi journey.</td>
<td>Low</td>
<td>PD_E</td>
<td></td>
</tr>
<tr>
<td>The system should enable viewing information on session presenter and registered attendees before, during and after the session.</td>
<td>Low</td>
<td>PD_E</td>
<td></td>
</tr>
<tr>
<td>The system should analyse areas of interest of attendees and come up with the key ones (e.g. like a tag cloud analysis) and then define zones in the conference and invite to those zones relevant people of interest to get a chance to mingle.</td>
<td>Medium</td>
<td>PD_E</td>
<td></td>
</tr>
<tr>
<td>The system should help me identify with whom I had a conversation based on the location / time the meeting occurred.</td>
<td>Low</td>
<td>PD_E</td>
<td></td>
</tr>
</tbody>
</table>
4.1.3 Disaster Management User Requirements Table

The “Priority” column is based on the subjective opinion of DLR, who acted as an expert proxy between the Disaster Management user community and the input required for this deliverable. The user requirements have been extracted from the initial scenario and section 3.3.

### SOCIETIES D2.1 – Disaster Management User Requirements Table

DM_EM: Disaster Management Ethnographic Methods; ISDM: Initial Scenario Disaster Management; PD_DM: Participatory Design Disaster Management; DMQ: Disaster Management Questionnaire (the question number may follow e.g. DMQQ2)

<table>
<thead>
<tr>
<th>Requirement Description</th>
<th>Priority</th>
<th>Related Source</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintaining respect and privacy when interacting with affected persons or groups or when personal data of affected people is disseminated.</td>
<td>High</td>
<td>ISDM, PD_DM, DM_E_M</td>
<td>Taken directly from section 3</td>
</tr>
<tr>
<td>Tracking a user’s position and keeping other team members informed about it.</td>
<td>High</td>
<td>DMQ9</td>
<td>Ditto</td>
</tr>
<tr>
<td>Communicating a user’s current activity to team members or mission control.</td>
<td>High</td>
<td>DMQ9</td>
<td>Ditto</td>
</tr>
<tr>
<td>Improving network connection and bandwidth in disaster areas.</td>
<td>High</td>
<td>ISDM, DMQ10, DM_E_M</td>
<td>Quote from Section 3: “The reason why instant messaging, video calls and video cameras are not commonly used today may lie again in the limited internet connection and bandwidth in disaster areas. Reducing this problem would consequently open up new chances for this community.”</td>
</tr>
<tr>
<td>System must have good feedback to users input – to ensure reliability.</td>
<td>High</td>
<td>DM_E_M</td>
<td>As users may not be familiar with devices but are reliant on their operation. Any unexpected response must be immediately evident to the end user.</td>
</tr>
<tr>
<td>No dependency on network connectivity for basic functionality</td>
<td>High</td>
<td>ISDM, DMQ10, DM_E_M</td>
<td></td>
</tr>
<tr>
<td>End-user devices, which are small, light, easy to use and robust for the outdoor need to be supported.</td>
<td>High</td>
<td>ISDM, DMQ13</td>
<td>Quote from Section 3: “Hardware that SOCIETIES would integrate into systems for disaster management support has to be small, light, easy to use and robust in outdoor environments.”</td>
</tr>
<tr>
<td>Requirement</td>
<td>Importance Level</td>
<td>Details</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>------------------</td>
<td>-------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Simple intuitive User Interfaces are required.</td>
<td>High PD_DM</td>
<td>Quote from Section 3: “The user interface needs to be extremely intuitive to use.”</td>
<td></td>
</tr>
<tr>
<td>Information exchange between all devices and technologies.</td>
<td>High ISDM, DMQ14 , DM_E M</td>
<td>Taken directly from Section 3</td>
<td></td>
</tr>
<tr>
<td>Network management, intelligent routing and ad-hoc peer-to-peer networks.</td>
<td>High ISDM, DMQ14 , DM_E M</td>
<td>Taken directly from Section 3</td>
<td></td>
</tr>
<tr>
<td>Inclusion of a worldwide community to help solve disaster relief problems.</td>
<td>High ISDM, DMQ15</td>
<td>Taken directly from Section 3</td>
<td></td>
</tr>
<tr>
<td>Community members need to be able to rate small detailed satellite views, e.g. choosing if the image content contains destruction or not.</td>
<td>High ISDM, DMQ15</td>
<td>Taken directly from Section 3</td>
<td></td>
</tr>
<tr>
<td>Need for and value in training</td>
<td>High PD_DM</td>
<td>Quote from Section 3: “Even a very basic training would make a significant change.”</td>
<td></td>
</tr>
<tr>
<td>Need for structuring tasks for the worldwide community.</td>
<td>High PD_DM</td>
<td>Quote from Section 3: “It is necessary to pose simple questions that the volunteers would be tasked and probably be able to answer. It is necessary “to constrain the creativity” of the volunteers.”</td>
<td></td>
</tr>
<tr>
<td>Reputation management linked to a volunteer user’s profile to support information validation.</td>
<td>Medium PD_DM</td>
<td>Quote from Section 3: “It is important to cross-check the results.”</td>
<td></td>
</tr>
<tr>
<td>Cross-checking, information validation for crowd-sourced data systems.</td>
<td>High PD_DM</td>
<td>Quote from Section 3: “It is important to cross-check the results.”</td>
<td></td>
</tr>
<tr>
<td>Registry of expertise, linked to volunteer CSS profiles.</td>
<td>High PD_DM</td>
<td>Quote from Section 3: “A database of the volunteers that lists their expertise would be necessary.”</td>
<td></td>
</tr>
<tr>
<td>Multi-language support</td>
<td>High ISDM, PD_DM , DM_E M</td>
<td>Bilingual (Greek/English) offsite volunteers start to transcribe the inputs from the onsite-volunteers to English.</td>
<td></td>
</tr>
<tr>
<td>Ability to prioritise resource access to different members according to their role</td>
<td>High ISDM, PD_DM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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| Support for logistics and resource management. | Medium | DMQ9 | Taken directly from section 3 |
| An integration of various communication protocols | Medium | ISDM, DMQ10 | Quote from Section 3: “When we asked, which other technologies the participants rated as useful, we were hinted at a desired integration of radio communication (PMR, VHF, etc.) and ASIGN (Adaptive Satellite-based system for Image Communications In Global Networks) Geopictures in a disaster management support tool.” |
| Devices should have a long battery life and limited to one small device. | Medium | ISDM, DMQ13 | Quote from Section 3: “Also long battery life is a major requirement and the reduction of devices is desired. If possible it should only be one device that is carried along by disaster helpers.” |
| Need for specialized social network. | Medium | DMQ7 | Taken directly from Section 3 |
| Include the use of the ASIGN Geopictures tool | Low | DMQ10 | Quote from Section 3: “ASIGN Geopictures seems to be a valuable option, as it can connect via satellite communication or the GSM network directly to the OSOCC.” |

Conclusions

The SOCIETIES project is one in which the user plays the predominant role: from inception of the three representative user-groups, scenarios, requirements, use-cases, right up to an evaluation of the software prototypes. This deliverable sets the scene for the user-centric developments in the rest of the project and is intended to serve as the reference point for all further work.

The document commenced with a state-of-the-art review, which illustrated the pioneering ideas pertaining to user research in HCI at this point in the history of computing. We outlined how the current shift to the disappearing computer, in a pervasive ‘everyware’ environment, is changing the interfaces between humans and computers; and this combined with the rise of massively networked ‘always on’ cross device social computing, is presenting new challenges for HCI in innovation design. On one hand, new opportunities for participatory and cooperative design with active users are envisioned through a creative third space in social computing, particularly online communities, while on the other hand ‘big data’ from cloud/crowd computing is promising new seams for remote anonymised user behaviour analysis. New paradigms for user behaviour are evolving on the continuum from non-users, consumers, and readers; to active authors, publishers and distributors of information; and co-developers of open systems. Users are creatively engaging in the power dynamics afforded by the emerging social and ubiquitous ICT convergence, as active citizens and ‘smart mobs’ [56], experimenting with harnessing rapid social influence for social, cultural and political ends.

The stages of the user centred design process were outlined, and extended to include UX considerations, which include perceived desirability, along with perceived usefulness, and perceived ease of use as significant to users acceptance and adoption of technology. The roles of ethnographic methods and participatory design approaches, in bringing the user to the foreground in system innovation and development were discussed.

The SOCIETIES user research methodology was presented and explained. Ethnographic methods, questionnaire and participatory design events were included to broaden the research with three different perspectives. Initial scenarios were used as a way of introducing the user base to our intentions and as a way of establishing communication and trust between the user groups and the project members. We started with a “quick and dirty,” but effective, participant observation and contextual inquiry to gain a deeper understanding about each of our user groups in each domain. This allowed us to filter observations around user communications and interactions and to understand what, how and when users did or did not do things; who they interacted with; where community activities took place; and what tools were used. A questionnaire was designed, distributed and the results evaluated; it captures different types of information: demographics, technology, social media, and community. A section with questions specific to each user group was also included. Finally, we have introduced participatory workshops to allow users to engage with each other, and the project researchers; to discuss the concepts, scenarios, and potentials of Cooperating Smart Spaces by focusing on tangible scenarios. This has and will in the future allow the users to feel that they are part of the process and that their contributions are valuable. We brainstormed as a consortium first and have documented the initial scenarios, which we used to convey our visions in the expectation that we could refine and develop the scenarios together with the users in participatory design sessions.

The main body of this deliverable was devoted to documenting the results of the process in the three user domains in great detail: the students, enterprise and disaster management groups. We provided detailed analyses of the result of the questionnaires, which show that our three groups are sufficiently different from one another to warrant their inclusion in the project, but similar enough to allow common underlying requirements to be gleaned. Based on the user observation, the PD sessions and the results of the questionnaires, we have tabulated the different user requirements and have referenced from which research activity each requirement was generated, in these tables.

By adopting a triangulated approach to user research, for three distinct groups, we are attempting to validate results through cross comparison and to thereby capture requirements that can be generalised for a broader group of users. Each of the user groups, students, enterprise executives, and disaster management professionals has different and particular requirements in terms of functionality and contexts of use, and yet we also have found some similarities in their expectations for the future SOCIETIES system. It is hoped that studying the variances and similarities between the three groups would be sufficient for designing a system for all users. However, the differences between our individual users remind us that the ‘average user’ does
not really exist, and that those users on the fringes should still be catered for, if we are to strive to achieve a
‘design for all’ accessibility in the CSS system. SOCIETIES users are all at different stages on the
continuum from consumer to creator in social and pervasive computing. Motivation to participate will
require continuous engagement and support.

