STUDENT MOBILITY IN A DIGITAL WORLD

Final Report of the VICTORIOUS Project

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EXECUTIVE SUMMARY

European Higher Education is changing. New technologies are offering new opportunities for learning, teaching and research, and these opportunities are being grasped by staff and students in the oldest as well as the newest universities. The political and spatial context in which universities operate is changing too. The European Higher Education Area, the Bologna Process, pressure to commit effort to the Europe 2010 agenda, and a global education 'marketplace' all require universities to be more outward looking, more involved in partnerships and collaborations, more responsive to stakeholder needs.

One challenge to be addressed is the steady rise in mobility of students. This comes in more than one form. Students are now moving physically more than ever to take courses in universities in other countries, supported in part by schemes such as Erasmus, which has ambitious targets for expansion. Students are also studying in a more place-independent mode, using the web, email, internet phones etc to get access to learning materials, staff and peers, and doing this from a widening range of locations. This mobile study is still mostly blended with traditional classes on campuses, but the beginnings can be seen of 'virtual mobility' in which students take courses and immerse themselves digitally in another university environment, and this is expected to increase towards a more substantial Virtual Erasmus Programme.

Questions therefore arise about the degree to which European students are using digital technologies to support physical mobility and to what extent universities are prepared for this shift in student behaviour and its presaging of large-scale virtual mobility.

In a partnership of nine traditional universities and one university network, we carried out an investigation of current practice in European universities, to find some answers to these questions. We addressed the period before, during and after the visits.

- interviews and surveys of students who were, or had recently been, undertaking study visits to other universities as part of their degree programmes;

- a survey of European universities about their provision of digital services for their own students whilst away and for incoming students;

- pilots and tests of options for universities as to how best to address some of the issues that arose from the information gathering exercises;

- case studies in our own universities of changing student needs and how we are addressing these.

Our findings about students

our European students were mostly young adults from 32 countries, almost 400 universities, and studying a wide range of subjects. Many, but not all, were in the Erasmus Programme, and their visits were generally for a few months, up to one year. These findings are similar to those of others. All of the students used digital technologies (ICT, mobile devices etc) routinely for social and academic purposes, and expected to find good quality information on websites about the university they intended to visit. They came from universities which varied in use of technology, some provided very deeply integrated services online (portals, matriculation, exams, virtual learning environments, e-journals, databases etc) and others provided much lower levels of digital service, and particularly much less integrated services (single password vs. multiple passwords for example). We have termed this change in digital academic environment 'digital culture shock', and offer some tools to aid thinking about how best to manage it.

Although the majority of students enjoyed their visits, they often had to employ resourcefulness to ensure continued access to digital services they need, such as email. These involved methods such as using the digital services of their home university, especially library and email; internet cafes to overcome limited PCs or network and sharing passwords when there were long delays in issuing these. In general, information provision was weak. It was hard to find, often in the local language only which is problematic when the subject is technical, and there was insufficient focus on the needs of the visiting students. Peer support is vital, and many students leave their normal support network behind when they go to study.

Our student respondents painted a picture of significant variation in ICT provision by universities across Europe, but also variations in effectiveness of use, and some real lack of 'joined-up' services. This appeared to be university-specific rather than country-specific.

Our findings about universities

An increasing number of universities seem to be moving to online access prior to arrival, essential when information is locked away behind authentication barriers. However, many did not yet offer this to their own or visiting students, and it appeared that these sorts of business processes lagged behind academic processes in terms of their integration of ICT. Even in universities where much was already digital, libraries particularly appeared to still require physical presence for issue of cards/logins.

Most university International Relations Offices considered that they had good websites or pointed to good information elsewhere (for example IT Services or Libraries), although this is not a view borne out by our student data, and in interviews with us, staff in support services did

agree that they were not very aware of the issues of digital services for incoming or outgoing students.

In general support services rated their services to incoming students more highly than those for outgoing students, perhaps because there is an 'out of sight, out of mind' aspect, but also because there is an assumption from the traditional visits that the only services students need are the ones at their host university. This ignores the needs of students to access learning materials, emails, etc from their home university whilst away.

A minority of universities are developing virtual mobility options at present, but a majority are aware of this emerging field and are considering their way ahead.

Our conclusions at the end of the research

Much is changing, but much remains to be done, even for the European physical mobility students of today. Many of these changes would be to the benefit of all students of the university.

The implications for large-scale virtual mobility are significant. Many universities need to significantly upgrade their information provision in content and organisation if students are to be able to understand the provision that will be made for them in services and support. Students who never set foot on the physical campus will not be able to go to notice-boards or ask peers in face-to-face classes. Without ability to join the university online and be issued with the necessary login and password they are effectively cut off from the university system. The increasingly-digital libraries will need to join in this endeavour, and probably rethink some of their views on licensing.

Recommendations for stakeholders

Some actions are **for universities** themselves to resolve. Providing good information and making it easy to find is a soluble problem for all universities. It needs an oversight mechanism to make it integrated information. Better use should be made of technology for essential business services, such as matriculation and course choice, and alongside that, better integration of the services that do exist, e.g. single passwords efficiently administered. For some universities there needs to be greater clarity about what the university provides and what it expects students to provide. It is clear that outgoing students need some form of training and support, so that they are prepared for mobile study. Many have travelled and used the internet, but this is not the same as studying at another university. For incoming students training and support at the outset (induction) so that they understand how to get the best from the facilities and systems. These actions will require joint efforts from senior management, from

International Relations Office, from the Student Record Office, from Libraries, IT and eLearning Services, and from Faculties, Schools and their staff involved with students undertaking visits.

Some actions are **for European, national and regional agencies**. At the present time there is no effective database of courses and so students must draw help from their university and/or search for themselves for suitable visit locations. A system of single digital identity for all students (and staff) would greatly facilitate movement between universities and access to legitimate digital resources. Systems exist for this (e.g. Shibboleth) but implementation requires high level action. Access to the internet was one common problem for mobile students. The embryonic wireless 'roaming' service EDUROAM offers one way to reduce these barriers. Universities should be encouraged strongly to participate in such international schemes, with assistance as necessary.

Some actions are **for students and their associations**. Students need to become more wide-thinking in their planning for a visit, and consider what difficulties might arise in studying in another university in another country. The student associations can help them in this by providing websites that offer advice, perhaps enable students to share experiences and solutions, and by pressing universities and educational agencies to consider more robustly the needs of mobile students. Student associations will also need to consider their role in supporting virtually mobile students, in terms of knowing who and where they are, what their needs are and how to cope with students who 'belong' to more than one university simultaneously.

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INTRODUCTION

Developments in European Higher Education

At the start of the 21st century, the higher education institutions of Europe are evolving new ways of working to continue to offer high quality advanced education, as some have done for several hundreds of years. They are adapting their courses and methods of teaching to remain in tune with the needs of diverse learners who seek to gain advanced education in high quality settings, wherever these are to be found. These universities are also in dialogue with their governments and with the European Union so that the needs of society as set out by these bodies can also be taken into account. At a European level, challenging targets have been set for higher education, with key roles in both research and education to help to build the knowledge economy and maintain global competitiveness [1]. To achieve these goals in higher education it was recognised in the second half of the 1990s that several processes needed to be put in train or given added momentum. These processes are:

- **The Bologna Process**, set in train in 1999, seeks to bring harmony of qualification pathways into a European higher education scene that was characterised by different names for degrees at the same levels, different periods of study for the same-name degree etc. Substantial progress has been made in improving legibility of qualifications, enabling employers and learners to better comprehend the qualifications offered by universities across Europe;

- **The European Higher Education Area (EHEA)** was initiated in 1999 as an goal of the Bologna Process, and aims to be fully operational by 2010. It is independent of the control of the European Union, being managed by member states that have signed up to join it. The EHEA extends well beyond the boundary of the present EU, including Turkey, Iceland and Switzerland amongst non-EU members. At present over 40 countries have joined, and the EHEA includes thousands of universities with around 20 million students;

- **Definition of a European Credit Transfer & Accumulation System (ECTS)**. In ECTS, credits are assigned to each course within a degree programme based upon the study load required of the learner to achieve the learning outcomes of the course. (A full-time student study load is 60 credits per annum.) This device has been widely adopted and enables learners and universities to assess the contribution to an award of any course. ECTS came into being through the Erasmus Programme, being an essential element in making explicit the value of courses taken during student visits to other universities;

- **Quality assurance in higher education.** To underpin confidence in the harmonised degree programmes across the EHEA there have been developments in quality assurance mechanisms, something well-accepted in higher education in some European countries and more innovative in others.

- **Mobility schemes**. The EC funds several mobility schemes targeted at learners and teachers/trainers, with the largest being the Erasmus-Socrates II scheme for formal education and Leonardo da Vinci for vocational training. The targets for the scheme have been raised substantially recently, and are discussed in more detail below;

- **Increased deployment of e-learning**/technology enhanced learning. Universities are adopting technology-based approaches to teaching and learning on a large scale, and few if any European universities are now without some use of e-learning. A modern university education consists of some elements of ICT. This progress has been supported and promoted nationally by governments and their agencies and by the European Commission through its various Programmes and Actions over the past twenty years;

- **Strengthening the ICT infrastructure.** As universities have become more electronic in their internal and external businesses, so has their dependence on the quality of the ICT infrastructure, both their own and the national and international systems through which they work. Areas which have been addressed are bandwidth, wide interconnectivity of sites, interoperability of systems through common standards and protocols, portability of solutions.

Simple explanations of several of these topics can be found at: [2]

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Student mobility

As the universities of Europe change to new ways of working, at the same time they continue to support some valuable traditions that are centuries old. Amongst these is an openness of each university to study visits and exchanges with students and staff of other universities, ensuring that the academic community is healthy and thriving, that ideas are exchanged and continue to flow freely in the public domain, and that cultural awareness is maintained at a high level.

Increasingly, universities are 'sharing' students between them, either sequentially under the Erasmus mobility or similar schemes, or concurrently on joint courses that now include those delivered entirely by e-learning (part of an area known as 'virtual mobility'). These developments are supported by individual governments and through the enhanced Erasmus scheme and its Erasmus Mundus programme of international collaborative Masters degrees. On Erasmus, Ján Figel', European Commissioner in charge of Education, Training, Culture and Multilingualism said "*Encouraging mobility will remain a priority for the Commission in the coming years, as we expect to reach the target of 3 million Erasmus students by 2011 with almost 300,000 students per year.*" [3]

Several sources of information about student mobility exist, although no single source has comprehensive coverage of all students in all EHEA countries. Data gathered by the Eurostudent and Institute of International Education surveys appear to be the most complete, with the caveat that data collection methods and data robustness vary by country. Some key features are apparent:

- Erasmus-type visits are undertaken mostly by young adults;

- Gender appears not to be very significant with females and males both equally likely to participate;

- Subject areas studied on Erasmus-type visits are not evenly distributed (even allowing for likely different numbers of students in each major subject domain) with a predominance of Arts and Social Sciences over technical subjects;

- The importance of particular mobility schemes differs between countries and many students are not travelling under the Erasmus Programme, and in some countries there is a high proportion of "freemovers" outside any formal programme.

A range of publications and reports containing recent data on European student mobility can be found online [4, 5, 6, 7, 8, 9, 10, 23, 24].

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Technology and mobility

This intended expansion of both numbers of students and study modes raises challenges for universities which involve both technical areas and academic business processes. To move to large scale physical and virtual exchanges requires a move from bespoke and hand-crafted

processes to automated and systematic processes, which will include enrolment (matriculation), password generation, authority to access restricted materials plus awareness of the need for advance information about digital resources that may be hidden behind authentication barriers. Students accustomed to working with efficient ICT systems in one university may find a less well-developed situation in the one they visit, which will impact upon their view of the quality of the experience. Those who have good experiences with technology whilst away may feel less satisfied on their return, and wish they could have continued access to the good resources they had whilst on their exchange visit.

These impacts of technology on the physical student exchange send warnings to universities that if they wish to venture into virtual exchanges by offering courses online to students at other universities, they need to address underlying business processes. Such processes include: automatic digital library access to <u>all</u> online materials; good advance information and enrolment/matriculation online; preferably well in advance of the start of courses; a facility for students to see the credits they have gained and for these credits to be passed smoothly to their home university. All these will be the essentials for a successful virtual visit experience. Few universities at the present time are in a position to be fully confident that <u>all</u> this works well, and with little need for human intervention to problem-solve after the event. Few traditional universities have many fully online courses that can be joined as easily as on-campus, physical-presence, courses. Even those universities that do have a reasonable complement of courses tend to offer at post-first degree level, and so the business is separate from the main on-campus first degree programmes. For virtual mobility to become a significant component of the total mobility movement there will need to be a move from a 'boutique' to a mass model of operation.