All user groups are interested in the potential benefits of a CSS system, but clarity about privacy issues needs
to be addressed as a significant concern, which will be closely related to user acceptance of this technology.

The student community are eager to engage creatively with the project. They are already social media users,
and are comfortable with a wide range of devices. They are interested in the potential for the system to fix
problems in their domain, like managing lab and library book access, facilitating access, and collaboration
between students. Their scenarios reveal a willingness to play with the technology, which may be optimised
by SOCIETIES in future prototypes.

Enterprise users are primarily interested in CSS services, which could enhance the workflow of their daily
lives, and additional features for more selective relevant communications. They are in some cases,
overloaded with communications and information, and are attracted to the idea of a system that would
automate filtering of both, without missing opportunities for useful connections.

Disaster Management community are interested in any means of communication which works in a disaster
zone. They are early adapters if a technology is clearly fitting their functional needs. They are only interested
in functional needs, rather than hedonic requirements. Accessing information from diversely situated experts
to inform decision-making, and supporting data assessment of conditions or mapping in a disaster zone are
eamples of tasks where the CSS might prove useful, if engaging with a wider user group via social
computing. However the Disaster Management experts stress training and other systematic checks would be
required to verify validity of any such information.

The Disaster Management volunteer community has been identified during the described observations and
discussion as being a requirement for the replacement for "broken infrastructure" or to perform tasks which
are best (or can only be) done by humans. As such, this is recognised as a user community that will be
needed for our user trial evaluations in WP8. We will identify, survey and incorporate suitable members of
the volunteer groups once the scope of the use-cases and scenarios has been identified and agreed with the
disaster management expert user group. The volunteer group can only be investigated once the actual
scenarios are fixed. However, given the time constraints imposed on the delivery date for the D21
deliverable, any requirements analysis of this user community was deemed outside of scope, at this point in
the project.

Online communities have been identified as a potentially creative space, for remote access, where
relationships between all of SOCIETIES stakeholders could evolve remotely and it would also allow for
ongoing observations of group activity. A closed social network could set the stage for a variety of
SOCIETIES online workshops within each group, from discussion groups to cultural probes. Scenarios could
be revised, and refined with personas and storyboards, to form story spirals for CSS development.

Our user groups are not pre-existing and are linked through common identity rather than common bonds, and
although some groups of individuals may have a priori strong bonds, the larger groups are linked by
relatively weak bonds, and do not already engage in a shared community social network for example.
SOCIETIES may spark new connections and lead to stronger and more bonds between individuals in the
groups, building social cohesion in the user groups through participation in the project.

Our analysis is presented as ethnographic vignettes, statistical survey data, and PD results. Extracting
requirements that are verifiable from qualitative user research is the interface between human and system.
We have formulated tables of requirements, to facilitate their reach into other aspects of the SOCIETIES
project.

This research undertaken in Task 2.1 will inform the approaches used in planning and establishing future
participatory events and evaluations with our users in Task 8.3, User Trial Evaluations. The importance of
tailoring engagements to fit the particular parameters of each user domain has been underlined by the
variances in participation and responses to different research methods as described in this document.
Information about users’ experiences with technology, and social networking will guide our selection of
media used for further communications, while knowledge about their communities, and understandings
gained about their experiences in their naturalistic domains has given us greater insight into what content, services and activities are most likely to be relevant to each user domain.
References

1. Andersson, Freeman, James, Johnston, Ljung (2005); “Mobile Media and Applications, From Concept To Cash: Successful Service Creation and Launch”; John Wiley and Sons Ltd..


Annex A  Additional Information Relevant To User Requirements

A.1  Initial scenarios

This section presents the initial scenarios designed for the three user groups selected in Societies.

A.1.1  SOCIETIES scenario brainstorming

This subsection presents the raw results of the Student scenario brainstorming session that was held at the SOCIETIES kick-off meeting in Dublin in October 2010.

A.1.2  Initial Student scenarios

The session was split into 4 focus groups. The raw results of each focus group are presented below. The initial scenarios developed for the Student user group are presented in the subsections that follow.

A.1.2.1  Pervasive support in a Social Setting

- Sports-buddy finder – Jim is a keen climber but he always needs a buddy to climb with (to anchor him). His CSS alerts him that John (his friend) is already in the Gym on the climbing wall (due to sensors in the wall, shoes, etc.). Jim heads to the gym and climbs with John.
- Display screens could be positioned in gyms, libraries etc. to let community members know if a fellow member is in the building and what their activity is.
- Spontaneous games – Andrew’s CSS alerts him that 5 fellow community members are in the park playing football. This is identified through sensors in the ball/shoes. He heads to the park and joins them for a game.
- Geocaching and location based sports – Such scenarios promote physical activity and healthier student lifestyles.
- Space allocation – Environmental information such as, how busy the library/gym is, can be broadcast to communities.
- Community suggestions based on proximity, sound, location – E.g. if it is identified that someone has spent significant time talking to someone else, suggestions could be made that they join similar communities or create their own community if not already the case.
- Agents with histories – E.g. a piece of lab equipment is used by someone for an experiment. They tag it with some information, such as results/tips for use etc. for the next user. In this way practical knowledge could be passed down from previous students to current ones. Histories could also be applied to identify who has had contact with whom. This would be highly beneficial to curb the spread of illness throughout the student community.
- Monitoring of beer consumption by a pub community to identify what pubs are busiest/most popular.
- Community music selection within a club – Based on the biometrics/preferences of the community within the club.
- Proactive DJ – Music selection could also be based on how busy the dancefloor is for certain genres/artists. This could be captured by sensors in the dancefloor. The music selection would then be tailored towards the most popular music genres/artists of the current crowd.

A.1.2.2  Pervasive support in an Academic Setting

- When working on coursework in groups sometimes the group cannot make contact with one or more members. Directional speakers could be used to target such individuals when they enter the public pervasive area and tell them to read/reply to their e-mails.
- Feedback from students on course material e.g. assignments, lectures, tutorials.
• As the public pervasive space is centrally located and most students will pass through it at some point during the day it might be possible to infer when a student has been absent from the campus for a day (by spotting that they did not enter the public pervasive space at all on a given day) and automatically download slides/notes/podcasts to their personal devices when they next enter the public pervasive space.

• Pervasive crowd sourcing – Posting feedback to community coordinator to build up course material.

• Detect who is friends with whom based on audio contacts.

• Messages could be broadcast to individuals (through directional speakers) in their native tongue – especially useful in emergency situations.

A.1.2.3 Social Network (etc.) support in a Social Setting

• Weekend/College trip organisation.

• Betting.

• Event planning (pre and post event).

• To entice recycling (e.g. beer bottles).

• To support cooperation with foreign countries for internships/work experience.

• Personal protection (e.g. alerting community of spiked drinks).

• Personal relationships.

• House sharing/rent a room schemes.

• Welcoming events for new students e.g. parties. Aids the establishment of new friendships.

• Relevant social games e.g. Farmville.

• Establishment of study groups.

• Buying and selling of books (hand downs to the next year).

• Carpooling, bicycle rental.

• Sharing of knowledge between students.

• Find replacement players/sports teams/professionals at short notice.

• Topics e.g. student facilities/services.

A.1.2.4 Social Network (etc.) support in an Academic Setting

• People have already used SNs to contact reference sources and key authors in the process of writing up their PhD thesis.

• Examples of currently used SN channels are Bulletin Boards, Page Flakes (Personalisation), IGoogle, etc.

• A successful student managed to sell his coursework and field material to a student in the following year through Twitter.

• Tutorials could be organised through Facebook.

• Advice forums and communities of practice could provide useful knowledge to members e.g. paper references, conference reviews etc.

A.1.2.5 Student user trial scenarios

Students start the term with their new CSS devices and add friends to their contact lists as they meet.
One day a student, Arthur, decides to go out to the cinema. He uses his device to arrange a group of people who want to join him. This community will all share details like where and what time to meet, what film to see, and so on.

Arthur finds he has different groups of friends who like to do different things. He finds it best to make separate communities in his device for them to do certain regular events; for example, several of his friends are members of the HWU Taekwondo society. For spontaneous, unplanned events, he and his friends simply create temporary communities on the fly to arrange them. Arthur enjoys fishing, so when he feels like doing this, he makes a group that automatically invites all his friends who also like fishing.

In this term, Arthur is in a group coursework project. His group has made a CSS community, and use it to arrange meetings. One day Arthur forgets he has a meeting; fortunately, the university has screen monitors dotted around the buildings that recognise this. He sees one monitor and it states “Arthur, you have a meeting in EM2.52 at 11:00.” He heads for the meeting.

Arthur’s meeting drags on for longer than planned, and he comes out after 3 hours. With everything else on his mind, he forgets he was supposed to attend a lecture that just started five minutes ago. Luckily, once again the monitors help him. They recognise he is a member of the class for the lecture that has started, and display a warning for him to get to the appropriate room. In case he misses this, some directional speakers also speak out “Arthur, you have a lecture in EM1.48 that has just started.” Arthur makes his way to the lecture.

His 3-hour meeting left Arthur frustrated and so, later in the day, he heads to the local park for a chance to unwind. As he walks along, his CSS alerts him that some friends of his are nearby, all clustered around the same area. When he goes to this area, he finds they are all having a game of football, so he joins in.

Later in the term, exams approach and it’s now crunch time for studying. Arthur switches on his CSS and discovers he’s been invited to a group dedicated to studying and sharing knowledge about one of his modules. He joins and soon the community is buzzing with activity, sharing useful notes and anecdotes of discussions with the lecturer about certain things such as what material is examinable. The lecturer even joins in the community and helps with any questions the students have.

A.1.2.6 Online lessons

Basic Scenario: The University provides Online Lessons which student can follow using their CSS. Using his companion device (e.g. a mobile tablet), the student can access the online session via the Web. The Online Lesson consists of the main video stream showing the lecturer, but has also other related session, e.g. a stream of slides he is presenting, related materials, online comments done by other viewers, and a stream of annotations that viewers can add while listening. Students watching the same lesson, are automatically added to a respective “Society” of students taking that course. The University is then able to send messages to all participants in case the lecturer is ill.