Thus to explore the challenges and opportunities for student virtual mobility on a large scale presents problems of identifying sufficient examples where this is currently taking place, and such examples do not necessarily help in understanding the implications for current students at the majority of traditional European universities. However, most traditional universities have significantly changed their business processes in recent years, from paper-based methods to heavy reliance on ICT to support and enable their main traditional academic and administrative work. Examples of these changed processes include:

- Learning and teaching with e-learning (virtual learning environments, e-assessment);

- Digital libraries (e-journals, e-books, online bibliographic databases, online help);

- Integration of digital databases systems holding staff, student and course records;

- Portals as single channels of access to digital resources;

- Email as the major or even dominant channel of internal and external communications;

- Single or reduced sign-on to authenticated systems, for example portal, email, library;

- Virtual private network or other secure off-campus access to restricted digital resources;

- Websites as the major or dominant channel for internal and external information provision.

Thus some of the main mechanisms needed to support student virtual mobility are already appearing or fully in place in many universities. Across the whole of the enlarged EU there are significant variations in the pace at which different universities have been able to develop their ICT infrastructures [11], but for the 'frontrunners' at least, much of the groundwork has been done. The rate of progress in any single university is influenced by local, national and European contexts, and hence examining specifically those aspects of university infrastructure and services that are requirements for moving to mass virtual mobility enables us to measure universities' readiness for taking this step. Even the concept of 'the university's readiness' is not simple in practice. The high degree of autonomy and devolution of power to Faculties and equivalent units means that some parts of a university may be very ICT-sophisticated and others relatively primitive. In addition, both the 'home' and 'host' universities have roles to play in preparing students for their visits, supporting students during their visits and providing continuing services after their visits.

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The VICTORIOUS Project

The VICTORIOUS Project was designed to address these questions of readiness for virtual mobility. We used 'student physical mobility in a digital higher education world' as a proxy for what might take place in virtual mobility, and also as a phenomenon which is with us on a large scale and hence worthy of investigation in its own right. Our own universities (Bristol, Edinburgh, Granada, Groningen, Leuven, Pavia, Siena, Tartu, Turku) served as 'testbeds', and in addition we also explored the experiences of students and other universities across Europe. We have a particular interest in the universities of the Coimbra Group as they take more than their proportional share of Erasmus and other exchange students.

In this report we review the ways in which one can study student and university experiences with digital technologies and mobility, and then present and analyse the data we gathered in terms of the three phases of student mobility (before the visit, during the visit and after the visit). From these analyses we draw some conclusions as to the current state of provision of European universities to support a large cohort of mobile students in a digital world, and the

implications of this for a large expansion of virtual mobility. Finally, we present some checklists of actions that could be taken by the main stakeholders in European student mobility (both physical and virtual) based upon our identification of the important issues that need to be addressed. A comprehensive set of Reference Reports, a Glossary and a Bibliography to accompany the report are available online (http://victorious-project.org).

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INVESTIGATING STUDENT MOBILITY IN A DIGITAL HIGHER EDUCATION WORLD

Introduction

It is clear from the discussion above on sources of information about student mobility in the European Higher Education Area that a **comprehensive** approach to data-gathering is unlikely to be successful unless it has the substantial resources needed to work with professional data-collection agencies in each country (currently over 40). Even given these resources, if more than very simple data are required of each respondent, low response rates and poor representation of the population in the respondent samples will cause problems for interpretation. However, for the purposes of this Project, we were not seeking to gain detailed comparative data about countries, or individual universities, or accurate proportions of students who experienced this or that feature during their visit. Our objectives were: to understand the variety of student and university experiences, with some indication of the major and the minor issues for both stakeholder groups, and from this to promote awareness of the need for systematic solutions; to provide some key recommendations for each stakeholder group, and to relate these findings in physical mobility in a digital higher education world to the emergent area of mass student virtual mobility.

To gain a good overview of the *status quo* requires a triangulation from different sources of data to avoid undue bias. For example as data providers, students and universities each might have views which are unduly positive or negative about the extent and quality of provision, and those skilled or well-developed in ICT may be more or less demanding than those with little skill or development.

Thus we chose an approach based upon 'surfacing' the current issues in physical and virtual mobility for students and for universities by background research, followed by working with a sample of in-depth case studies that were themselves supplemented by some limited data gathering from the relevant populations, for a 'light touch reality check'. Although it is likely that in detail individual students and universities will differ in how issues present themselves, and how the local context affects their actions, some generic and common issues and challenges should be identifiable. Some of the important variables that need to be borne in mind when undertaking such a study are:

- Students: although they are often discussed as if they are an homogeneous group there is substantial and increasing diversity in the European student population. Some are relatively easy and non-contentious to record (e.g. age, gender, subject studied, level of degree); others are more sensitive (e.g. ethnic origin), and some are difficult to address other than by gathering the self-reported assessments of students themselves (e.g. skills, competencies, knowledge).

- Courses: students study particular subjects at their home and host universities, with varying degrees of freedom in the selection of individual courses or modules depending upon the constraints of each degree programme and the university approach to flexibility in curriculum choice. Some of these courses or modules at the host university will be very adaptable to the needs of visiting students and others may not be so accommodating. Thus the quality of the individual student experience has a major component due to the micro-level of the course or module embedded in the component due to the macro-level of the university.

- University teachers & tutors: the proactivity of teaching staff towards visiting students, their interest in such short-term visits, their power to modify courses to make them more 'visitor friendly', and their awareness of, and competencies, with ICT, all influence the experience of the visiting student. Staff mediate the university services, and so different students may perceive the availability of services in the same university in different ways depending upon the staff they come into contact with.

- Universities as organisations: universities vary greatly across Europe in many respects. Some place their emphasis on teaching rather than on research; some offer rather traditional courses whereas others strive for pedagogical innovation; some are ancient and others very newly founded; some have very integrated academic and administrative units in contrast to those with high independence of each unit (devolved). The key units with respect to student mobility are: International Relations Office, Library, IT Service, E-learning Service, Accommodation Service, Student Record Office, Erasmus Coordinator Office, Language Service and the Faculties/Departments/Schools. The lack of a common terminology for all these units indicates the complexity in comprehension of where students should look for different types of support and information.

- National infrastructure: universities are embedded in regional and national contexts that may or may not provide very supportive and high-quality infrastructures. Clear examples exist in the domains of libraries, IT static and wireless networks as well as centralised application systems, identity management systems etc. Thus the facilities experienced by visiting students may (invisibly) be due to services external to the university they visit, and may be only slowly influenced by the wishes of any single university.

- Geographies: the different countries of the student's home and host universities offer the major attraction of experiencing different cultures and languages, an essential feature of the Erasmus-type exchange and almost certainly an important part of the decision as to where to study. However, they may also impose some restrictions and difficulties that impact on the quality of the visit. Balancing the value of difference with the concept of equivalent high quality is problematic.

We were aware of some of these issues at the start of our study, and others became apparent as we carried out our work between Jan 2005 and Feb 2007. We will return to many of them throughout the course of this Report, and also later in our conclusions and recommendations.

As noted above, there are several 'players' taking different roles and actions to enable an exchange visit of the Erasmus type. This is usually of short duration, up to one academic year, undertaken within another university's degree programme and characterised by credits for courses that usually count towards a degree. Most visits take place in another country. In addition to formal units within the university, these include the visiting student, teachers on courses taken during the visit, and personal tutors. As universities and students have become more adept at using ICT, and more reliant on it for much of their academic business, each of these stakeholders has a contribution to make to the digital element of the experience of the exchange visit. As the student is technically a member of two universities at the time of the visit, there are inputs to be made from both home and host universities.

At the start of our enquiry, we had raised some preliminary questions about student mobility in a digital higher education world and identified three broad areas of university activity, namely quality in e-learning; interoperability of ICT systems between universities, and digital repositories/digital libraries. We therefore explored the status of these areas at the start of the project by **desk research**, focussing particularly on mobility issues. We also looked into the research and development work taking place in student virtual and physical mobility.

We needed next to understand **the current situation inside our own universities**, as exemplars. The project partners included nine European universities in seven countries widely spread geographically (Belgium, Estonia, Finland, Italy, Netherlands, Spain, UK), all with high standards of learning and teaching, and all with substantial numbers of visiting students each year, mostly young adults, many from within Europe but also many internationally. We limited our studies to European students visiting other European universities, but we were aware, from informal data, that much interesting information lay in examining visits by students to and from universities further afield. In the light of concerns about the competitiveness of European higher education in the wider international arena this information would be a valuable later study. We knew from student mobility data gathered by the university association, the Coimbra Group (www.coimbra-group.be), that included all our partner universities, that we had almost twice the European average of Erasmus programme students in our universities in 2004. Our universities also represented a range of the extent of development of the use of ICT for learning and teaching, and also for administration and academic business processes.   All were experimenting in the area of virtual mobility, however small scale and tentative this might be. Finally, the project team had individual members with expertise in very technical subjects, several types of data collection and analysis, and involvement with international student affairs.

To help us to understand the issues in our own universities we each developed a **case study** that described the nature of the university (short outline), gave data on incoming and outgoing

short-visit students and then described the organisation of university services and activities <u>as seen through the eyes of</u> a visiting student or home student going on a visit plus a statement on the university's policy and strategy for providing and enhancing digital services to these groups of students. Services included:

- elearning (online registration for exams, courses; ability to see 'career' grades, courses; etc);

- Database, resources, libraries (PCs / Internet availability of computers, loan of laptops, wireless, cheap network in student residences, etc);

- Interoperability / single sign-on – examples of where joint VLEs or Library services can work between two universities;

- Quality for learning and teaching especially for eLearning (criteria and processes for quality assurance – internal and external – examples would be gathering student views of experiences, representation on student committees, etc); compulsory or elective pedagogical training for teaching staff & tutors, and evaluation of their competence.

Specific support for incoming and outgoing visiting students included:

- Induction;

- Multilingualism;

- gathering views of quality of educational experiences;

- possibility for visiting students to participate in quality assurance mechanisms;

- existence of courses databases so that students can see courses, descriptions and credit rating before arrival;

- use of ECTS & e-transcripts;

- active steps for increasing teaching and support staff skills in English or other non-local languages.

We followed up the case studies with a **series of interviews** with individual and small groups of our own students who had recently completed visits to another university in Europe. These interviews focussed on their experiences, with a particular emphasis on ICT and how it fitted into their studies, their personal lives and the roles universities play in the provision of digital services and resources. We experimented with different styles of interviewing, using audio and video to capture the interviews when feasible and acceptable to interviewees. The data were analysed for major themes and used to inform the design of the next stages of the methodology

– the student survey, the university survey and feasibility pilots of approaches to supporting mobility. The students' responses also made us look again at our own university provision.

The **student survey** was a successful route to understanding the experiences of European students who had recently been on, or were still undertaking, a study visit. The survey was completed online after an email alert routed to students via their universities, Erasmus Coordinators, national, local and European student associations (for more detail on the findings, and printed versions of the survey and the alert see Reference Report 5). Almost 2400 responses were obtained over a 3 month period (February – April 2006) from students resident in 32 countries.

Half the students stayed 3-6 months at their host university, 25% stayed 6-9 months and 25% stayed more than 9 months. Whilst they were on their visit, the great majority took courses (91%) with the rest doing research, placements or other activities. This accords with the level of degree they reported that they were taking at the time of the visit (Bachelor 59%; Master 34%). The largest proportion of students were studying Social Science subjects (40%), with Arts (23%) and Science/Engineering (27%) next most common. Only 5% stated that they were studying Clinical Subjects. These data are in reasonable agreement with findings by other surveys. Despite an increase in the diversity of European students, including age, the great majority of our respondents are young adults, again in agreement with the findings of others. In terms of the importance of the digital world to these young adult students, this age range concentration emphasises the need to understand their experiences of ICT during their study visits (Figure 1). The gender distribution of the respondents reflects the rising proportion of females in the student population, especially in social sciences and arts subjects (female 64%; male 36%). Sixty-four percent of students took either a PC or laptop with them on their visit, 5% bought whilst away and the rest had no personal computer. Interestingly, those who had their own machines answered almost all questions very similarly to those who did not have one, suggesting that there is no technology bias in the data. Students from different disciplines were approximately similar in ownership of PC/laptop, reflecting current trends as shown in other data sources [12, 13].

Figure 1: Age ranges of respondents to the student survey

Age of respondents
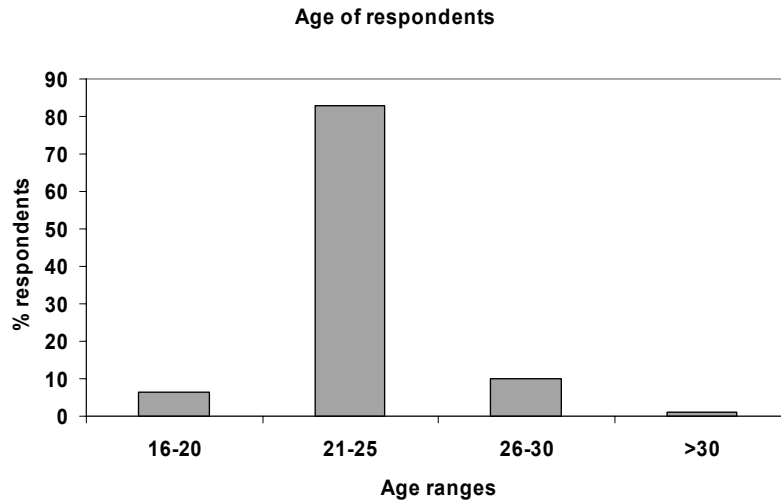
The use of email and online surveys may well have predisposed to responses from those with strong skills and interest in ICT in general, however, in this survey we were seeking data from exactly those students who were aware of and would seek to use ICT-based services.

The **survey of European universities** enabled us to make a tentative assessment of the extent to which universities were addressing the ICT needs of students undertaking short visits. The survey was complex as it addressed several business areas of the university (International Relations, Library, IT, e-Learning, Student Record Office) and so could probably not be completed by a single individual. Fifty-five returns were made from different types of higher education institutions in 21 countries. The findings, and printed versions of the survey and the alert are presented in more detail in Reference Report 7. The survey asked about services for both incoming and outgoing students, and in the periods before, during and after the visits. It also addressed the extent to which universities were developing the use of virtual mobility solutions, no matter how tentatively. As with the student survey, the use of an online survey may have predisposed to responses from ICT-sophisticated universities, and the challenge of the questions may have resulted in less-well organised universities declining to respond. However, not all answers were highly self-congratulatory, and this was most pronounced in the more specific rather than overview, general questions. It was clear that many respondent universities were still grappling with the problems of mobile students and digital services, especially clear in the free text answers many supplied. The surveys were not anonymous and required a contact name and email address (indeed only one was not returned by email). Data were handled with due regard to good practice in confidentiality and security.

A major portion of the project time was assigned to conducting some **pilots and feasibility tests** of solutions to particular problems that arise or questions that students or staff might ask

about ways to support mobility in a digital age. Six pilots were designed and were tested at some or all of the partner universities. They were:

- Creating high quality information for incoming students through appropriately-located websites;

- Creating high quality information for outgoing students through appropriately-located websites;

- Exploring the issues for a university wishing to provide course data to a central database;

- Exploring the feasibility of using a digital identity management system to enable students to use their existing authentication credentials at other universities;

- Exploring the options for transfer of materials from one e-learning system to another to enable users to access these on their 'accustomed' system;

- Analysing the issues in 'digital culture change' when students change universities.

The pilots proved difficult to implement fully. Changing the way a large university works is not an easy task and meets resistance, lack of interest, problems of costs etc. However, some exemplars and tools were created that can help other universities follow similar approaches and do generally raise awareness of the work needing to be done.

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To make our data and our analyses more readable, avoiding a 'blow by blow' account of the VICTORIOUS Project workplans and activities, we have drawn together the findings from each of the different methodological approaches into a single narrative. The details of our findings in each phase of our work can be found in the various Reference Reports at the end of this document. We have structured the main body of the report into the three phases of student mobility - before the visit, during the visit, and after the visit - as there are separate issues raised by each phase, and different options are open for the exchange student and her/his home and host universities. We have also addressed a section to the likely impact of future technology and social developments ("future-proofing the conclusions") and detailed consideration of the relevance of our work to expansion of virtual mobility by universities.

❖

THE PERIOD BEFORE THE VISIT

Choosing a university and course(s)

In the phase before each student decides to undertake a short visit to study at another university ('host university') as part of a Degree programme at her/his own university ('home university') they need to assess their options as to where to study. As a consequence, access to high-quality information about potential universities and their courses is essential. Some of this information undoubtedly comes from fellow students at the home university who have been to study at various other universities. Peer advice and support is a major route to decision-making in many areas of student life. In addition, teaching and support staff at the home university may also provide good information, especially if the student is one of a substantial number each year who undertake such exchange visits, as a corpus of knowledge is built up, and special relationships may be formed between particular university departments/faculties. Language and cultural studies students are probably the best served in general by these informal mechanisms. However, the awareness of teaching staff about the full range of important student services on offer at each potential host university may be limited.

As the number of students being encouraged to undertake study visits under Erasmus and other programmes or as 'freemovers', rises, the informal approach may become less effective on average. The number of European universities and colleges is increasing (not least due to expansion of the EU), the range of subjects involved has expanded due to greater diversity in types of universities, and so students with low or no access to good and relevant personal advice may well increase. Alternative strategies will be needed to ensure that these students are assisted as much as possible to make sensible choices as regards the host university and courses.

At present there is no comprehensive European central database of all courses that potential Erasmus and other visiting students could refer to or search to gather information about courses and universities that might suit their needs. Some universities have central listings of courses, with summaries and ECTS credits but others do not. The information in these lists varies a lot between universities, and even when they exist they are often not at all easy to find within the university website, which itself may not offer more than the local language making searching more difficult. For most potential visiting students the International Relations Office (IRO) or equivalent unit website is a logical place to look for advance information on study visits, but not all universities have separate websites for this function. Most IROs do appear to try to be helpful to applicants, and their staff probably are almost always helpful if approached, but this requires increasing amounts of human intervention from them as the number of applicants rises, and full-time full-degree students from other countries might take precedence over short-term visitors. Thus an online location that intending visiting students could search which contained all courses in all European universities would be very valuable.

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A European course database?

As part of the project work we explored options for entering course information data into a European database using Course Description Metadata (for details see Reference Report 5). Issues that arise in trying to enable a given university to enter information into a central database are:

- The creation and maintenance of the university's electronic prospectus;

- The ownership of the course description (copyright issues);

- The technical format for the course descriptions and the reasoning behind it;

- The information taken up in the course descriptions and the reasoning behind it;

- Explanation for different versions of the course descriptions (e.g. English vs. local language) which existing course databases (country-specific or Europe-wide) to use.

It is clear that universities vary in their management of course information, both in which unit(s) within the university are the holders of the information and the form and content of the information itself. In universities where ownership of this information is very devolved (even to individual teachers) the opportunities for systematically entering and updating a national or European database will be much harder to achieve. An additional complication is that most universities hold their information in the local language, although this is changing to concurrent use of English. Where a central management of course information exists within a university, even if the content is devolved, the university is in a position to offer this information to a central database at national or European levels. To export the data in a useful form the university has to ensure it is stored in a form that can be read into the remote database or can export it in such a form. One 'standard' that exists and that could form the basis of a European database of course information is the Course Description Metadata format which is XML-based and was designed by the University of Oslo as part of the Norwegian eStandard project [14] and the education portal. Alongside this standard is that for ECTS, and a search engine has been designed with EC funding. The challenge for each university is to convert its course database into the correct format (or at least an export annually from it). The conversion process is somewhat cumbersome and so unless there is a strong desire inside each university to offer this information the administrative overheads are likely to be unfavourable.

Some European databases and portals do exist in different stages of development, as do national systems. PLOTEUS and "Study in Europe" are two examples of these [15,16]. The portals largely try to circumvent the problems of getting all universities course data into a single database by offering ways to 'drill down' into each country's education information, taking advantage of websites and national data systems. This seems likely to be the most productive route in the medium term.

We also became aware that the Erasmus Mundus Programme, with its global focus, was also interested in the development of a European course database. This development, if it encompassed all courses available for visiting students, could be the high level initiative required to provide a common system for individual universities to opt into. Support and pressure at national level could then lead to good levels of population of the database.

❖

Application And Enrolment At Host University

Erasmus and other short visit students must apply directly to the university of their choice. Some national systems handle applications for home students studying for a whole degree through a central system but nothing comparable exists for visiting students, even those in the Erasmus Programme. In some universities visits are administered centrally and in others this is the role of Faculties or Schools. We asked universities about the enrolment options open to visiting students, and their responses are shown in Table 1 below.

Table 1: Option to matriculate/enrol with the university online before arrival

Before they arrive at our university, **most visiting students** will generally have received their **matriculation information** and **be able to matriculate/enrol online**	Before they arrive at our university, **most visiting students** will generally have received their **matriculation information** but there is **no option to matriculate/enrol online**	**No matriculation/enrolment information** is given to visiting students before they arrive in our university.
15	31	1

From these data and our case studies, it was clear that not all universities have yet put in place online enrolment and course registration systems, and so in those universities, neither home nor visiting students have this option available to them. Most universities report that they *do*

manage to send information about the university matriculation process to students prior to their arrival, if given enough warning. This advance information sometimes includes logins/passwords to access digital services, but most commonly these are not issued until after arrival, via central services or via Faculties. In a few universities, visiting students had to request access to services through the appropriate person - a practice likely to add delay unless the visiting students were made aware of the process.

We also asked our student respondents about the timing of access to enrolment and online

"Staff were not aware that we visiting students had joined the class"

enrolment, and one third indicated that they could enrol before arrival but only 14% reported being able to register for courses (Table 2). Thus across Europe it seems likely that only a minority of universities have so far managed to put effective digital services in place for students to register and choose courses in advance of arrival. This probably also reflects the level of service offered to their own students, as almost all universities responding to our survey indicated that the same digital services were available to both home and visiting students.

Table 2. Access to digital services before arrival at host university

Available before arrival	% respondents able to access
Enrol with the university	35.1
Register for courses online	14.2

❖

Advance Information About Digital Services & Systems At Host University

All students intending to visit another university certainly have a range of questions to which they would like to find answers. As students generally become more heavily involved in the use of technology in their social lives and for their studies, many of these questions will relate to the provision of ICT-based services and systems, and they will try to find answers through digital channels, particularly websites. As much useful information about the detailed workings of universities is protected behind authentication barriers, timing of access to the necessary logins and passwords is important. For visiting students different rules or provision might apply in comparison to those for home students.

Getting information about the ICT services available at the host university in advance of arrival would enable visiting students to make some important decisions about how to manage their studies and their personal lives. As noted above, ICT is an integral part of the academic and personal lives of most students, and so maintaining contacts is essential at a time when the student is away from home in a new environment, possibly without any close colleagues for support. The digital services students might wish to know about at their host university, prior to leaving their own university and its (familiar) support systems, include:

- provision of email account by university;

- filespace for storage;

- open internet access – access to own personal email etc;

- wireless network for laptop connection;

- internet-connected PCs and printing; level of provision, rules for access, obtaining logins if necessary, payment for printing, software available;

- access to digital library and learning materials, especially where separate autonomous libraries exist;

- ICT help and support for problems; how and where obtained.

This information would enable students to decide what tactics to adopt before arrival (e.g. setting up own email and making sure it works) and asking for help in becoming a 'mobile learner' from the home university support service if available to help with this.   For students moving to a university with much better digital facilities than those on offer at the

"I didn't take my own computer as I knew there were plenty – my friend took hers to download digital photos"

home university there will be less concern than for those moving in the opposite direction, but understanding the provision and the rules that govern access are important to both groups.