1. Online experiences: While sitting at home, the student can utilise the CSS control interface to re-direct the main video stream to the TV set in his apartment, keep the slides on his tablet, get the audio from his music player, and have the annotation stream from his fellow student being displayed on his digital picture frame where they belong. He can enter private annotations on his tablet, but can also publish them to the common annotation stream. All streams are automatically recorded in his Clodu storage.

   When he feels hungry, he pushes a button on his CSS control interface that instructs the CSS that the user wants to move away from this room and that the UIs need to be re-arranged to his companion device only. Audio can now be listened through the earphone, video stream and slide stream are sharing the table, and annotation stream is now hidden in a roll-up menu. The configuration was stored in his user profile as his preferred setup for lessons when “on-the-move”.

   When entering the joint kitchen, he sees his learning buddy grabbing some water from the fridge. They decide to continue watching the lesson jointly. They establish a “Learning-Buddy Society” of their CSS and also include devices from the kitchen (TV set, audio play out) into the new “Society”. The can now move the lecturer again to the TV set and have the kitchen audio system being used for the lecturers voice. They decide to share their annotations which are then automatically stored on the other device. After the lecture, they decide to keep the “Learning-Buddy Society” alive, but only include the stored
lesson and annotation as resources shared via this “Society”. This enables them to later add further annotations, pictures and links which might be useful references.

2. Offline Experiences: The student has missed the lesson and now watches it from the storage. He sees the annotation from the others that were done live during the event, but also adds his own references. These new references are automatically shared with all students in the “Online Lesson Society”. So jointly they can create a kind of “Live-Wiki” about the lesson. Some students have found 3D Models that help illustrating the material. The student can include a new 3D mouse into his CSS and use that for moving and turning the 3D model.

3. Lecturer – Student Interaction: During the lecture, the lecturer had a special session within the “Online Lesson-Society”. He has full control over that session. First he allows all students to directly ask him questions by voice. When he got too many, he switches to only written questions. Knowing that this might also be too much, a secretary helps in highlighting the questions that need immediate answer.

   After the lecture, the recorded lesson is still available and students can still post question, which the lecturer will answer asynchronously.

### A.1.2.7 Research budget distribution

A University is about to decide on which research areas to allocate next year’s budget.

The professors, the lecturers, the researchers and the administration employees are already members of various communities, based on the department they work and other personal interests. Via their CSSs, all University members propose a budget allocation percentage for each of the predefined research areas.

The University’s CSS processes the proposals, clusters the proposed percentage values for each area and creates several temporary communities (RBDi, i=1,2,…,n) of employees’ CSSs based on these clusters.

Each of the RBD communities above controls a virtual space with common resources (processing power, storage, printers and displays), where its members can put down and present their arguments in a personalized manner, as well as exchange opinions. Members of other RBD communities can view and comment on these arguments.

Large displays located in public areas of the University are presenting video-spots supporting the various proposals. University members can directly interact with the displays to collect more information, or to add a comment/argument. The entire process can either be completely anonymous or not, based on the CSS owners privacy preferences and intentions.

After a week, a new budget proposal cycle starts, where the University members express their updated opinions on the research budget allocation. If the proposals do not converge within a month’s time the latest, a voting process is initiated by the University’s CSS in order to elect the most popular proposal.

Once the research budget distribution scheme has been decided upon, the RDB communities are automatically removed.
A.1.3 Initial Enterprise scenarios

The initial scenarios developed for the Enterprise user group are presented in the subsections that follow.

A.1.3.1 Pervasive communities for conferences

- Multi day large conferences with many employees/attendees from different companies and locations
- Conferences/Seminars/Workshops could use the CSS to interface with Communities of Practice or Communities of Interest
  - Business Networking: Identity areas of interests for networking
  - Relationships between communities can be gathered to show network of contacts → visual representation to attendees
  - Within a large conference room – be able to infer potential networking targets and relationships
  - Auto-suggest adhoc meetings, locations, times, …
  - Auto Business card sync based on preferences, history, intent
- Community created
  - start interacting
  - exchanging business cards
  - IM chats
  - Automatic resource sharing among communities
  - Pro-active exchange of information based on the situation, interests, resources, ...
  - Attendee discovery based on ‘similarity’ → community creation
- Community driven Sustainability for Conferences
  - Proactive transport arrangements – pooling
  - Paper less conferences – location based data exchange driven by community interests
  - Support services (catering, communication, energy) tailored by community needs
- Pre-conference organisation
  - community driven
  - agenda extracted from community interests
  - pre-event networking via social networks
  - Resource requirements
- Post-conference
  - Extract context information from conferences to be used by other tools (e.g. forums).
  - Auto-publish of the content discussed (e.g. chats) in Wikis, blogs, etc.
  - Auto-suggest sharing and “follow” to subjects previously discussed to the community members.
- Affect the room temperature
- Affect the audio volume
- Organising F2F meetings
  - check calendars, convenient locations & times
- follow-on post-conference meetings (more complex travel arrangements)
- Benefits: discovery of business contacts
- help understanding relationships/networks
- initiate further cooperation opportunities/meetings
- reduce business costs, increase productivity
- promote better sustainability

A.1.3.2 Automated social e-procurement

Acme Inc., a manufacturing company, uses SOCIETIES to define the community of its suppliers. Whenever the pervasive devices within ACME’s warehouse sense that a given article is going out of stock (this is done by collecting data on the “average need/day” of each item), an auction for that particular item is sent to the community. Suppliers provide their quotes for the required item, and the one with the optimal offer is chosen. The SOCIETIES server interacts with Acme’s Resource Planning System so that the details of the deal are saved in it (item type, quantity, date of arrival, target warehouse, …). Acme Inc is part of a corporation Über Corp, so its communities are hierarchically included in the ones defined at the “Corporation” level. Statistical data are collected from the “sub-communities” of each company belonging to the holding so that reliable or cheap suppliers can be advertised across the companies within the corporation. Financial Data are sent continuously from the community of corporated companies to Über Corp, whose management team can keep track of financial performances in real-time. The same holds true for provisioning, so that the logistics managers (a different community within Über Corp) can coordinate on requests on suppliers in order to increase scale-economy optimisations (a big order from a given supplier is almost always cheaper than several smaller orders for the same amount of items).

A.1.3.3 Sustainability in an office environment

A.1.3.3.1 Group Context Driven Comfort in an Office Environment

- Information about occupant’s preferences and context is key to inferring the most appropriate comfort levels in a physical environment and Building Management Systems (BMSs) are adapting to provide more dynamic control over the environmental settings
- Adaptive energy management, based on people preferences and dynamics, increases people comfort and improves building energy efficiency
- SOCIETIES could provide intelligent comfort preferences for a set of occupants within an office environment which then could be used as input to the BMS in order to adapt the appropriate settings leading to optimised group level user comfort and reduced energy consumption / CO2 emissions
- The exact location of occupants, the number of occupants in a specific office location, the patterns of predicted movement between locations, the type of work performed and the group comfort preferences are all attributes which could be gathered and inferred to optimise the office environment

A.1.3.3.2 Proactive Energy Management based on Group User Intent & Context

- SOCIETIES aims to research how user intentions and context can be modelled for a group of users with the potential of pro-actively performing some actions or adapting some services on behalf of individual users or a group of users
- Analysing the intentions and context of occupants (e.g. when they usually arrive to the office, are there plans to use an office resource, which office locations are to be used that day) could allow for the optimised management of energy provisions and usage, by proactive adjusting comfort levels and resource availability based on users’ usage intentions
• For example, combining weather forecast data with office user calendars enables optimum level of pre-heating / pre-cooling.

• A meeting room could have all HVAC systems, light and projectors switched off until shortly before a scheduled meeting, thus creating “just in time” ambient conditioning.

• Office resources such as printers and coffee machines could be switched off when the most frequent users are out of the office.

A.1.3.3 Building Energy Control based on Occupant Context Patterns

• Building on the previous description, modelling group dynamics and context histories of how people use a building could provide valuable data for controlling, planning and adaptively managing the energy use and requirements of a building.

• Changes to group context could trigger scaling of energy consumption and thus provide building energy managers and energy providers with an adaptive mechanism for effective and efficient energy control.

A.1.3.4 Enterprise meeting and travel communities

• Personal calendars are shared (with some optional form of obfuscation) among the Project Community in order to better schedule a meeting.
  • best dates, based on the Project Community availability, are automatically suggested.
  • A meeting (Project Community) or a conference/event (community of interest) is scheduled: Everyone (or a sub-set of the people?) in the community get an invitation.
  • Users indicate their intent to attend or not.

• The responsible person of the enterprise’s travel approval process and approves trips (Enterprise Community).
  • The trip scheduling process is done by crossing data from various communities: Airport(s) and Hotels are suggested based on event location and attending people’s choices (community of interest or Project Community).
  • Hotels, Flights and Restaurants are suggested based on colleagues also travelling/travelled to the same location (Enterprise Community).
  • Suggest rental car pooling for people travelling to/from the same airport (Enterprise Community for the “home” location and community of interest or Project Community for the remote location).
  • Provide public transportation information, weather information and travel map (Enterprise Community for the “home” location and community of interest or Project Community for the remote location).
  • Each group of people that will share transportation or hotel form a new community.
    • Contacts are exchanged, means of “broadcasting” messages and digital documents within the community are established.

• After the trip is confirmed, the user is joined to the “people travelling to that city” community.
  • touristic highlights, restaurant recommendations from users and events information for those dates become available to him.

• Airport Smart Space provides orientation in shared public screens based on travel plan of the users nearby.
  • screen in front of each entrance of the airport indicates the direction and numbers of the check-in counters.
  • screen in front of each security check slot indicates the direction and numbers of the boarding gates.
  • screens at the arrival area indicate the direction of the...
• rental car company counter
• public transportation stop/station and departure times for the ones that the users want to take

A.1.3.5 Carpooling

In order to reduce the transportation cost, Anna, who works for a big enterprise employing over 500 people at the suburb of Athens and lives about 45 minutes away from her office, wants to find some people to split the transportation cost.