The universities that responded to our survey had been asked to indicate whether centralised information was made available to visiting students through a single mechanism to ensure all relevant information was accessible together (Table 3). It was clear from the responses that there was a considerable degree of variation in provision of this sort of information on International Office websites, not all Offices had websites, and several universities reported that they were updating them. Some universities reported that the Faculty websites were the places for such information, suggesting that the devolution of responsibilities discussed above did indeed have practical implications for intending visiting students who wished to understand about digital services on offer, and this is also a very likely area where divergences in quality of

information will emerge. A few universities indicated that some or all of this information is only available after arrival at the university, which is not very supportive of advanced planning by students. Overall the impression was of substantial variations in practice, much of which would be in the local language. This was also the case within our own universities as our case studies showed very limited provision of links from International Relations Office websites to the digital services and resources of the university.

Table 3: Easy and centralised access to information about digital services

There are links or a web page on the IO website to information available to enable them to check easily and in one place **all the digital facilities and services** of the university before exchange/visit	There are links or a web page on the IO website to information available to enable them to check easily and in one place **most of the digital facilities and services** of the university before exchange/visit	**No links or web page** on the IO website giving information **about digital services and facilities of the university**
20	17	14

In our survey of European students, we asked about the digital services that students were able to access before they arrived at their host university (Table 4). Almost 100% of the respondents had used the web to search for information about their intended host university. We offered a choice based upon our information from preliminary interviews with a small sample at our own universities that belonged to the same cohort of students. Respondents reported that course details and credits were obtainable from over half the universities but that access to authenticated systems was much lower (probably due to a combination of lack of these systems as well as lack of advance login/password – see below).

"I used the website to access useful information about accommodation, housing benefits and societies."

Table 4. Access to digital information & services before arrival at host university

Information available before arrival	% respondents
Check details of courses online	61.7
Check credits assigned to courses	58.3
Check language courses available	54.1
Check accommodation available online	43.5
Login to intranet, portal or similar system	11.2

In face-to-face interviews students at our own universities confirmed use of the web to find out about their host university.

The universities that responded to our survey had been asked to indicate when access to digital services is made available to visiting students (Table 5). As an important example we chose the digital library as this is likely to be needed by students very early in their studies and so delays are problematic. Unlike email and e-learning which may not be offered by some universities or courses, the library is a constant feature of all universities and all now have digital content to a greater or lesser extent. Very few universities indicated that access to the digital library was offered to visiting students prior to arrival, which suggests that for some of the universities, perhaps many, use of library materials is 'guarded' quite closely and only made available to students after arrival. In some universities there are multiple libraries which may all set their own rules for use.

Table 5: Online access to digital library materials before visit

Online access to digital library materials…		
…….is usually given to them **before their arrival** at the university	…… is given to them **on (or soon after) arrival** at the university	…… is given to them **some longer time after arrival** at the university
4	45	4

❖

Offering the right information in a findable way

It was expected that International Relations Office websites would be the location where intending visit students would look for information, and the students we interviewed confirmed that this was the case. When we examined our own universities websites we discovered that they did not really address all the information needs of incoming students who intended to visit the university for a short period; specifically they were lacking in information about the digital services and support students might expect. Some pointed to the other services of the university, others did not. These were therefore the targets for our work in trying to develop good practice examples of how information might be better targeted to potential visiting students.

The University of Edinburgh developed a test site containing pointers to the sorts of information students would need in the area of ICT (www.flp.ed.ac.uk/test) and asked incoming students to assess this for usefulness prior to arrival. The site offered an organised set of links to the existing university services (microcomputer labs, wireless network etc) and proved to be a useful source of information. It is now being incorporated into the university information pages.

Other partners made modifications to their International Relations Office webpages to incorporate some of the same types of information. For example, at the University of Turku they modified the pages of the International Office to include explicit links to the good and extensive information for students already available on the Library and Computing Centre (http://www.utu.fi/en/studying/students/exchange/index.html). These are simple changes to make as long as the underpinning information in the services to which students are directed is clear and in an accessible language (as they are in these cases). Where the information is not so accessible or useful, more radical changes would be needed (as for example in Edinburgh where information was scattered and needed a site to confer order – see above).

These developments demonstrated that the IROs are interested in developing their services to incoming students, and that these enhancements to the information offered are relatively simple to put into place. By and large the IROs had not considered that this was important information, or had left such provision to other services, although these other services had little focus on the international visiting student.

❖

Information from student interviews

Our interviews with returning students emphasised some of the themes discussed above:

1. Local culture of the university had high impact. It might be technically oriented, indifferent, bureaucratic & rule driven, restrictive, controlling, or a flexible 'can do' culture;

2. Access to facilities mattered - length of opening hours and which buildings, ability to make network connections, limited or extensive number & quality of computers, printers and photocopiers;

3. Support varied - presence or absence of induction and training, possibility to get peer support, helpful or unhelpful staff, clear rules for use or no written (unwritten) rules;

4. Variations in use of ICT in teaching and learning - fully developed e-learning, insistence on handwritten essays, good digital library or no search tools in library, inconsistent use of email;

5. University business processes - ranged from well-resourced & used and used to largely paper- and person-based, evidence of overly complex systems with multiple logins and passwords, non-streamlined processed making poor use of technology;

6. Information varied - quality of websites, availability of people to contact, good advance information about what to expect, vital materials only in local language, especially in technology aspects, paper copies of information only, perhaps on noticeboard only, clarity on course & whether marks in assignments counted towards the course credits, availability of exam results;

7. Informal practices matter - students finding ways to making things work for them if not provided by the university, sometimes by bending the rules sharing e.g. password, dependence on internet cafes and other non-university sources, getting support from elsewhere e.g. going virtually back home for everything, finding friends with internet access;

8. Quality of educational experience - students recognised that different educational systems expect different approaches, and did not necessarily see this as worthy of either criticism or praise, but regarded it as a change to something different, e.g. only asked to read one textbook little or no use of online journals, little or no expectation of independent study vs expected to read very widely, to be self-directed, to use digital sources as routine.

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Information About Digital Services Still Available At Home University During Visit

Each university is able to help its own students to prepare for their forthcoming visit to another university by providing information, guidance/advice and direct support. It is likely that many Faculties/academic staff, Erasmus coordinators and International Relations Office do something of this kind, particularly whilst students are selecting host universities. However, it may be less likely that other support services (e.g. Library, IT Service) provide such assistance as they probably have no way to identify such students, and their absence from the university may not be 'detected' by such services. They may also have less awareness of the potential for

proactive support for these types of students studying at a distance, as opposed to students enrolled for distance education courses. This is likely to be particularly true in traditional universities with predominantly on-campus students.

There are two main areas of proactive support – provision of information about home university services that students will (should) still be able to use from another university (and provision of those distance-access services if they do not already exist) and advice and help to students in setting up laptops, internet access, email etc as appropriate to enable them to stay online whilst on their study visit.

We asked our university respondents whether the International Relations Office had such information on its website or linked from its website so that students could find the information easily (Table 6). We also asked whether the IT Service provided easily obtained information on student use of its digital services whilst away on a study visit (Table 7). As with information for visiting students, these services were variable, and almost a third of International Offices gave no information or links to it. IT Services generally felt that they provided this information and several International Offices commented that home students

"I should be able to access my home university digital services from the University of X computers (there are plenty of them) but always get an error message about sessions timing out."

knew where to find this information already and so they did not provide links. However, it was clear from the comments in several university responses that there were often conditions on the access to services whilst away (for example, needing to register and pay a fee in order to continue to be a member of the university, only web-based services being accessible, access varying by host university country). The definition of 'easily and in one place' may well also be open to interpretation, for in our case studies we discovered that although the information was in one website, it was not gathered together in an organised manner and targeted to intending student users. We therefore have some reservations about the extent to which the stated provision in the university surveys matches the student need.

Table 6: Easy and centralised access to information about digital services

There are links or a web page on the IO website to information which is available to enable them to check easily and in one place all the digital facilities and services of the university that they can continue to use during an exchange/visit	There are links or a web page on the IO website to some information available to enable them to check the digital facilities and services of the university that they can continue to use during an exchange/visit	No links or web page on the IO website giving information about continuing digital services and facilities of the university
21	13	16

Table 7: Access to centralised IT services: email, internet, chat, filestores, Virtual Private Networks (VPN) and other software for academic work etc

They have information available to enable them to check **easily and in one place** the digital facilities and services of the university that they can continue to use while away on an exchange/visit.	Some information is available to enable them to check **easily and in one place** the digital facilities and services of the university that they can continue to use while away on an exchange/visit.	There is **little or no systematic provision of information about digital services and facilities** that they can continue to use while away on an exchange/visit.
40	11	2

❖

Advising outgoing students

A university's outgoing students need support as much as incoming visitors do. The advent of mobile learners has forced many universities to re-assess their support and services for those studying off-campus, although many universities have still to address this in a systematic way. The needs of students undertaking study visits to other universities have much in common with those of off-campus learners, but there are some specific differences as we discovered in our study of the options for advising outgoing students.

Although there is a commonly-held perception that online materials are available 'anytime, anyplace', this is only partially true. Many digital resources offered by universities to their own students are protected by various methods and require authentication to access them. Examples of such restricted materials and systems are the virtual learning environment, the library's digital contents, especially e-journals and databases, and webpages which are domain restricted (some IT, Library and business areas such as Finance, Student Records). Although all of these may be web-delivered, they are not freely available to all-comers from anywhere.

Students accustomed to using such services on campus may not recognise the restrictions or may tolerate them as they can access materials the next time they are in the university. Advising them on how to make access work whilst away for prolonged periods is one important preparation activity. The other major area of concern to mobile students is getting online whilst travelling. Within their own university they may have wireless access or network ports for their laptop, but once away from their home university they may need to rely on Internet cafes or wireless hotspots. Making students aware of how to get online whilst travelling and how to

make a connection that is like the one they have on-campus is a valuable service. Typical mechanisms for doing this are the 'virtual private network' (VPN) connection and use of an authenticating portal. Finally, support services may not recognise that they still have a responsibility to students who are away from the home university, or may not have thought deeply about how to provide support and to what extent. Self-help pages may or may not provide guidance for these types of learners.

We explored ways to offer online self-help for intending visit students at some of our universities, and tested a website similar to the one used for incoming students (www.flp.ed.ac.uk/test). The information in the site mainly directed student attention to information already available on support service websites but which they would be unlikely to find, and may well not have recognised that they needed to until too late. Many students who used this site commented that these were subjects that they

"I am studying Italian and Art History which means I am always needing the internet and library resources for information for projects and essays. I hadn't thought about the things in the website about IT and what I could do BEFORE my visit to Italy and so would probably not have known these things til I went abroad and THEN hit problems!!"

had not thought about, even though they were reasonably skilled in the use of ICT. We were able to maintain contact with a small group of students during their visits to a range of other universities in Europe and gather feedback from them on the ease with which they had been able to get online and access resources back at their own university.

As with the information for incoming students, this area was not one which the International Relations Offices had felt was in their domain to influence and had generally not recognised as being important to the effective studies of local students whilst away.

Future Developments

The most effective way to draw the attention of universities to the need to address the needs of incoming students is likely to be through offering good practice examples to university networks and associations, through EAIE to which most IROs belong, through student associations and through Erasmus offices in each country. The rise in Web 2.0 technologies that enable individual students or groups to create their own commentary on topics of interest may offer community-based solutions. Blogs produced by students during visits can be searched online, wikis provide group contribution 'spaces', file-sharing sites like www.flickr.com offer locations to place photographs and commentaries. One example of this use of Web 2.0 is the work being done by the Erasmus Students Network (ESN), which is developing an interactive map of European universities based on Google Earth technology. Individual students will be able to lodge information about each university that they have visited for retrieval later by others

interested in the same places. If universities themselves were to begin to add data to this collection it would be able to offer both formal and informal information to intending visitors.

Further into the future, a desirable objective would be a more systematic development of a central database of course information, and perhaps a central application centre analogous to that used in some countries now for applications to universities (e.g. UCAS in the UK). Good data stored in compatible formats are necessary for this to take shape – at present there is too much variety but a goal alongside the Bologna process and the Europass initiative might be greater harmonisation in this area.

❖

THE PERIOD DURING THE VISIT

We have analysed the period during the study visit from three viewpoints:

- the range and quality of the digital services that are provided to visiting students by the host university;

- the extent to which continued access to the digital services of the home university can and need to be maintained during the visit;

- the likely future developments that will affect this period of the study visit.