So she notifies her CSS declaring a departure and arrival point of her trip, her working days, the time that she wants to be given a lift from her home and the time that she wants to be given a lift back to home from her office. She also declares an alternative destination/departure point, since her home is in great proximity with a Metro station and so she could also use this station to commute to and from her home and optionally a time frame of about 15 minutes regarding her departure time from her home.

Her car is a 5-seat car but one seat is always occupied by her two years-old daughter’s seat. So Anna indicates that she can serve up to 3 more passengers when using her own car. In addition, she wants to be given a lift from a non-smoking driver and preferably a woman.

Some days though, she has to pick up her son from the nearby university and that means she can only serve 2 more passengers in this case. She can only know that just two hours before she leaves her office so her CSS has to dynamically inform the group about the change in the number of available seats.

A carpooling community is formed according to the above rules, as well as, each user’s profile (e.g. early/late starters and so on), while the HVAC system in Anna’s office is turned on 5 minutes before her arrival at her office, based on the estimated time of arrival.

After forming the carpooling community, during a ride that Anna makes towards home with 3 other co-workers, they deal with a huge traffic due to a car accident. Based on the vehicle’s average speed and the covered distance, their CSS notifies other co-workers still at the office about the traffic conditions and suggests alternative routes for their return back home.

A.1.3.6 Conference scenes

John works in the R&D department of the multinational company XYZ and is about to attend the annual assembly of XYZ. During this event, the company’s employees, management team and stakeholders will have the opportunity to meet, discuss and take certain decisions that will affect the company’s future.

All attendees carry various MID devices, where the CSS software has been installed. They are all members of the “XYZ” community. Employees are also members of various sub-communities that are formed based on the department they work for (i.e. “XYZr&d”, “XYZmarketing”, “XYZfinancial”, “XYZhr”, “XYZhci”, etc.).

John had registered for the assembly a month ago, specifying the sessions he was planning to attend. He is mainly interested in attending the session about the company’s future research directions. The CSSs of all attendees registered for this session are forming a community called “XYZ-GA-FutureResearchTargets”. Via their CSSs, they have started a preliminary exchange of opinions before the physical meeting. During the initial brainstorming, they realize that there are certain critical Human Computer Interaction (HCI) issues that have not been addressed. Thus, they decide to invite members of the company’s HCI department to their discussion. A new community is then created that is called “XYZhci&XYZ-GA-FutureResearchTargets” and is formulated by the union of the two communities (i.e. “XYZhci” and “XYZ-GA-FutureResearchTargets”). Now the members of “XYZhci” can participate in the discussion and have access to the already exchanged opinions.

On the first day of the event, John arrives at the venue and through his CSS, he is forwarded information about the place where the Future Research Targets session will take place. His CSS also informs him that a person registered as “friend” in his SNS is also in the venue and asks John if he wants to meet his friend. He responds positively and his CSS contacts the CSS of John’s friend to arrange for them to meet, also reserving seats next to each other in the rooms of the sessions they are both registered for.

The event starts. The pre-meeting discussions have led to two main contradictory options about the future research targets. Most members of the “XYZ-GA-FutureResearchTargets” community have been
automatically divided into two new sub-communities according to the option they support. The members of the “XYZ-GA-FutureResearchTargets” community that have not decided yet belong only to the initial community. Each community presents arguments in support of their preferable option. As there is no outcome they decided to vote after the lunch break.

The CSSs of the “XYZ-GA-FutureResearchTargets” community interact in order to reserve seats on the same table allowing them to have informal discussions over lunch. These discussions convince most of the undecided members to vote for one of the two options and after lunch, they community members vote and the decision is to put the company’s research focus on aspects of smart spaces.

A.1.4 Initial Disaster Management scenarios

The initial scenarios developed for the Disaster Management user group are presented in the subsections that follow.

A.1.4.1 Earthquake

The initial overall scenario for the disaster management use case is a major earthquake close to the city of Istanbul, Turkey. In this scenario the local response capabilities of the local emergency management agency and available local assets are overwhelmed and the European Civil Protection mechanism is activated (coordinated European response is organised under the European Civil protection Mechanism for disasters inside and outside of territory of member states). Istanbul is the largest city in Turkey with a population of 12.8 million, also making it the second largest metropolitan area in Europe by population.

In the scenario we describe how a team of European civil protection experts are performing early stage needs assessment and how they are supported by the Monitoring and Information Center (MIC) in Brussels, Turkish local authorities, the local general public and offsite volunteers that are organized and communicate via the Societies advanced social networks functionality.

A.1.4.2 Fire extinction

Firemen of the local fire department are notified about a forest fire. Every fireman is equipped with a CSS capable device. Upon notification they join the “Fire Extinction Group”. Local authorities and military forces that have come to put the fire out also join the same group.

Their devices display information about the area where the fire has started. This information includes the following:

- Aerial photographs of the area
- Maps of the area
- Type of germination
- Info about area approach (e.g. roads condition)

Apart from the above static data, the firemen are also notified about dynamically changing information, such as:

- Short term weather forecast
- Wind direction and velocity
- Water load of every fire-engine vehicle
- Water load of the nearest water tank through which every fire-engine is reloaded (since this is an agricultural district no fire hydrants are present)

Since everyone that takes part in the fire extinction is equipped with a GPS device, everyone at the community is immediately aware of the force distribution. The officer that is in charge of the operation however, can forward instructions and redistribute the forces.
The SOCIETIES student user group participated in a workshop with researchers in Heriot-Watt University on the 22 November, 2010. The participants broke into groups for brainstorming sessions comprising of brainwriting, brainstorming and bodystorming – wherein the students created new sample scenarios for a pervasive social (CSS type) system in a student context - the results of which are outlined below.

### A.1.5.1 SOCIETIES User trial PD Workshop - Group 1 Brainstorming results

**Role Playing storyline:**

Calum - *walks down the street*

*phone vibrates*

*get phone*

Phone - *"It's Connor's Birthday."

*"He likes whiskey on Facebook." (has suggested so)*

Calum - *points phone around*

Callum's Phone - *"There's two whiskey shops nearby."

Calum - *Goes inside the whiskey shop.*

Callum's Phone - *"John's nearby."

John - *looks at phone*

John's Phone - *"Calum has just been alerted of Connor's birthday and has been looking for whiskey."

**Notes:**

- Augmented Reality.
- Detects position through GPS.
- Displays overlay of local businesses (Google Maps).
- Displays overlay of people in your social circle that are nearby.
- Alerts you nearby food outlets based on personal preference at meal times.
- Alerts to local sales.
- Friends can "like" shops similar to Facebook, alerts when you're near their birthday and a shop that's liked.

**Other ideas collected from brainstorming:**

- Route - mapping that avoids people/places that you don't like. map overlay (google maps, custom maps for in-building).
- Have a webcam at your front door to recognise who rings your doorbell.
- Bin detects when full and shouts at you to empty it when you walk past it.
- A shower which remembers your preferences.
- Stealth mode where it does not track you (the system).
- Switch on car so it can heat up in winter.
- Car defrosts the windows based on your appointments (i.e. 30 minutes before).
- Have the fridge order the stuff itself.
• Recliner that remembers your preference.
• Speakers that wirelessly sync to your laptop (with inbuilt porn mode) (!).
• Alerts you to new products you may like based on what you have previously purchased.
• Unified volume controls for devices, rather than changing several different volume controls.
• Detects the opposite sex in a club and detects if they are single, married, have the same interests, etc, by checking Facebook status etc.
A.1.5.2 SOCIETIES User trial PD Workshop - Group 2 Brainstorming results

- **Notes:** Track the price of petrol at nearby garages and direct to the one with lowest price. Recommend due to distance to garage.
- Offer a study plan based on order of exams to ensure an even amount of time for all subjects.
- Use a tracker to locate your house keys or any other keys should you misplace them and direct you to them.
- Could also have a checklist of sub topics and alert user to other users on course who are working on it. Arrange user group session through societies.
- Remote Computer Switch on.
  - The user is leaving and returning home the device detects this and informs their computer at home to boot up and open certain programs depending on user preferences.
- Automated data sharing.
  - The user is leaving home, the societies device detects this and automatically backs up data on their home computer.
- Forgetting items.
  - The user is leaving home and has left something which they need for their appointment. The device detects this and alerts the user to it.
  - Track where the object is in the house and tell the user this so making it easy for them to find it.
- Listen to music, find artist and song and tell user where they can find the song the cheapest.
- Input subjects the users are studying and find and recommend books related to the subject. Tell user where to get them.
- When mobile is within radius of your house, your television turns on to a channel set as favourite.
- User can also override this. Remote recording of programs if user is late.
- Societies detects what courses the user is doing just now. The device takes into account exam times and user arrangements and offers a study timetable. User can check off subtopics on their device. The user can then see who's currently working on similar/same subtopic and offers to arrange an appointment to do some studying / group session. User will be entered into a temporary community based on the current subtopic. The device also looks at the books the user might require and checks the University library if it is available and if not, offers the best price for the book.
A.1.5.3  SOCIETIES User trial PD Workshop - Group 3 Brainstorming results

- **Role Playing storyline**: A billionaire is driving around in Florida. It is lovely and sunny. The car roof is down.
- A weather station detects an oncoming heavy storm. Oh no!
- The car has GPS which compares its position to the location of the super mega storm.
- As the car heads towards the storm, the roof automatically goes up.
- The upholstery remains dry. Hurrah!
- **Notes**: In a sports car having a weather detector that when bad weather is on its way, the car automatically brings up the roof.
- iPod having settings that has your preferred genre of music and when in music store wireless on your iPod connects to their store and you are told what is in stock that matches your taste.
- When you have keys for a car and you open your car, heating is automatically turned on on a cold day.
- Student late to lecture sends an email to lecturer exploring students location and student can explain where he has been and why he/she is late.
- Car enters petrol station, phone automatically turns off/goes silent.
- When the user enters work and has a calendar event for working updates status to working and is busy. If he enters work without an event, he maybe visiting or shopping.
- Location - GPS of car.
- Weather beacon updates when car goes towards bad weather message on SATNAV pops up.

---

**BRAIN STORM**

- HI-FI system that automatically turns on when you walk into a room
- automatically goes off when you leave
- Going to pub - signal sent to staff to prepare a pint for when the customer gets there.
- you could have a collection of teams and updates
- customer programs favourite drink onto phone
- favourite sports teams programmed onto phone. when something major happens during a game, a message is sent.
A.1.6 SOCIETIES User trial PD Workop - Group 4 Brainstorming results

- **Notes**: Detects what sort of mood you're in and sets stuff in the house e.g. lights, music.
- When watching a film, pauses if you fall asleep and if you leave the room.
- Smart oven/microwave scan item then sets timer and heat.
- Change lights + sounds.
- Save energy by being able to turn down electricity from mobile.
- Turns off boiler when you leave.
- Movie theatre silent, e.g. updates to Facebook status: "I'm at the movies, don't call".
- Setting the burglar alarm, (or any security), sends pictures to your phone if there are problems.
- Unlocks your car within a certain distance, once sat in the driver’s seat, starts the ignition, records mileage, fuel etc.
- When you leave your house the burglar alarm detects this and sets up a security system. Then if there is a problem a video of the problem is streamed to your phone. When in the house, you can also set the security from your phone.
- Turn heating on to certain temperature before you get home.
- Adjust swimming pool temperature before you get home.
- TV records things and you can decide what it records from your phone.
A.1.7  SOCIETIES User trial PD Workos - Group 5 Brainstorming results

- **Notes:** Put phone off when you enter the cinema.
- Open windows during summer if room is too warm.
- Puts the kettle on when you wake up. Sets a loud alarm 30 minutes before a meeting.
- Patient at a GP gets prescribed medicine for an illness, but is forgetful so when the meds are due to be taken a reminder is sent from the doctor to the patient. When med is taken by patient, it has a code on it so that the reminders are stopped. (used in role playing exercise)
- Doctor knows where patient is and knows that another patient is early. Can take the patient who is early since the other one is going to be late.
- Manager could send a list of tasks for you to do at work saving time and having to track them down and ask.
- Turns off laptop/television/games console when set study time begins.
- Put all devices on silent when entering a class room or cinema.
- At hospital if an IV or something needs changed it sends a message to a nurses pager. Reminds them about medicine rounds.
- Put house alarm on when you go to sleep, and when you leave the house.
- Defrost your car in the morning if it has been frosty the night before.
- Set gritters out when senses it's been icy.
- Reminds driver to fill up screen wash when talk is low (by text etc).
- For 4 wheel drives: when it snows or 4-wheel drive is required, put into 4 wheel drive automatically.
- In a busy job, with lots of meetings with clients and staff, it could help to co-ordinate a plan. e.g. Mary is going to be 15 minutes late. I'll move my meeting with client forward to now because he is not busy.
- Saving energy. Perhaps heating systems in big buildings such as schools could be controlled more effectively e.g. If summer, lets turn the heating off at night for all departments. Or, if is winter, Jim the janitor is in at 7am, lets turn the heating up at 6.30 am so the building is warm enough for pupils to come in.
- Help knuckle down an anti-social behaviour. People involved with the violence or if they had been causing trouble could be easier to track down.
- The ability to put on the dinner when out of the house
- Energy efficiency - way of turning all the computers in a University for instance, puts the light off too.
- Texts getting sent to the owner of car when there is a problem i.e. if the tyre pressure gets below 30PSI send message saying they have to be pumped up.

A.1.8  SOCIETIES User trial PD Workos - Group 6 Brainstorming results

- **Notes:** I would like to have some kind of reminder, which will tell me every morning after I wake up what is my schedule for the day. What I have to do and what I could do. There might be data base, which collects data for things that I have to do in the next few days, but I have the chance to do it today. For example, if I have to go shopping but I also have to go to the bank, and the bank is on my way to the shop, I could stop there and deal with it. However if I have a busy day, I might forget about it. There are so many things that can be scheduled.
- Sometimes when I go to labs, it is hard to find a free computer. If my phone could interact with available machines and could send me there it would be great. If I am late, it can automatically log me in and start the program that I need for this exercise. Thus, I could save time.
A year ago, I used to play on FOREX platform. The problem was that I had to follow all the news, in order not to lose money. It would be good if I could receive notifications on my phone, about everything that might be related with me. Thereby, I don't have to stay on my computer all the time and also earn more money.

Rather than simply direct you to a machine, when you are going towards the lab, your phone could interact with available machines and log you on and then lock the computer so no-one else can use it! It would then tell you the location.

I would like to have a group of my friends, sharing same devices and my device will know how I feel. So if I am in a good mood it will arrange a party. If I am ill it will send messages to my group so that people can come by my home and visit me.

It will be very good if there is some kind of reminder which will know what the weather is. and it will remind me when it's raining - to take my umbrella, when the sun is shining to take my sunglasses.

I am really bad at remembering people's names. So it will be good if the device can remember names of people I meet. And it will be good to sense when this people are near me, before we meet again to tell me their name, so I won't feel embarrassed for not knowing someone's name.

Also it should look at your bank account, if you can afford, it will arrange moreover it should look if tomorrow you have an important meeting or maybe a game of volleyball etc. (EP note: I think he means that if your balance is below a certain threshold, it should notify you)

It can also suggest what clothes to wear.

It should remind if you own owe money to this person or maybe you have a meeting and the context of the meeting.

Person wakes up

Person checks phone

Phone speaks to person

"The weather outside is not good today. Because of your asthma, I recommend that you wear your thick warm jumper to protect you against the cold".

"Because of the rain, wear a waterproof jacket".

"You don't have an umbrella, but if you go to ASDA on the 34 bus you can get one for £5".

Remind me of early appointments the night before, advising me to go to bed for plenty of sleep!

Notify me automatically at user-defined times of day of where locally is a good venue to eat out with good deals in reference to current location. Tell what is open and closed and does student discounts.

If I have planned a trip using a map function, advice me of the volume of petrol currently in the car, and whether I will need more or when I need more automatically. If it's a long trip, it can remind you to buy some water or food. Or may be where is the next gas station or stop where you can find WC (toilet). May be it sounds funny, but if you have to drive for hours it might be useful to use it before you go.

Money is really important, food can be purchased, basing on our preferences for instance our habits or traditions so when we enter a restaurant we are automatically identified. Also if we have an allergy etc, we won't be offered that type of food, which contains products that makes us allergic. Also it should suggest the cheapest so to save money. It will be good to know what we drink as well. So when we go to a restaurant it will order our favourite drink.

Music centre in your flat/house can play music depending on your mood, how many hours have you worked/walked or maybe you had a fight with your boss. Depending on time and day too. For example, Friday night at 9pm and you have guests. It plays music to make a better atmosphere.

Basing on weather, the computer identifies clothes that you have in your wardrobe and tells which is the most suitable and will look nice. Also, it can suggest, to buy something so it suggest a shop, that is nearby and cheaper or maybe if you have a lot of money better and more expensive (brands).
- Detect weather, suggest appropriate clothes. Alert you if you don't have items such as umbrella and give you a location of where to buy one.

- Log onto internet, check and confirm your location. Check weather currently, plus forecast for the day. It would be used for health purposes. It will get access to your personal medical record. It would predict if the weather is good for your health or if it is harmful.

- Track objects such as keys and important cards.

- Things for helping one in the morning.
  - get breakfast made
  - clothes laid out

- It will be good if there is a robot to do the cleaning as well. It should be well programmed to know exactly how to keep things organised.

- Track minimum time a journey will take for me individually.
  - what is the latest time I can leave home to get the bus. link with bus location (if it's coming early or late).
  - It will be good if it can calculate the time each bus-journey will take.

A.1.9 SOCIETIES User trial PD Workosop - Group 7 Brainstorming results

- In terms of emergency, if there is a fire at home, the sensor will detect that and send a message to you telling you there is something wrong. or emergency text the appropriate service? Perhaps a stream video to your phone if it's not sure of the course of action.

- If you car is stolen or being stolen you could receive a message telling you what is happening. How would they differentiate between you and a stranger? Does that limit people driving your car?

- If you were in a shopping store and you passed a shop that had items you were interested in your phone/terminal would advise you to have a look inside.

- I am working on some kind of coursework and I am struggling. The app would inform other friends that are working on the same project or already finished it and ask for help.

- The app would check the location of my friends and recommend a club that I should or shouldn't go to based on 'white' and 'black' lists that I set up. It would maybe take white and black lists from other friends or log what music you listen to on the device?

- Find project partners at the university. Each user enters their skills and if you start a project you can find people with the required skills.

- Create a project sheet listing the goals. Checkboxes next to goals that could then automatically find partners that have already completed certain things.

- Could be interesting if a boss is searching for a certain skill/qualification in a future employee, it could check the CVs of the nearby persons.

- A heart rate monitor could log different situations that you are in.

- You could have a 'close friends' section that would alert them if you are nervous, angry etc. Perhaps the device is logging different fluctuations in your speech combined with heart rate.

- Or a sports activity section that could simply log that you are 'active'. The GPS could state where you are and depending on your interests could show the most likely thing that you could be doing.

- In your meetings section, it could measure how long it takes to get to the location. Takes into account what transportation you have available and if there is traffic (or expected traffic... rushour) and alerts you when you should leave. Texts you bus times etc.
• Whether you have to add fuel to car, nearest petrol station / cheapest petrol station that you can reach with fuel left.

• When watching TV and not having your mobile phone at hand (in the next room for example), then the TV will show a call on SMS showing that you could output on the split-screen (text or video-conference call). It may be possible with wi-fi TVs that are coming to the market now. (Google TV? + Skype?)

• If a person gets into an area which has mate(?)phone coverage then it is displayed before you contact him.

• Sensors could be embedded inside devices which could assist in health monitoring. Could be useful for people with health issues and if one wished to look for health patterns or to compare with health records.

• If one approaches a bus stop instead of reading, information being emitted can update schedule times.

• Telling the device user that a certain household appliance is finished, like a washing machine or a dish washer. An option on the machine to log who needs to be alerted.
Annex B  SOCIETIES User Research Questionnaires

B.1  Heriot-Watt Student Survey

Hello, You are invited to participate in our SOCIETIES project survey. Your information will be digitally recorded and will remain confidential. If you feel uncomfortable answering any questions, you can withdraw from the survey at any point. Thank you very much for your time and effort. This survey will take about 15 minutes to complete. Please start with the survey now by clicking on the Continue button below.

B.1.1  General Questions

SQ.1  Gender
1. Male
2. Female

SQ.2  Age
- 18-24 years
- 25-35 years
- 36-45 years
- 46-54 years
- 55-64 years
- Over 65 years

B.1.2  Technical Tools Questions

SQ.3  How often do you use the following devices if at all?