Digital Services Provided By The Host University

The study visits of the majority of European students is between 3 and 12 months, with half our student respondents staying 3-6 months, and the rest 6 months to 1 year, roughly in line with other statistics [4, 7]. These stays appear to equate to stays of either one or two semesters (i.e. one academic year) for those universities using a semester system. The students are mostly in the middle of their degree programmes when they visit, and so many (perhaps most) enter their host university's degree programmes in mid-stream courses so as to be studying at comparable levels. Thus where they are able to integrate into local peer groups quickly they will find themselves with advice and support about 'how the university really works' – where this does not happen they may find formal induction valuable, if it is offered.

❖

Digital culture shock?

Students moving from one university to another will experience varying degrees of 'discomfort' in proportion to the magnitude of the differences between the two institutions. In the digital domain this will be no less than in the cultural domain, for although ICT systems are in some respects universal or global, in practice technology is implemented in local settings than provide substantial room for diversity. An example is provision of PCs for students which, although they are all in theory the same machines with the same operating systems, they may be large or small in number on campus, may be accessible 24x7 or very restricted hours, may allow full unimpeded internet access or be subject to limitations, may provide a wide range of academic software on demand or be loaded with only a few, very basic, applications. All these differences impact on the student experience, and may be felt in these areas:

"Compared to home, everything was new to me"

- Digital library range of materials and rules for access;

- Microcomputer room extent, availability and software/services provided;

- Availability of wireless access points;

- Level of support provided and topics covered;

- Extent of use of e-learning and systems in use;

- General level of off-campus access to student-focused services;

- Provision of email and capacity/features;

- Extent of use of email etc for communications within university.

Thus, the transition from studying in one higher education system (i.e. in reality in one university in one higher education system) to another is a culture change, and can be a culture shock if the differences between the two universities and education systems are substantial.

We developed a methodology for exploring digital culture shock in visiting students, with a classification scheme using 'clines' and degrees of shock, thus:

Figure 2: A SERVICE cline

NO/POOR SERVICES	←→	HALF-WAY HOUSE/ IN-BETWEEN SERVICES	←→	TOP QUALITY SERVICES
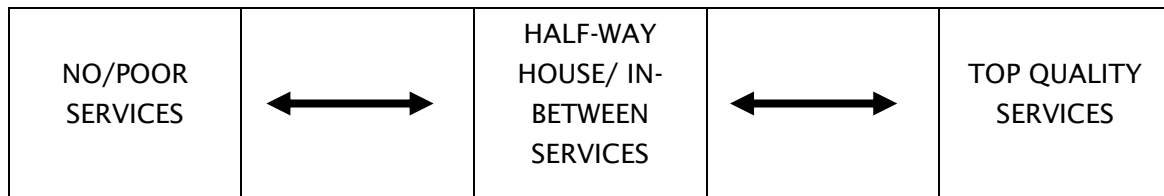
Figure 3: A related CULTURAL SHOCK cline

VERY SHOCKED/ DISAPPOINTED	←→	NO CHANGE	←→	VERY SHOCKED BUT PLEASED
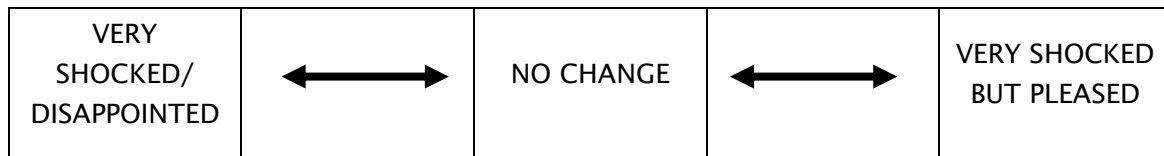
In terms of the various trajectories that students can follow in terms of their digital culture shock, these can be displayed in tabular form thus:

Figure 4: Culture shock states and university digital service provision

Satisfaction state	Student	Level	Transition experienced
Very satisfied	A	High	Home ☹ - Host ☺
Satisfied	B		Home ☺ - Host ☺
No change	C		Home ☺ - Host ☺
			Home ☺ - Host ☺
			Home ☹ - Host ☹
Dissatisfied	D		Home ☺ - Host ☹
Very dissatisfied	E	Low	Home ☺ - Host ☹

Where ☹ implies a poorly-equipped and serviced university and ☺ implies a well-equipped and serviced university, with ☺ implying an intermediate state.

Studying the information we gathered from our student respondents, and key informant staff at our universities, we confirmed that these categories of student *do* indeed exist in the visiting student population, and that universities *can and do* apply 'digital cultural shock absorbers' to minimise impact of the transition from one university to another. This is analogous to the special services targeted on ethnic, religious and gender minorities already being targeted for support.

One area that has a major impact on many visiting students is that of language, and targeting key information to visiting students in more than just the local language provides a shock absorber as we note below.

In addition to differences in technical services there are also some differences in how well universities use technology, particularly for academic business processes such as registration and communication. Not all European universities have developed their use of mainstream ICT applications and systems to the same extent, easily evidenced by variations in the extent and quality of websites for external information and the offer of email as a routine means for addressing queries. We explored the provision of these digital services and the effectiveness of their use by host universities with their visiting students through our student surveys and interviews, and our university survey. Some major themes emerged clearly.

❖

Student Experiences Of Host University Digital Services

From the information offered by our student survey respondents it appears that very many European universities offer quite extensive digital services to both their own and visiting

students. Table 8 shows a sample of the services and resources that were reported as being offered online to students, suggesting a good penetration of ICT into the major academic work of the several hundred universities that our respondents visited.

Table 8: Extent of use of e-learning at host universities

Courses taken offered online materials of some sort	68%
These materials were…	
…course information	92%
…learning materials (e.g. lecture notes)	77%
…tests or exams	30%
…online collaboration or discussion	36%
…grades / marks online	50%

Social sciences and science and engineering courses were more likely to offer online materials

"VLE used for announcements and information"

(72%) than were those in arts and clinical subjects (58%).

The **library services** also appeared to be well developed in digital provision (Table 9). Although many students made use of these services, a surprising percentage were unsure if they existed (e.g. 43% for e-journals), perhaps suggesting that those who came from universities with limited ICT provision lacked some essential knowledge and skills for learning in the 21st century. The presence of these 'unsure' responses means that the overall provision figures are underestimates of actual provision, and the percentage of those who were sure they did not exist were less than 10%. There was relatively small variation between respondents who were unsure about the existence of various digital library services with respect to the subjects they were studying.

Table 9: Availability of digital library services at host universities

Digital resource	% respondents
Online library catalogue	74%+
e-journals	48%+
Online bibliographic databases	49%+
Online user record / borrowing record	43%+

We asked students to comment on the **general IT services**. Lack of PCs and opening hours of computer rooms posed no problem for around half the visiting students, with the rest viewing this limitation as a minor problem (~30%) and a major problem (~20%). In this they may have been little different to local students except that they might have less access to other facilities (e.g. home, friends) or less knowledge of them, at least initially. Around 90% were able to access their normal email (this was not always a university email as many students use Gmail, Hotmail etc due to their easy web interface and wide availability). Six percent of students had major login/password problems (18% had minor problems) and almost 30% found language a problem of some degree in the ICT area. Of the students who took laptops with them, ~20% were unable to connect it to the internet for various reasons.

> "There was no WebCT and no portal and everything was done by noticeboard which changed every 5 minutes !"

> "It was very disorganised, no passwords and logins, so for the first four months I used a friend's login."

Visiting students were generally less well-served in terms of **help and support** than they were in terms of the digital services on offer, with over 40% of them stating that they did not get help with computing support from their host university. Most help was face-to-face with email and webpages next most common. Although some students reported good and friendly service, some had the opposite experience. Induction into the ICT systems on offer was not offered in many universities, making complex systems unnecessarily difficult to master. Some students failed to solve problems for the duration of their visits.

> "Plenty of support staff, walking around looking for questions, very helpful"

Language difficulties were a recurring theme in student feedback. Partly this will be due to lack of preparation on their part, expecting to be able to pick up competence in a new language in weeks or with a short course. However, in technical areas such as IT, or in urgent notices about changes to timetables etc, use of more than one language would be of great help to visitors, especially if the local language is not commonly used or easily acquired.

It was also clear to us that the variations in practice within individual universities, for example between Faculties or Departments, made it much harder for newly-arrived students to find the services they need. Different systems, variations in opening hours, rules of access etc complicated visiting students' lives. Some degree of standardisation would help all students.

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University Provision Of ICT-Based Services

The majority of universities reported that they do not make broad distinctions between visiting students and their own students in terms of the services they offer, although a small number had some restrictions. One limitation mentioned was that of the language of information about services, which may have more implications in technical areas for the non-technical than in academic areas. Few respondents commented on the degree of diversity of practice in what are often substantially devolved organisations, but those who did implied or stated that Faculties or Departments could set their own rules and standards. This diversity leads to

> "The PC rooms were closed all weekend so I had to use an internet café."

some confusion for visiting students, and sense of inequity when they are used to consistent treatment in their own university.

Some of the European university heterogeneity in range and quality of ICT-based services could be detected in the responses to the university survey, partly through additional written comments but also in the extent to which ICT had not yet permeated key areas of academic business such enrolment / matriculation and management of ECTS credits (Table 10).

Table 10: Universities with limited provision of online access for students to key academic business services

Service	
No access to online matriculation or enrolment	56%
Students have to request ECTS credits gained and cannot see these online	55%
Students cannot view the ECTS credits associated with courses they may wish to take	24%

The contrast of these data with those on general ICT, library and e-learning provision suggest a disparity of progress between the academic educational and the academic business areas of many universities. This will come as no surprise to many staff in European universities, and almost certainly contrasts starkly with practice in North America.

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Continuing Access To Digital Services Of The Home University

The use of digital communications and resources has changed the nature of the expectations of young adult students of the facilities open to them to support their social and academic lives. Until the advent of widespread email and websites, students on a study visit would not expect much communication with their home university whilst away other than perhaps an occasional letter and perhaps fax or telephone contact for urgent business. All direct support had to be provided by the host university. Classes were solely face-to-face and libraries were solely physical entities and so the option to be in simultaneous touch with two university settings was not available. The advent of digital technologies has changed those expectations fundamentally, and now students can be (potentially) in easy contact with staff and students in both their home and host universities. As we noted above, both home and host universities now need to be aware of the information and support needed to enable students to establish their digital environment prior to departure for a study visit. There is the option of ensuring that this environment is provided and supported by the home university whilst their own students are away. Thus support whilst away has a home university component as well as a host university component – the student is both 'theirs and ours'. To what extent do universities consider that they provide some or all of this support and to what extent do students perceive its existence and how do they rate its quality?

> "Stayed in touch with tutors about dissertation – kept in contact by email"

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University Provision For Students Whilst Away

The majority of universities that responded to our survey claimed that they had good help and information available for their own students whilst away on visits, in IT/computing, in libraries and in e-learning (see Table 11). There is consistency in the different services in this, perhaps reflecting the internal consistency but also perhaps a consequence of many single respondents answering for their whole university. However, although many universities do claim good provision, an important fraction have lesser or little provision,

"Things were not joined up at home – the Student Record Office hadn't realised I was away!!"

and the additional written comments given by some respondents suggest that there are limitations and caveats in practice to what appear to be overall excellent off-campus support. The library area, identified as an important one by student respondents, appears to be the most problematic in terms of making a full range of digital services available to students who are away.

Table 11: Continued access to home university digital services

Extent of access to YOUR University's services for YOUR own students while away on an exchange with / visit to another university			
Range of services and support at a distance offered is…	Full range	Limited range	Little or none
	%	%	%
Digital library materials, including e-journals and databases	37	14	4
Library help available electronically for use at a distance: phone, email, chat, web forms etc	42	11	2
Access to centralised IT services: email, internet, chat, filestores, Virtual Private Networks (VPN) and other software for academic work etc	40	11	2
IT help and support via email, chat, web forms etc	39	8	6
E-learning services: virtual learning environment, online tests, podcasts, learning materials, multimedia etc	43	7	2
Easy and centralised access to information about digital services on International Office website	21	13	16
Easy access to ECTS credits for individual students	32	18	1

The universities that responded to the survey generally reported less systematic and less consistent support for their own students whilst away than they did for incoming visiting students, probably because it is easier to do this and also because there is a 'lack of visibility' of students who are not present over students who are.   Some support department staff interviewed expressed surprise about the question and indicated that this was not a topic they

had thought much about. Where universities have been developing distance education courses and support therefore they are aware of the need to reach services out to students who never attend the university. They may provide support materials online for these students, but may still not recognise that their own students studying away from home university may well have comparable needs. This will be particularly true where special distance education units or teams are created.