<table>
<thead>
<tr>
<th>Device</th>
<th>Never</th>
<th>All the time</th>
<th>Once or twice daily</th>
<th>Once or twice weekly</th>
<th>Once or twice monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Phone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>PDA/SmartPhone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Laptop/Netbook</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Desktop Computer</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Games Console</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Media Player</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>SatNav/GPS</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Printer/Scanner/Fax</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Digital Camera</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
If you selected other above, please list here:

SQ.4 How do you use the following devices? Please tick all boxes that apply.

<table>
<thead>
<tr>
<th>Device</th>
<th>I don't use one</th>
<th>VoIP</th>
<th>Web Surfing</th>
<th>E-mail</th>
<th>IM/Chat</th>
<th>SMS/MM</th>
<th>Games</th>
<th>Social Networking</th>
<th>Blogging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Phone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>PDA/SmartPhone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Laptop/Netbook</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Desktop computer</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Game Console</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

If you selected other above, please list here:

SQ.5 What types of functions are integrated in the devices you use on a daily basis? Please tick all that apply.

- None
- Location (e.g. GPS for showing your location on a map)
- Presence, Proximity, or Vicinity (e.g. can Facebook on your smartphone tell you when friends are nearby?)
- Light, Audio or Visual
- Movement, Acceleration, or Orientation (e.g. speedometer when jogging, digital compass)
- Temperature, Humidity, Air Pressure, or Wind Speed (e.g. digital barometer etc)
- Weight, Force, or Touch (e.g. touch screen on iPhone or other smartphone)
- Bio-sensors (e.g. heart rate monitor when jogging)
- ID sensors (e.g. barcode reader in supermarket scanner, RFID reader)
- Other (please list below)
SQ.6 Which of the following features would you like to enjoy when interacting with services, devices and resources in general? Please tick all that apply.

- Resources are invisible and available anywhere, integrated in physical environment & objects around us (e.g. coffee-cups that inform you if the coffee it too hot or windows that open and close automatically depending on the weather)
- Resources are available all the time (i.e. at no time the resources are out-of battery, out-of order, inaccessible, etc.)
- All resources can communicate with each other
- Resources are automatically adapted on behalf of the user in advance of a request (e.g. automatic turn on of TV when the user’s favorite show starts)
- Adaptability to the users’ current situation and preferences (e.g. automatic turn-on of the air-conditioning, when the user enters the office, configured to his preferred temperature and humidity settings)
- None, I am happy with the current situation
- Other (please list below)

SQ.7 If you could synchronise all of your devices and webspaces so that you could access all your data and applications from anywhere would you see any benefits to this?

- A lot of benefits (please give example below)
- Some benefits (please give example below)
- No benefits
- If you answered a lot of benefits or some benefits above please explain here.

SQ.8 Would you allow others to access some of your applications and resources in return for access to some of their applications and resources?

- Yes
- No
- Maybe

Please explain your answer to the above question.
SQ.9 With regards to the last question, how important would you consider the privacy aspects of this?

- Very important
- Important
- Somewhat important
- Not important at all

If you answered not important to the above question please explain.

B.1.3 Social Media Questions

SQ.10 What social media do you use?

- None
- Facebook
- Linkedin
- Twitter
- MySpace
- Bebo
- You Tube
- Flickr
- LastFM
- Couchsurfing
- Special Interest Social Network
- Blogger
- Wordpress
- Other blog tool
- Skype
- IM tool
- Other (please list below)
SQ.11 How often do you use: Social Networking Sites (SNSs: Facebook, MySpace, Linkedin), Blogging sites (Twitter, Blogger, Blogspot, WordPress) Instant Messaging applications (IMs: Skype, Live Messenger, ICQ, AIM, Google Talk)?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Social Networks</th>
<th>Instant Messaging</th>
<th>Blogs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Im logged in most of the day</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>I check it once a day</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2-5 times a week</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Once a week</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Once a month</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Never</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

SQ.12 For which activities do you use social media? Please tick all that apply.

- Keeping in touch with friends/colleagues
- Email/Messages
- Chat/IM
- Posting Status Updates
- Blogging
- Sharing photos/videos/links
- Commenting on links/photos etc.
- Rating information (like/dislike etc.)
- Sharing Information
- Organising events
- Groups
- Gaming
- Birthday reminders
- Travel Assistance
- Discover Interests and Information
- Making new connections
- Professional Networking
- News and Event updates
- Support a cause
- Show interest
- To meet like minded people
- Research
- Music
- Other (please list below)
SQ.13  Have you ever used or are you aware of location-aware social networking sites (L-A SNS) such as Foursquare and/or Facebook Places?

- I’ve never heard of them
- I’ve heard of them, but don’t use them for privacy reasons
- I’ve heard of them and I’d like to give them a try
- I’ve used them and I like them
- I’ve heard of them, but don’t use them for other reasons
- Please explain your answer to the above question.

SQ.14  Who would you share the following personal information within a Social Networking Site?

<table>
<thead>
<tr>
<th></th>
<th>No-one</th>
<th>Specific Friends</th>
<th>All my Friends</th>
<th>My Groups</th>
<th>All Social Network Sites</th>
<th>All Public to WWW</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile Info</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Photos</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Videos</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Page Likes/Interests</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Contact details (phone number, e-mail address)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Contacts/Friends list</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Status Updates</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Location</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
SQ.15  How satisfied are you with the available privacy settings in social media?

<table>
<thead>
<tr>
<th></th>
<th>Very Satisfied</th>
<th>Unsatisfied</th>
<th>Neutral</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Networks</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>IM/Chat applications</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Blogging sites</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

B.1.4  Community Questions

SQ.16  How do you prefer communicating with the different groups in your life? For each group, please tick all that apply.

<table>
<thead>
<tr>
<th></th>
<th>Face-to-face</th>
<th>Email</th>
<th>Texting</th>
<th>Social Networks</th>
<th>Voice Calls</th>
<th>IM</th>
<th>Discussion Forum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Friends</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Family</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Old Friends</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Sports Clubs</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Hobbies / Shared Interests</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Shared beliefs / Religion</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Work</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Online contacts (people you dont meet offline)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Other</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

If you answered other in the above question, please specify here.
SQ.17 Please rank your preferred mode of discussion for groups (1-7 where 1 is the most important, 7 is the least important): Face-to-face __________
- Email __________
- Texting __________
- Social Networks __________
- Voice Calls __________
- IM __________
- Discussion Forum __________

SQ.18 Do you accept any suggestions made by the Social Networking Site about connecting with new friends?
- I do not use SNSs.
- No, I never accept such invitations
- Sometimes, depending on various criteria (suggested persons profile, habits)
- Yes, always
- Please explain your answer to the above question.

SQ.19 In cases when you are proposed to join a new SNS group, which are the most significant criteria in order to join the new group? Please rank from 1-4 with one being most important to you and four the least important.
- Other members should already be my “friends” __________
- Other members should be “friends” of contacts that are already my “friends” __________
- Other members should have the same interests with me __________
- Other members should spend some time in areas close to me __________

B.1.5 Student Specific Questions

SQ.20 Who makes up your main circle of friends since you began University? Please tick all that apply.
- People I’ve met through student groups/clubs
- People who I share halls with
- People on my course
- People I knew from my school
- Other
SQ.21 How do you communicate with your fellow students or other members of the university community? Please tick all that apply.

- Via course lectures requiring physical presence, face-to-face meetings, phones, hardcopies/lecture notes
- The university provides access to online services for all members of the university community and we communicate using our internet-enabled devices (via these online services and/or via emails, IMSs, SMSs, Blogs, fora, etc.)
- We have established a community on a social networking site (SNS) and everything is published there
- Other

SQ.22 How often do you interact with your fellow students or other members of the university community online?

- Daily
- Weekly
- Monthly
- Less than once a month

SQ.23 For which of the following reasons do you interact with other members of the university community online? Please tick all that apply.

- For purely educational/studying purposes
- For communication
- For socialising and/or entertainment
- To share views, information, multimedia material, experiences, etc.
- To keep in touch and/or meet new members of the university community
- To keep up to date with university news
- To plan university events
- Other

SQ.24 Do you think it’s important to attend lectures on campus if all the lecture material is available online and the lecturers are contactable via email?

- Yes
- No
- Maybe

Please explain your answer to the above question.

SQ.25 How often do you use online services for University processes and activities?

- Daily
- Weekly
- Monthly
- Less than once a month
SQ.26 For one of your modules you are required to solve some computer problem. How would you most likely go about gaining the appropriate knowledge to solve the problem? Please rank the following options from 1 to 4 with 1 being the most likely option and 4 being the least likely.

- Borrow library books __________
- Buy books __________
- Search the web __________
- Ask a friend __________

SQ.27 When you first came to the University, would you have found it useful if your mobile phone automatically put you in contact with other like-minded people?

- Yes
- No
- Maybe

Please explain your answer to the above question.

SQ.28 How do you envisage that future communication/computing technologies will assist everyday academic tasks, making your life easier around campus?
B.2 ICCS Student Survey

Hello, You are invited to participate in our SOCIETIES project survey. Your information will be digitally recorded and will remain confidential. If you feel uncomfortable answering any questions, you can withdraw from the survey at any point. Thank you very much for your time and effort. This survey will take about 15 minutes to complete. Please start with the survey now by clicking on the Continue button below.

B.2.1 General Questions

SQ.1 What academic level are you currently at?
- Undergraduate 1st year
- Undergraduate 2nd year
- Undergraduate 3rd year
- Undergraduate 4th year
- Undergraduate 5th year
- Postgraduate (Master)
- Postgraduate (PhD)
- Post-doc Researcher

SQ.2 Gender
- Male
- Female

SQ.2a Age
- 18-24 years
- 25-35 years
- 36-45 years
- 46-54 years
- 55-64 years
- Over 65 years
### B.2.2  Technical Tools Questions

#### SQ.3  How often do you use the following devices if at all?

<table>
<thead>
<tr>
<th>Device</th>
<th>Never</th>
<th>All the time</th>
<th>Once or twice daily</th>
<th>Once or twice weekly</th>
<th>Once or twice monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Phone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>PDA/SmartPhone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Laptop/Netbook</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Desktop Computer</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Games Console</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Media Player</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>SatNav/GPS</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Printer/Scanner/Fax</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Digital Camera</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Other</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

If you selected other above, please list here:

#### SQ.4  How do you use the following devices? Please tick all boxes that apply.

<table>
<thead>
<tr>
<th>Device</th>
<th>I don’t use one</th>
<th>VoIP</th>
<th>Web Surfing</th>
<th>E-mail</th>
<th>IM/Chat</th>
<th>SMS/MMS</th>
<th>Games</th>
<th>Social Networking</th>
<th>Blogging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Phone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>PDA/SmartPhone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Laptop/Netbook</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Desktop computer</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Game Console</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

If you selected other above, please list here:
SQ.5 What types of functions are integrated in the devices you use on a daily basis? Please tick all that apply.