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Student Experiences Of Home University Provision Whilst Away

Access to the home university digital services whilst away was generally reported to be good by student respondents to our survey (Table 12) although a substantial proportion either did not know whether they were, or did not try to use some of them, perhaps partly reflecting the generally good ICT provision by their host universities.

Table 12: Student respondents able to access digital services and materials at home university whilst at host university

Digital services and materials at home university still accessible whilst at host university:				
Online materials, databases	Email account	filespace	Online course materials	Student record
68%	74%	25%	52%	50%

Written comments by these respondents raised a variety of issues around the area of continued access but some common themes emerged. A good proportion of students (approx. 80% of those providing comments) were able to access most or all of the digital services and resources of their home university.

"Can see back into my own university library"

The most notable examples cited were the library and e-learning systems. However, a proportion of the comments showed that some universities did not yet provide all or even any of the services we asked about, particularly learning materials and student record systems online. Some students appeared to be offered very little by way of digital materials by their home university, demonstrating the variation across Europe in the extent to which universities have introduced ICT.

Feedback from students during interviews indicated that this interpretation is correct, with some needing or wishing to use their well-understood systems at their home university due to lack of comparable services at their host university, others not feeling a need for a look-back to home due

> "Cannot access [home university] portal from the PCs in the university here, I keep getting 'session expired' messages, although it worked OK yesterday from the internet café."

either to equally good services at their host university or, more worryingly, due to lack of good or even adequate digital services at their home university.

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Future Developments

The student experience whilst away from the home university is one of partial or complete dislocation from the services and support that they are accustomed to. One such dislocation is that of change of digital identity, the means by which students authenticate to restricted services. An administrative overhead for all universities is the issue and termination of logins and passwords, and as our studies with European students have shown, this process can be slow (even very slow) given the importance of access to digital services in modern higher education. Another dislocation is the need to change from one e-learning system to another, even though these are designed (at least ostensibly) to offer the same range of tools and interfaces to content. If the student maintains access to the home and host universities e-learning systems concurrently, they have to work with two systems and two digital identities.

A single digital identity for students?

Much interest is being shown within higher education in ways to simplify the continued access to legitimate academic digital resources whilst the user (staff or student) is mobile. Adoption by many universities of a single or reduced sign-on is easing the common problem of multiple logins and passwords ('digital identities') within a single institution but problems still remain for the mobile learner or worker moving to another location. Issuing identities is time-consuming and

> "There were two different logins and passwords which was confusing."

is often much slower than the student or staff member would like given the importance to them of access to digital libraries and e-learning systems. A student who cannot access digital materials cannot study effectively.

The Shibboleth system, devised in the US (http://shibboleth.internet2.edu/shib-intro.html), is one mechanism that offers promise to those wishing to move to an automated digital identity sharing method, and was evaluated as part of our work. Firstly, not all universities in our partnership were able to evaluate the method for technical reasons. This indicates the need for further strengthening of the ICT infrastructure within universities. A few partners had experimented with this technology (Bristol, Leuven & Edinburgh) and some real service uses were in operation in Belgium, Finland, Switzerland and the UK.

The system is based upon a trust relationship between universities in a partnership ('federation') which agree to share very limited information about their staff or students. In such a federation the burden of identity management is moved away from the individual services and distributed across many providers – a much more scalable approach. When a student travels to another federation member host university and tries to login with the digital identity from their home university the host university enquires, electronically and automatically, of the home university whether this person is a legitimate student and if an affirmative response is received the student is given access to the host university systems using their home university login and password. Each request is rapidly checked so that when the student leaves the home university (e.g. graduates) the permissions to access are removed from all federation locations. The travel can be physical but can also be digital, logging to another university's services whilst physically anywhere in the world.

There are setup costs for each partner university, but once a service is 'Shibbolized' and staff and student records have been established, no more work to authenticate mobile users is needed. If major digital services are accessed via a portal or equivalent single gateway, shibbolizing this controls access to all mobile users and problems of access to individual services is removed. This is not to underestimate the efforts that are required, firstly to maintain a federation and secondly within each member university to assign permissions to groups or individuals. The more this can be done through group permissions the lower the cost per individual using the services.

A comparable service is also being tested for wireless access for mobile users ('roaming') so that the home university digital identity can be used (http://www.eduroam.org/). In tests with students and ourselves we found that the system is still very limited (not all wireless points in universities that are members have been included) but the potential for enabling mobile students with laptops to stay on the network is high.

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THE PERIOD AFTER THE VISIT

If their visit was for one academic year or was in the second semester, a student's return to the home university may not be until several months have elapsed since they left their host university. At this point they will probably need to be able to provide evidence of the success of their visit to have their credits registered towards their degree programme. This traditionally was done by a handcrafted solution using a paper transcript supplied by the host university.

With the emergence of electronic student records and hence digital transcripts the option is

> "Can only now see open catalogue in library, lost access to password so cannot get at journals, wish I had used it more whilst there."

created of either allowing students to see the data online at a distance or making a direct electronic 'transfer' of credits to the home university. The latter is a feature that individual universities may have established between them but is not common, even within most European countries, and remains a desirable future development. The former, allowing students to continue to access their records online and hence demonstrate to their home university that they did indeed succeed in specific courses is more realistic and so in our survey we asked universities about the availability of this option. Table 13 shows their responses.

Table 13: availability of ECTS credit statements online after visit

When visiting students return to their home university, they will be able to **see online their ECTS credits from courses taken at our university**	When visiting students return to their home university, they will be able to **request from us information about the ECTS credits from courses taken at our university**	**No information is given to visiting students about ECTS** credits for courses taken at our university during an exchange or visit
18	30	1

It is clear that electronic access to credits is still quite limited and that one-off requests are needed. This must create a significant amount of work in each university to supply this information, given the number of exchange visits that take place each year. Interestingly, this contrasts with the situation for their own students whilst away where access to this information online is more common (Table 14).

Table 14: access to ECTS credit statements whilst away

While at another university, **our** students **will be able to see** (and hence show to staff there) the ECTS credits for courses already taken at **our** university	While at another university, **our** students **will be able to request information** (and hence show it to staff there) about the ECTS credits for courses already taken at **our** university	No information is given to **our** students about ECTS credits for courses already taken at **our** university
32	18	1

The problem is compounded by the fact that students reported that they lose their access to the digital resources of the host university some time after they leave (between weeks and months). It is likely that by the following academic year almost all students will have lost such permission to view as university authentication systems are generally reset in the summer vacation period.

Along with the loss of access to their online records, students will also lose access to their online academic materials and services. Traditionally this was unavoidable as physical libraries required physical presence, as did classes and peers. However, e-learning, digital libraries, digital communications have removed that limitation and students can now reasonably expect to continue to see the learning

"Because of the stage of my development a year later, I would have liked to have gone back and reviewed the online materials, especially e-journals"

materials provided or created during their visits to other universities, and indeed back across those of their whole degree programme no matter where each module was taken. Some universities routinely preserve past copies ('instances') of online courses so that students can refer to them later in their degree programmes. A modern high-quality degree programme might be argued to allow this reflective approach to learning. We did not search for examples of students using e-portfolios during their study visits, but this is undoubtedly one area where transfer of materials and access will be vital to enable the student to maintain a continuous record of their work and development. A limited but perhaps valuable alternative to maintained electronic access for prolonged periods after the visit is use of a mechanism to enable students to download an offline version of course materials from VLEs. One example of this approach is Blackboard's 'Backpack' which is software that students can use to copy materials in the Blackboard VLE to an offline form, and hence could use to take with them when they leave a host university using this VLE. At present this is not a standard feature of all VLEs. This option will not substitute for loss of library access, for which only changes in licensing of e-journals etc or widespread use of open access publishing will bring meaningful opportunities.

Finally, as universities develop stronger alumni networks as part of their drive to keep the attention of their students post-graduation so that they can offer them further educational services and community, consideration will be needed as to which students are alumni. At present, we know of no universities that consider visiting students to be alumni, but with

attention turning to ensuring that good experiences on a first visit turn into 'repeat business' in the form of higher degrees or continuous professional development courses, and the use of online alumni associations, this may be an area for further development.

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CONCLUSIONS

We have described our explorations of a range of complex issues centred upon the experiences of European students who travel to other universities in other countries to study for a short time as part of their degree programme. What general conclusions can we draw from the data we gathered, and what are the implications for these current student and university experiences for the development of large scale virtual mobility in the near future?

It is clear that most students undertaking visits have good experiences during them. They almost all report that they have learned a lot, have learned to cope under new circumstances, and have 'made it work in the end'. Clearly, at the present time students opt for this experience and are probably mostly predisposed to cope well.

It would appear that almost all universities could support their incoming and outgoing students better, even those that generally do this well. Thinking about all their needs specifically, and not just assuming that what works for their own students will work for visiting students, and that what works for their own students when at home or in residences will be suitable for them when they are studying away. Most International Relations Offices do not have a strong focus on the essential digital business and academic services of the university. Provision of these lies with other offices and units, and so information about them for visitors is assumed to lie there too. However, it is clear that these other offices do not necessarily have much, if any, focus on visiting students, and so the full range of needs of this group may be met by no-one.

Much of the needs of visiting students, before they choose a particular university to visit and later whilst preparing for their visit, could be met by better information with better presentation and structure, rather than leaving it to students to find it if they are prepared to search around long enough in a local language-only site. Where digital services are devolved to Schools and Departments, IROs should check that visiting students really are treated with equity, because it is at these levels that variety of practice is greatest. It is very important for them to engage with the library (or libraries) as this service is vital to each visiting student's studies.

One method for support which can now be done much more simply due to ICT is providing visiting students with a local student as 'email buddy' or 'electronic mentor' whilst they are in the early stages of planning their visit. This provides them with a local peer support mechanism

which may be able to fill the gaps left in the information provided by services and units in the university. Some of this is now being explored in the VM-BASE Project which has taken up ideas generated by the research reported here [18].

Some European universities still have some way to go to begin to really use ICT for academic business advantage, for example through online registration and course choice, offering excellent advance information and access to key digital resources. Login/password problems abound on a small scale everywhere and there are many local, handcrafted, solutions rather than a systematic and automated solution. Part of this resolves to making sure that all support services know about visiting students, incoming and outgoing, and agreeing identical access to services for all.

Our project work demonstrated that some of these changes were not difficult to implement, but required an awareness on the part of key services that there was a problem or a need from students. The separation of academic units and service units into 'silos' was the source of much of the lack of awareness, and some single action was sometimes enough to trigger change.

Some developments at the national and European levels are also needed. ICT infrastructure is vital to enable universities to easily offer some services and for users to be able to help themselves rather than having to be helped. Reaching a condition where there is widespread wireless or fixed network 'roaming' within European HE would mean mobile users (of all types) would suffer less problems of internet access. Local network service providers would not need to even be aware of the presence of such roaming users other than ensuring there is sufficient bandwidth and coverage, which they need to do for their own users anyway. This is a service taken for granted in cellphone services where users switch invisibly between nodes and networks.

Digital identity sharing across Europe would remove need for so much local 'handcrafting' of access and permissions. Sensible agreements are needed with licence holders as to what being a student of any university means, and establishment of rules that allow access so long as a user has legitimate rights to the resources of the university (e.g. journals, software, networks). Some standardisation in interpretation of these rules, especially in digital libraries could resolve many problems. The question 'Whose student are you?' may require a different answer in a situation where many more students move between universities for their studies.

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Implications for large-scale virtual mobility

What conclusions about large-scale virtual mobility can we draw from these data about students moving physically between different European universities, but using and requiring digital services and resources, to support their studies?

1. It is clear, as found in other studies [11], that universities vary significantly in the extent to which they have been able to integrate ICT into their mainstream academic and business processes. Unlike many large commercial organisations, universities are quite devolved, even in those that are most centrally managed, and so piecemeal developments are taking place which mean that students in one subject area may be offered a quite different set of services and supports to those in others. However, despite this internal diversity, it does appear that many universities have not yet managed to integrate ICT into their key academic businesses, such as enrolment, and that some areas, for example libraries, are relatively distinct in their ICT mechanisms from the other services. Thus moving to large-scale virtual mobility with hundreds of students taking courses from individual universities from a distance would present serious challenges to organisations still largely set up to deal with admissions and permissions face-to-face.