- None
- Location (e.g. GPS for showing your location on a map)
- Presence, Proximity, or Vicinity (e.g. can Facebook on your smartphone tell you when friends are nearby?)
- Light, Audio or Visual
- Movement, Acceleration, or Orientation (e.g. speedometer when jogging, digital compass)
- Temperature, Humidity, Air Pressure, or Wind Speed (e.g. digital barometer etc)
- Weight, Force, or Touch (e.g. touch screen on iPhone or other smartphone)
- Bio-sensors (e.g. heart rate monitor when jogging)
- ID sensors (e.g. barcode reader in supermarket scanner, RFID reader)
- Other (please list below)

SQ.6 Which of the following features would you like to enjoy when interacting with services, devices and resources in general? Please tick all that apply.

- Resources are invisible and available anywhere, integrated in physical environment & objects around us (e.g. coffee-cups that inform you if the coffee it too hot or windows that open and close automatically depending on the weather)
- Resources are available all the time (i.e. at no time the resources are out-of battery, out-of order, inaccessible, etc.)
- All resources can communicate with each other
- Resources are automatically adapted on behalf of the user in advance of a request (e.g. automatic turn on of TV when the user’s favorite show starts)
- Adaptability to the users’ current situation and preferences (e.g. automatic turn-on of the air-conditioning, when the user enters the office, configured to his preferred temperature and humidity settings)
- None, I am happy with the current situation
- Other (please list below)
SQ.7 If you could synchronise all of your devices and webspaces so that you could access all your data and applications from anywhere would you see any benefits to this?

- A lot of benefits (please give example below)
- Some benefits (please give example below)
- No benefits

If you answered a lot of benefits or some benefits above please explain here.

SQ.8 Would you allow others to access some of your applications and resources in return for access to some of their applications and resources?

- Yes
- No
- Maybe

Please explain your answer to the above question.

SQ.9 With regards to the last question, how important would you consider the privacy aspects of this?

- Very important
- Important
- Somewhat important
- Not important at all

If you answered not important to the above question please explain.
B.2.3 Social Media Questions

SQ.10 What social media do you use?

- None
- Facebook
- Linkedin
- Twitter
- MySpace
- Bebo
- You Tube
- Flickr
- LastFM
- Couchsurfing
- Special Interest Social Network
- Blogger
- Wordpress
- Other blog tool
- Skype
- IM tool
- Other (please list below)

SQ.11 How often do you use: Social Networking Sites (SNSs: Facebook, MySpace, Linkedin), Blogging sites (Twitter, Blogger, Blogspot, Wordpress) Instant Messaging applications (IMs:Skype, Live Messenger, ICQ, AIM, Google Talk)?

<table>
<thead>
<tr>
<th></th>
<th>Social Networks</th>
<th>Instant Messaging</th>
<th>Blogs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Im logged in most of the day</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>I check it once a day</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2-5 times a week</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Once a week</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Once a month</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Never</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
SQ.12 For which activities do you use social media? Please tick all that apply.

- Keeping in touch with friends/colleagues
- Email/Messages
- Chat/IM
- Posting Status Updates
- Blogging
- Sharing photos/videos/links
- Commenting on links/photos etc.
- Rating information (like/dislike etc.)
- Sharing Information
- Organising events
- Groups
- Gaming
- Birthday reminders
- Travel Assistance
- Discover Interests and Information
- Making new connections
- Professional Networking
- News and Event updates
- Support a cause
- Show interest
- To meet like minded people
- Research
- Music
- Other (please list below)

SQ.13 Have you ever used or are you aware of location-aware social networking sites (L-A SNS) such as Foursquare and/or Facebook Places?

- I’ve never heard of them
- I’ve heard of them, but don’t use them for privacy reasons
- I’ve heard of them and I’d like to give them a try
- I’ve used them and I like them
- I’ve heard of them, but don’t use them for other reasons
- Please explain your answer to the above question.
SQ.14  Who would you share the following personal information within a Social Networking Site?

<table>
<thead>
<tr>
<th>Information</th>
<th>No-one</th>
<th>Specific Friends</th>
<th>All Friends</th>
<th>My Groups</th>
<th>All Social Network Sites</th>
<th>All Public to WWW</th>
<th>I don't know</th>
<th>I don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile Info</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photos</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Videos</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Page Likes/Interests</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Contact details (phone number, e-mail address)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Contacts/Friends list</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Status Updates</td>
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<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
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<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Location</td>
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<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

SQ.15  How satisfied are you with the available privacy settings in social media?

<table>
<thead>
<tr>
<th>Social Media Type</th>
<th>Very Unsatisfied</th>
<th>Unsatisfied</th>
<th>Neutral</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Networks</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>IM/Chat applications</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Blogging sites</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

B.2.4  Community Questions

SQ.16  How do you prefer communicating with the different groups in your life? For each group, please tick all that apply.

<table>
<thead>
<tr>
<th>Group</th>
<th>Face-to-face</th>
<th>Email</th>
<th>Texting</th>
<th>Social Networks</th>
<th>Voice Calls</th>
<th>IM</th>
<th>Discussion Forum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Friends</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Family</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Old Friends</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
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<td>O</td>
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</tr>
<tr>
<td>Sports Clubs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hobbies / Shared Interests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared beliefs / Religion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online contacts (people you dont meet offline)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you answered other in the above question, please specify here.

SQ.17 Please rank your preferred mode of discussion for groups (1-7 where 1 is the most important, 7 is the least important):

- Face-to-face
- Email
- Texting
- Social Networks
- Voice Calls
- IM
- Discussion Forum

SQ.18 Do you accept any suggestions made by the Social Networking Site about connecting with new friends?

- I do not use SNSs.
- No, I never accept such invitations
- Sometimes, depending on various criteria (suggested persons profile, habits)
- Yes, always

Please explain your answer to the above question.

SQ.19 In cases when you are proposed to join a new SNS group, which are the most significant criteria in order to join the new group? Please rank from 1-4 with one being most important to you and four the least important.

- Other members should already be my “friends”
- Other members should be “friends” of contacts that are already my “friends”
- Other members should have the same interests with me _________
- Other members should spend some time in areas close to me _________
B.2.5 Student Specific Questions

SQ.20 Who makes up your main circle of friends since you began University? Please tick all that apply.
- People I’ve met through student groups/clubs
- People who I share halls with
- People on my course
- People I knew from my school
- Other

SQ.21 How do you communicate with your fellow students or other members of the university community? Please tick all that apply.
- Via course lectures requiring physical presence, face-to-face meetings, phones, hardcopies/lecture notes
- The university provides access to online services for all members of the university community and we communicate using our internet-enabled devices (via these on line services and/or via emails, IMSs, SMSs, Blogs, fora, etc.)
- We have established a community on a social networking site (SNS) and everything is published there
- Other

SQ.22 How often do you interact with your fellow students or other members of the university community online?
- Daily
- Weekly
- Monthly
- Less than once a month

SQ.23 For which of the following reasons do you interact with other members of the university community online? Please tick all that apply.
- For purely educational/studying purposes
- For communication
- For socialising and/or entertainment
- To share views, information, multimedia material, experiences, etc.
- To keep in touch and/or meet new members of the university community
- To keep up to date with university news
- To plan university events
- Other

SQ.24 Do you think it’s important to attend lectures on campus if all the lecture material is available online and the lecturers are contactable via email?
- Yes
- No
- Maybe

Please explain your answer to the above question.
SQ.25  How often do you use online services for University processes and activities?
  - Daily
  - Weekly
  - Monthly
  - Less than once a month

SQ.26  For one of your modules you are required to solve some computer problem. How would you most likely go about gaining the appropriate knowledge to solve the problem? Please rank the following options from 1 to 4 with 1 being the most likely option and 4 being the least likely.
  - Borrow library books __________
  - Buy books __________
  - Search the web __________
  - Ask a friend __________

SQ.27  When you first came to the University, would you have found it useful if your mobile phone automatically put you in contact with other like-minded people?
  - Yes
  - No
  - Maybe

Please explain your answer to the above question.

SQ.28  How do you envisage that future communication/computing technologies will assist every day academic tasks, making your life easier around campus?
B.3 Enterprise Survey

Hello, You are invited to participate in our SOCIETIES project survey. Your information will be digitally recorded and will remain confidential. If you feel uncomfortable answering any questions, you can withdraw from the survey at any point. Thank you very much for your time and effort. For more information about the SOCIETIES project please go to www.ict-societies.eu/. This survey will take about 15 minutes to complete. Please start with the survey now by clicking on the Continue button below.

B.3.1 General Questions

EQ.1 Gender
- Male
- Female

EQ.2 Age
- 18-24 years
- 25-35 years
- 36-45 years
- 46-54 years
- 55-64 years
- Over 65 years

B.3.2 Technical Tools Questions

EQ.3 How often do you use the following devices if at all?