2. The substantial number of comments we received from returning students about multiple passwords to access key services suggests that many universities have not yet been able to achieve interoperability between their systems so that one authentication challenge can manage access to all relevant services. This is a significant problem for even the most digitally-sophisticated universities, and probably some time away for those still working to develop strong digital libraries, email, universal websites etc. Virtual mobility students will not be in a position to negotiate these individual permissions, due to both time and lack of sufficient information about where to seek information. Such students may soon present quite complicated demands on universities as they will be able to take courses online from their home university whilst physically at their host university, or simultaneously take online courses from both whilst on the opposite side of the world!

3. Despite the rather positive view of many of our university respondents about information being readily available from individual websites, our experience is that from the student perspective this is more often not the situation in reality. Web service providers perhaps have too optimistic view of the quality of information they offer than do users, and there is a clear detachment of the International Relations Offices from the key academic digital services of the university, each believing that the other makes good provision. Online information is essential to the VM learner, for they have no other way to make decisions about what courses are on offer and from where.

4. Fourthly, it is clear that most young adult learners now routinely use the digital tools of virtual mobility, and expect to be able to continue to get access to whatever they need from wherever they are. They are quite tolerant of failures, as long as they can find 'workarounds', but most of these require some peer support or access to local knowledge that may be harder to provide to those fully at a distance from the university. Indeed, without the ability to get through into the university digital systems there is no peer community with which to converse!

5. If students taking courses from more than one university at the same time are to be able to manage their academic lives more easily, enabling a single digital identity will be essential. At present, students cope with these multiple identities, but if virtual mobility is to become a routine activity and with students less adaptable than present visiting students, password management needs to be rationalised. This can only be done at a high level within the Higher Education sector, and needs to be addressed as a priority. It is a complex area technically, with issues of licensing, security, data protection and funding to be resolved. Again, the fundamental question of 'Whose student are you?' will need resolution, and unlike the present where each student is associated with a single university, the answer may need to be more complex than 'S/he is with the University of X'.

Several other projects and groups have worked in this area, exploring the opportunities and challenges facing universities, their staff and their students, as they begin to adopt virtual mobility approaches to education [17, 18, 19, 20, 21, 22]. Our results add to the body of knowledge supporting change, grounded in the reality of large-scale physical mobility in the present digital world of the European student and European universities.

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CHECKLISTS FOR STAKEHOLDERS IN STUDENT MOBILITY

A) For students intending to undertake a visit

Students need to be aware of the types of digital activities they may undertake whilst away from their home university so that they can get support before they leave if needed. Much of this needs to be self-help.

1. Assess the range and types of digital services offered by your host university, beginning your search at the International Relations Office, but also visiting the Library, IT or Computing Service, e-Learning service etc websites. If the material is all in a local language use a glossary of IT terms from the internet (e.g. http://home.online.no/~gjon/multil.htm; http://lipas.uwasa.fi/termino/collect/).

2. Is there a buddy or mentoring system through instant messaging, email or other digital communications channel? If not, can you find someone there to talk with to help you answer queries about the university?

3. Assess the extent to which use of ICT is common in the learning, teaching and administration processes of your host university and compare that to what you are accustomed to using (it may be much higher or much lower).

4. Answer these questions if possible:
   - How many computers are available?
   - What locations and what opening hours? Any restrictions on use?
   - Is there a wireless or fixed network, with locations where you will be?
   - Are you provided with email, internet access, filespace, other IT services and software you are accustomed to using?
   - What sorts of IT support will be available?
   - Does the library have an online catalogue?
   - Does the library provide access to the electronic journals and databases you are accustomed to using?
   - Can you get login and password before you arrive to allow you to check what is going to be available?

5. Try to assess the range and types of digital services that you will still be allowed to access from your home university, by visiting the Library, IT or Computing Service, e-Learning service websites. Try to answer these questions:
   - Will you need to get special access to be able to use some or all of the digital materials you might need whilst away? Check about availability of virtual private networks or other ways to appear to still be electronically on your home campus.
   - Will you still have access to the electronic journals, e-books, databases and search tools you are accustomed to using?

6. If you are taking a laptop, do you know how to get online through wireless networks? Have you tested that this works at a commercial or free wireless hotspot? Can you access home university materials in this way? Do you know how to maintain your laptop for the period you are away (updates, anti-virus, backup, security etc)?

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B) For the European Commission

The EC plays a vital role in working with national and regional governments to develop the ICT infrastructure for Higher Education across Europe. Much excellent work has already been done and more is underway. However, development is patchy and some countries have levels of service above those of others, and so students moving between countries find very different ranges of services and ease of access to them. A focus on the experiences of mobile students provides a lens through which to see what developments are still needed to reach equitable high quality throughout European HE, and resolution of the difficulties of this group of students would make the study lives of the far greater number who do not travel during their degree programmes much easier too.

1. How robust and extensive is the European Higher Education ICT infrastructure? In particular…
   - is there availability of wireless roaming for *bona fide* staff and students?
   - can all universities participate in a common digital identity sharing mechanism?

2. How robust and extensive is the European Higher Education Library infrastructure? In particular…
   - are barriers to access by bona fide students and staff (such as licensing, differential rights for home vs visiting students) being progressively removed or lowered?
   - is there progressive movement towards digital repositories and collections rather than physical collections where appropriate?
   - are libraries fully participating in digital identity sharing mechanisms rather than maintaining their own authentication processes?

3. Is there sufficient support for the development of greater modernisation of universities through their more effective use of ICT for core academic business processes?

4. Are staff in the Erasmus and other mobility agencies and offices fully aware of the implications of much greater reliance on digital technologies on their work?

5. Can the Erasmus Mobility Programme operate a well-regarded channel to ensure better dissemination of good practice in this area of digital technology?

6. Are there robust mechanisms in place to help spread good practice throughout the European Higher Education sector in support of mobile students?

7. Is there sufficient impetus towards establishing a European Higher Education online course database that intending physical and virtual mobility students can use to plan academic programmes? Can the Erasmus Mundus Programme be used to leverage the development of this much-needed service?

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C) For University Senior Managers in Universities

The senior staff of each university must take an interest in the area of visiting and exchange students for sustained and coordinated work to take place within Faculties, Schools and Support Units. Their awareness of the issues for mobile students (incoming, outgoing and those who study away from the campus) will set the agenda for developments in use of technology to support academic business practice. This group will set the strategic agenda and vision for the rest of the university to address.

1. Is ICT embedded in all business units, and is it embedded in such a way as to ensure equity for all staff and students, especially those that are mobile in their studies?

2. Do you offer online services for visiting students and for your own whilst away that address their needs in a timely and equitable manner?

3. Do you know that in practice visiting students are really able to access all digital services of the university similarly to home students?

4. To what extent is variation in practice between different parts of the university leading to variations in quality of services for incoming and outgoing students?

5. If there is variation, is this being addressed to equalise quality?

6. Is there an online course database that all students can see before arrival at the university, with ECTS credits, timetables, teaching and learning methods, course contents, assessments?

7. Have you considered ways to integrate these data into a central European course database?

8. Do you empower your International Relations Office to lead this work, perhaps with oversight from a member of the senior management team?

9. Do you have quality control and assurance mechanisms in place to ensure sustainable developments in support for students undertaking visits, gathering feedback from visitors and your own students, including good practice elsewhere?

10. Have you mechanisms to ensure dissemination of good practice and awareness raising for all staff in the area of student mobility?

11. Is your university addressing the need to develop virtual mobility (VM) courses?

    - How will these fit with current university policies and practices, for example credit transfer, joint examinations, user rights at more than one university simultaneously?

    - What changes will be needed to support staff and students in this form of education?

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D) For International Relations Offices in Universities

IROs are key players in the processes of supporting visiting students both incoming and outgoing. They are in a position to be aware of the student experience, to engage with staff in all units of the university to ensure awareness of issues and to influence developments to improve or enhance experiences. Their role must be pro-active, leading by example in their own provision and by encouragement, guidance and good advice for others.

1. Do you have an easily-found website for intending or potential visit/exchange students?

2. Does your website really address the needs of incoming and outgoing students directly and separately?

3. Have you assessed the usefulness of the materials on your website with incoming and outgoing students who have needed to use it in practice, and acted upon their comments?

4. Is your website sufficiently language accessible?

5. Do you directly address questions about technology matters for incoming and outgoing students or do you leave this to other departments and units?

   - If the latter, do their sites actually cater for the needs of these types of students?

   - How will you address these issues effectively?

6. Do you systematically gather and analyse information from your own returning students after visits and address support issues from your own university, and take up problems with host universities?

7. Do you have feedback mechanisms for students leaving you after a visit, preferably so that they can remain anonymous?

8. Might you offer a 'travellers' tales' website for returning students to post information about their visits and solutions they found to challenges?

9. Do you have regular contacts with the Schools, Faculties and Departments that host incoming students about their technology provision and support where these services are local, so as to ensure in so far as is possible equitable treatment?

10. Do you have regular channels for communicating with your local student association(s) about visiting students?

11. Do you have channels to influence the enrolment and course choice mechanisms within the university, in particular migration to online methods and how this will impact on intending visiting students?

12. Have you set up mechanisms to enable student peer support in advance of and during visits, for example through an email 'buddy' or 'mentoring' system?

13. How ready are you to engage with the virtual mobility (VM) developments in European Higher Education?

    - do you have staff with knowledge of VM developments taking place inside your university and more widely?

    - have you got plans to work alongside academic colleagues who will produce the VM courses?

    - are you supporting the development of policies and guidelines for supporting VM students?

E) For Student Record Offices (SRO) in Universities

The admission to the university and enrolment in courses in most European universities is the responsibility of a Student Record Office or equivalent. Even where authority to recruit and enrol is devolved, some central authority usually takes a university-wide responsibility and oversight. If universities exist where these powers are completely devolved, the senior management of the university will need to ensure quality across the whole institution. As universities move to online systems to manage this area of academic business, attention needs to be paid to the experience of the incoming and outgoing student to ensure equity of treatment, to consider the implications of widespread use of technology for learning and teaching for joint enrolment, and to make data transfer as simple as possible between the universities of the mobile students.

1. Are you able to matriculate/ enrol visiting students online before they attend the university physically?

2. Are visiting students able to gain access to the digital services of the university before arrival so that they can make themselves aware of services and facilities, including those requiring authentication?

3. Can your own students access their records online (including ECTS) whilst away from the university to as to be able to show these to another university's staff?

4. Can visiting students access their records online (including ECTS) after they have left so as to be able to confirm with their own university the work that they completed?

5. Do you have mechanisms in place to synchronise your services with those of other academic and support units in the university for visiting students, especially the International Relations Office?

6. How ready are you to engage with the virtual mobility (VM) developments in European Higher Education?

   - Do you have staff with knowledge of VM developments taking place inside your university and more widely?

   - Have you got plans to work alongside academic colleagues who will produce the VM courses?

   - Are you supporting the development of policies and guidelines for supporting VM students?

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F) For Libraries, e-learning and IT services in Universities

These are the main academic support units that offer many of their services via digital technologies, although much of their work is still through personal mediation. As support services often do not become involved in the arrangements and negotiations about visiting students, or have any knowledge of the extent or timing of visits by home students to other universities, their services may not be tailored or even suitable for the needs of these types of students. Proactive engagement by these units is vital to ensuring their awareness of needs and synchronisation of their activities with those of other academic and support partners.

1. Do you operate a single- or reduced sign on mechanism to digital services within the university?

2. Are you working to minimise diverse practice across the university with respect to digital access?

3. Are you able to give access to students before arrival to enable them to assess what is and is not available?

4. Is as much information and resources made available digitally as possible, and is this increasing with time?

5. Are you gathering and acting on systematic feedback from incoming and outgoing students about digital services they need and their experiences of using what exists?

6. Are you regularly reviewing which services you make available to your own students whilst studying away, in the light of their actual needs?

7. Do your websites and support/advice/help services address language problems?

8. Do you provide adequate induction for those who arrive into the 'middle' of degree programmes and so could miss out on newly-arriving home student provision?

9. Do your services really recognise the time constraints and lack of local peer support of visiting students?

10. Do you provide clear routes to online information for visiting students?

11. Do you actively prepare your own students for their time of study away?

12. Do you actively support incoming students to adapt to your range and types of services, e.g. with targeted training, well-documented rules and regulations?

13. Do you cooperate effectively with International Relations Office and Student Record Office to get joined-up services?