<table>
<thead>
<tr>
<th>Device</th>
<th>Never</th>
<th>All the time</th>
<th>Once or twice daily</th>
<th>Once or twice weekly</th>
<th>Once or twice monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Phone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>PDA/SmartPhone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Laptop/Netbook</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Desktop Computer</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Games Console</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Media Player</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>SatNav/GPS</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Printer/Scanner/Fax</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Digital Camera</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Other</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

If you selected other above, please list here:
**EQ.4  How do you use the following devices? Please tick all boxes that apply.**

<table>
<thead>
<tr>
<th>Devices</th>
<th>I don't use one</th>
<th>VoIP</th>
<th>Web Surfing</th>
<th>E-mail</th>
<th>IM/Chat</th>
<th>SMS/IM</th>
<th>Games</th>
<th>Social Networking</th>
<th>Blogging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Phone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>PDA/SmartPhone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Laptop/Netbook</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Desktop computer</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Game Console</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

If you selected other above, please list here:

**EQ.5  What types of sensing functions are integrated in the devices you use on a daily basis? Please tick all that apply.**

- None
- Location (e.g. GPS for showing your location on a map)
- Presence, Proximity, or Vicinity (e.g. can Facebook on your smartphone tell you when friends are nearby?)
- Light, Audio or Visual
- Movement, Acceleration, or Orientation (e.g. speedometer when jogging, digital compass)
- Temperature, Humidity, Air Pressure, or Wind Speed (e.g. digital barometer etc)
- Weight, Force, or Touch (e.g. touch screen on iPhone or other smartphone)
- Bio-sensors (e.g. heart rate monitor when jogging)
- ID sensors (e.g. barcode reader in supermarket scanner, RFID reader)
- Other (please list below)
• All resources can communicate with each other
• Resources are automatically adapted on behalf of the user in advance of a request (e.g. automatic turn on of TV when the user’s favorite show starts)
• Adaptability to the users’ current situation and preferences (e.g. automatic turn-on of the air-conditioning, when the user enters the office, configured to his preferred temperature and humidity settings)
• None, I am happy with the current situation
• Other (please list below)

EQ.7 If you could synchronise all of your devices and webspaces so that you could access all your data and applications from anywhere would you see any benefits to this?
• A lot of benefits (please give example below)
• Some benefits (please give example below)
• No benefits

If you answered a lot of benefits or some benefits above please explain here.

EQ.8 Would you allow others to access some of your applications and resources in return for access to some of their applications and resources?
• Yes
• No
• Maybe

Please explain your answer to the above question.

EQ.9 With regards to the last question, how important would you consider the privacy aspects of this?
• Very important
• Important
• Somewhat important
• Not important at all

If you answered not important to the above question please explain.
B.3.3 Social Media Questions

EQ.10 What social media do you use?
- None
- Facebook
- Linkedin
- Twitter
- MySpace
- Bebo
- You Tube
- Flickr
- LastFM
- Couchsurfing
- Special Interest Social Network
- Blogger
- Wordpress
- Other blog tool
- Skype
- IM tool
- Other (please list below)

EQ.11 How often do you use social media, i.e. Social Networking Sites (SNSs: Facebook, MySpace, Linkedin), Blogging sites (Twitter, Blogger, Blogspot, WordPress) and Instant Messaging applications (IMs:Skype, Live Messenger, ICQ, AIM, Google Talk)?

<table>
<thead>
<tr>
<th></th>
<th>Im logged in most of the day</th>
<th>check it once a day</th>
<th>2-5 times a week</th>
<th>Once a week</th>
<th>Once a month</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Networks</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Instant Messaging</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Blogs</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
EQ.12 For which activities do you use social media? Please tick all that apply.

- Keeping in touch with friends/colleagues
- Email/Messages
- Chat/IM
- Posting Status Updates
- Blogging
- Sharing photos/videos/links
- Commenting on links/photos etc.
- Rating information (like/dislike etc.)
- Sharing Information
- Organising events
- Groups
- Gaming
- Birthday reminders
- Travel Assistance
- Discover Interests and Information
- Making new connections
- Professional Networking
- News and Event updates
- Support a cause
- Show interest
- To meet like minded people
- Research
- Music
- Other (please list below)

EQ.13 Have you ever used or are you aware of location-aware social networking sites (L-A SNS) such as Foursquare and/or Facebook Places?

- I’ve never heard of them
- I’ve heard of them, but don’t use them for privacy reasons
- I’ve heard of them and I’d like to give them a try
- I’ve used them and I like them
- I’ve heard of them, but don’t use them for other reasons

Please explain your answer to the above question.
EQ.14  Who would you share the following personal information with in a Social Networking Site?

<table>
<thead>
<tr>
<th></th>
<th>No-one</th>
<th>Specific Friends</th>
<th>All my Friends</th>
<th>All My Groups</th>
<th>All Social Network Sites</th>
<th>All Public to WWW</th>
<th>I don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile Info</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Photos</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Videos</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Page Likes/Interests</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Contact Phone Number</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Contact E-mail Address</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Contacts/Friends list</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Status Updates</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Location</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

EQ.15  How satisfied are you with the available privacy settings in social media?

<table>
<thead>
<tr>
<th></th>
<th>Very Unsatisfied</th>
<th>Unsatisfied</th>
<th>Neutral</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Networks</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>IM/Chat applications</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Blogging sites</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
B.3.4 Community Questions

EQ.16 How do you prefer communicating with the different groups in your life? For each group, please tick all that apply.

<table>
<thead>
<tr>
<th>Group</th>
<th>Face-to-face</th>
<th>Email</th>
<th>Texting</th>
<th>Social Networks</th>
<th>Voice Calls</th>
<th>IM</th>
<th>Discussion Forum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Friends</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Family</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Old Friends</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Sports Clubs</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Hobbies / Shared Interests</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Shared beliefs / Religion</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Work</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Online contacts (people you don't meet offline)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Other</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

If you answered other in the above question, please specify here.

- EQ.17 Please rank your preferred mode of discussion for groups (1-7 where 1 is the most important, 7 is the least important): Face-to-face _________
  - Email __________
  - Texting __________
  - Social Networks __________
  - Voice Calls __________
  - IM __________
  - Discussion Forum __________

EQ.18 Do you accept any suggestions made by the Social Networking Site about connecting with new friends?

- I do not use SNSs.
- No, I never accept such invitations
- Sometimes, depending on various criteria (suggested persons profile, habits)
- Yes, always

Please explain your answer to the above question.
EQ.19 In cases when you are proposed to join a new SNS group, which are the most significant criteria in order to join the new group? Please rank from 1-4 with one being most important to you and four the least important.

- Other members should already be my “friends” _________
- Other members should be “friends” of contacts that are already my “friends” _________
- Other members should have the same interests with me _________
- Other members should spend some time in areas close to me _________
- Conference Users Questions

EQ.20 How many conferences do you normally attend in a year?

EQ.21 Which Intel conferences did you attend this year?

EQ.23 Please rank your goals at a conference? Starting with most important = 1

- Networking _________
- Education _________
- Dissemination/Showcasing _________
- Other (please specify below) _________
- If you answered other in the above question, please specify here.

EQ.24 What information would be useful for you to have in advance of a conference?

EQ.25 What information would be useful for you to have updates of during a conference?

EQ.26 What information would you like to receive updates about after attending a conference?

EQ.27 What community based services would you see as useful at a conference?
B.4  Disaster Management Survey

This is a survey for the EU FP7 project ICT SOCIETIES; it will take about 15 minutes to complete. Your information will be digitally recorded and will remain confidential. If you feel uncomfortable answering any question, please skip that question and continue to the next. You may withdraw from the survey at any point.

B.4.1  General Questions

DMQ.1 Highest Educational level
1. Secondary level
2. Higher level education
3. Degree
4. Postgraduate
5. Other

DMQ.2 Gender
1. Male
2. Female

DMQ.3 Age
1. 18-24 years
2. 25-35 years
3. 36-45 years
4. 46-54 years
5. 55-64 years
6. Over 65 years

DMQ.4 How many years of experience do you have in Disaster Management Relief?
1. Less than a year
2. Less than 5 years
3. 5-15 years
4. over 15 years of experience

B.4.2  Technology Background Experience

The following questions are designed to deepen our understanding of technologies you use and are familiar with in everyday life. This information could help us to design tools that are intuitive and usable in emergency situations.

DMQ.5 How often do you use the following equipment, in your everyday life?

<table>
<thead>
<tr>
<th>Equipment</th>
<th>All the time</th>
<th>Once or twice daily</th>
<th>Once or twice weekly</th>
<th>Once or twice monthly</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Phone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>PDA/SmartPhone</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Laptop/Netbook</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Desktop Computer</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Dictaphone / Recording Device</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Media Player</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>----------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>GPS</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Printer/Scanner/Fax</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Digital Camera</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Tetra/Tetrapol/PMR/Other radio</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

DMQ.6 Please indicate which social media, if any, you use in everyday life?

- None
- Facebook
- Linkedin
- Twitter
- MySpace
- YouTube
- Flickr
- Couchsurfing
- Special Interest Social Network
- Blogger
- Wordpress
- Skype
- Instant Messaging tools
- Other (please list below)

DMQ.7 Would a specialised social network be useful for any of the following emergency management actions? Please tick all that apply and explain your answer in the space provided below.

1. For exchanging best practices
2. For promoting other agency or organisation contacts
3. Posting announcements for trainings
4. Distributing information to media
5. Other (please specify)
DMQ.8 How do you communicate with colleagues: During a disaster mission?

Outside of the disaster mission?

Please explain your answer.

B.4.3 Disaster Management Questions

The following questions are related to disaster relief. Their objective is to identify the needs of Disaster Management teams for technologies (in both, hardware and software) that could support you during operations.

DMQ.9 Which of the functionalities listed below could you imagine using in software for disaster management support? Please tick all that apply.

Tracking your position and keeping other team members informed about it
Communicating your current activity to team members or mission control
Support for logistics and resource management
Other (please specify) ____________________________________________________________
DMQ.10 Which of the following technologies do you use, or would see value in using in disaster management situations?

<table>
<thead>
<tr>
<th>Technology</th>
<th>Yes, I use this.</th>
<th>No, but this could be useful.</th>
<th>No, and I don't see value in this.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instant Messaging/Chat</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>IRC</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Email</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Video call</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>GPS</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Video cameras</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Digital cameras</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Digital barometer</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Bio-sensors (e.g. monitoring a heartbeat)</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

DMQ.11 Please list any other technologies you think could be relevant or useful below.

DMQ.12 What in your opinion is the best means of communication during the unprecedented event of a disaster?

DMQ.13 What are your requirements for extra hardware (e.g. sensors, mobile devices) you would have to carry to enable these functions?

DMQ.14 Would it be an advantage or disadvantage to have sharing of information among all of these devices or technologies? Please explain your answer.

DMQ.15 In which situations could you imagine addressing a worldwide community to help solve
disaster relief problems?

DMQ.16 How much would you rely on disaster relief related information (such as road status or road maps) coming from a worldwide community?