14. Do you cooperate effectively with Faculties and Schools to get joined-up services?

15. How ready are you to engage with the virtual mobility (VM) developments in European Higher Education?

    - Do you have staff with knowledge of VM developments taking place inside your university and more widely?

    - Have you got plans to work alongside academic colleagues who will produce the VM courses?

    - Are you supporting the development of policies and guidelines for supporting VM students?

G) For Faculties, Schools & Departments in Universities

The academic units are the true hosts of the visiting student, and the home of those who are away. Support from these units is vital to a good experience. Knowledge about which students are incoming and outgoing may be held only in academic units, and so they have responsibility to ensure that services in the university more generally are of high quality.

1. Do you have an easily-found website for intending or potential visit/exchange students?

2. Does your website really address the academic needs of incoming students directly?

3. Have you assessed the usefulness of the materials on your website with incoming and outgoing students who have needed to use it in practice, and acted upon their comments?

4. Do you update the information about courses, timetables, locations etc regularly and ensure these are available for incoming students before and after arrival?

5. Is your website sufficiently language accessible?

6. Do you directly address questions about technology matters for incoming and outgoing students where these are your responsibility (e.g. digital learning materials, information and updates)?

7. Do you systematically gather and analyse information from your own returning students after visits and address support issues from your own university, and take up problems with host universities?

8. Might you offer a 'travellers' tales' website for your returning students to post information about their visits and solutions they found to challenges?

9. Do you have regular contacts with the central and local support services about their technology provision and support to ensure that they are aware of incoming and outgoing students' needs?

10. Have you set up mechanisms to enable student peer support in advance of and during visits, for example through an email 'buddy' or 'mentoring' system?

11. Do the staff in the Faculty, School or Department have enough awareness of the needs of incoming and outgoing students?

12. How ready are you to engage with the virtual mobility (VM) developments in European Higher Education?

    -   Do you have staff with knowledge of VM developments taking place inside your university and more widely?

    -   Have you got plans to produce VM courses?

    -   Are you influencing the development of policies and guidelines for supporting VM students?

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H) For Erasmus coordinators in Universities

Within each university that operates in the Erasmus scheme there is at least one coordinator who plays a key role in enabling visits by incoming and outgoing students. These individuals (potentially if not actually) hold excellent knowledge of the student experience, and can play a vital role in ensuring that support services and academic departments are working together to maintain the highest possible quality of support and advice. Erasmus coordinators may be within an active national network that can enable sharing of good practice about developing digital services for visiting students. Any work that this group does to improve quality for Erasmus students should also impact positively on other visiting students, in schemes and free-movers. As virtual Erasmus programmes take shape, coordinators will need to make themselves aware of the special implications for their own university in this virtual mobility area.

1. Do you have a good awareness of the real needs of your incoming and outgoing students, through gathering information about their actual experiences?

2. Do you have channels within your university to feed back information to support services and academic Faculties, Departments about the needs of incoming and outgoing students?

3. Can you influence your International Relations Office and any associated committees to become more aware of and act on the needs of these students?

4. Does your national Erasmus Office disseminate useful information about the digital infrastructure developments for mobile students, and can you influence this awareness-raising?

5. Do you work with your local student association to address issues for mobile students?

6. Do you have the technical skills or support to enable you to help mobile students with their technology-related problems?

7. Are you aware of European developments in Virtual Erasmus and virtual mobility in general, and how your university is reacting or adapting to these?

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I) For Student Associations & Representatives

At European, national, regional and local (university) level, the student associations have a responsibility to represent their constituencies within various levels of the higher education sector. They must play a central role in ensuring understanding of the needs of mobile students, particularly as the number of these rises, and as virtual mobility takes a stronger foothold in the educational offerings of universities.

1. Do you have mechanisms in place to ensure good understanding of the actual needs of mobile students in each country?

2. Are you ensuring that these students have an adequate voice in your representations?

3. Are you working with the various agencies within European Higher Education to ensure that there is sufficient progress on:

   - development of ICT infrastructure for students?

   - adoption of ICT-based digital services such as online enrolment, single sign-on, accommodation reservations via the web?

   - reduction of barriers to access to digital academic materials, especially in libraries, by *bona fide* students?

   - peer support via digital communications to support students in preparation for visits?

   - better support for accessibility of language, through course, multilingual websites etc?

4. How ready are you to engage with the virtual mobility (VM) developments in European Higher Education?

   - Do you have staff with knowledge of VM developments taking place inside your university and more widely?

   - Are you influencing the development of policies and guidelines in universities for supporting VM students?

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REFERENCE REPORTS

The report has 11 reference reports associated with it that provide more extensive coverage of various aspects of the research work undertaken during the VICTORIOUS Project. Reference Report 1 – VICTORIOUS Project Methodology - is available at the end of this report. The ten other Reference Reports (listed below) are available only online, and can be found at:

www.victorious-project.org

Reference Report 2 – Desk Research Reports

Reference Report 3 – University Case Studies

Reference Report 4 – Student Interviews

Reference Report 5 – The Student Questionnaire

Reference Report 6 – Six Pilot Reports

Reference Report 7 – The University Survey

Reference Report 8 – The Edinburgh Seminar

Reference Report 9 – The Tartu Seminar

Reference Report 10 – The Berlin Seminar

Reference Report 11 – Extended Bibliography

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REFERENCE REPORT 1: THE VICTORIOUS PROJECT METHODOLOGY

The VICTORIOUS Project's objectives were two fold: to explore the current issues around the subject of student mobility in a digital higher education context, seeking to give recommendations to stakeholders, and to examine what insight this knowledge could bring to the large-scale development of student virtual mobility. It had at its core a series of feasibility pilots or tests to be carried out within the partner universities. However, to devise these tests required the Project partnership to understand much better the issues for both students and universities, and some of this exploration was foreseen as being addressed by an early desk research phase. A late-stage future-proofing activity was planned to make sure that the Project findings and recommendations took into account likely near-future changes in the context of physical and virtual mobility.

In practice, the approach had to deviate from this plan to some degree, and a methodology was devised that had concurrent and sequential elements, and data were gathered from a wider range of sources than had been planned (i.e. triangulation) to ensure a more robust understanding to inform our pilot activities.

The Desk Research and Case Studies both took place initially in the early phase of the Project, with later updating and minor revision. The University Survey had been planned for early phase also, but data were required about the reality of the student experience to inform the design of the university survey, and so a Student Survey was carried out mid-project, with the University Survey coming after it, in the last quarter (6 months). To construct the Student Survey we needed in-depth information about the student experience and the issues that physical mobility raised for their access to and use of ICT systems and services, and so we conducted a series of student interviews during the first half of the project. The University Survey was also supported by selected interviews with staff involved in student exchanges and mobility.

The pilots had only been defined in outline in the project definition, and this was an activity that needed significant trial and error to select the final pilots, ensuring that they were feasible. The different partner universities did not have the same options open to them in terms of being able to carry out pilots. Some could/would effect change in central services and systems within the timescale of the Project and some could/would not.

Finally, as a way to gather comment and advice, we organised three separate seminars on aspects of student mobility. One was in Edinburgh, early in the Project (at 3 months), the second was close to the middle of the second year (i.e. at 18 months) where preliminary results from student survey and pilots were presented and discussed, and the third was close the end of the Project (at 23 months) at Online EDUCA, Berlin 2006, and was organised jointly with another mobility project (Being Mobile) to gain synergy.

Desk research

In the early stage of our work we explored three areas that we had identified as being important to student mobility in a digital higher education setting, namely interoperability, digital repositories and libraries and quality of e-learning provision. These three reports gave us an insight in the state of the art in these areas that would enable us later to assess developments we found in European universities.

Case studies

The case studies were produced early in the Project at all of the nine partner universities (Bristol, Edinburgh, Granada, Groningen, Leuven, Pavia, Siena, Tartu, Turku) following a common template to ensure comparability and consistency. They were revised and updated towards the end of the Project to enable each university to take into account the information about the issues raised by our investigation into digital aspects of student mobility, including the university and student surveys.

Each case study addressed the following aspects of university activity in digital services for visiting students:

1. Short outline of the university;

2. Patterns of exchange students incoming and outgoing over the past one or two years (degree levels, age, gender, subjects studied, exchange/visit programmes);

3. How the university organizes its services, viewed from a student perspective, i.e. what a student from another university visiting the university, or one of the home students going to another university, would experience in services from the home university. The areas addressed were: eLearning (online registration for exams, courses; ability to see 'career' grades, courses; etc); database, resources, libraries (PCs / Internet availability of computers, loan of laptops, wireless, cheap network in student residences, etc); interoperability / single sign-on – examples of where joint VLEs or Library services can work between two universities; quality for learning and teaching especially for eLearning (criteria and processes for quality assurance –internal and external – examples would be gathering student views of experiences, representation on student committees, etc); compulsory or elective pedagogical training for teaching staff & tutors, and evaluation of their competence;

4. The university policy / strategy / actions to support incoming and outgoing exchange students especially vis-à-vis ICT or digital information resources (induction, multilingualism, etc) and gathering views of quality of educational experiences, possibility for visiting students to participate in quality assurance mechanisms, existence of course databases so that students

can see courses, descriptions and credit rating before arrival, ECTS, e-transcript, active steps for increasing teaching and support staff skills in English or other non-local languages.

Student interviews

This method was chosen as the first approach to gathering data about student experiences on visits because we had attempted to create a university survey early in the project and had found it extremely difficult due to a substantial lack of knowledge on our part about the issues from the learner perspective. Thus the open-endedness of interviews suited this acquisition of understanding about the range of student experiences during an exchange visit. The richness of interview data made it much harder to analyse than survey data but major themes could be identified relatively easily, and it was possible to probe more complex issues. All student data was anonymised before use or permission gained before use.

Student survey

Many of the issues we chose to address were obtained from the student interviews, others from our own experiences.   We carried out the survey online, reaching students by email and advertisement using contacts obtained from International Relations Offices' own email contact lists for exchange students, the European Student Association (ESIB) and our own university Student Associations with the request to circulate the survey to their own members, and via university networks (Coimbra, EUA). We targeted those European students who had been on an exchange visit within Europe in the past 12 months or were still on such a visit. We had a reward system of iPods and Amazon e-vouchers. The survey was open from February to April 2007. The areas addressed in questions were: home and host universities, duration of visit, age, gender, degree level and subjects studied; access to digital services prior to arrival at the host university, range of digital services and support during the visit, including IT, library and e-learning; continuing access to home university services whilst away; and digital services of the host university still available after the visit is over.

Data were transferred to Excel for 'cleaning' before analysis in statistics software.

A PDF version of the student survey can be found at: www.victorious-project.org

University survey

The issues to address in this survey were obtained from the analysis of the responses in the student interviews and surveys, plus the case studies of the VICTORIOUS partner universities.

The survey was targeted at the university's management and probably always needed to be answered by more than one individual as it spanned several business areas. It was likely to be redirected to relevant senior administrative staff, senior librarian, international relations officer, IT director, student records director, e-learning service director, it was designed to be sectional so that it could be completed and returned independently by each person if necessary. The inducement to complete was the promise of hardcopy of this report, and hence access to an analysis of the results of the university survey. Email was used to reach target respondents via university networks (e.g. CG, UNICA, EUA) and via national associations, Erasmus coordinators and personal contacts. The surveys were returned by email in all cases except one.

The sections of the university survey addressed were libraries, Registry/Student Record, International Offices, e-learning and IT. The respondents were asked to place the university on a 3 point scale of their degree of development of specific services for home students going away on exchange and visiting students attending university on exchange, with questions about services for both types of student before the visit, during the visit and after the visit. Free text areas were available for more elaborated explanations of the current situation, which many used.

A PDF version of the university survey can be found at: www.victorious-project.org

Staff interviews

Some limited interviews were conducted with staff in key roles in supporting visiting students, particularly members of International Relations Offices and Erasmus Coordinators. These interviews were designed to explore, in our own universities, the reasons for the presence or absence of services, and to understand the political dimensions of their work.

Pilots

A major part of the work of the project partnership was defining and testing some options which could immediately or in time offer enhancements to the experiences of mobile students, before, during or after visits to other universities. These pilots were in six areas:

Pilot 1: providing information for incoming students about digital services and resources;

Pilot 2: assessing and attenuating digital culture shock;

Pilot 3: exchanging and transferring e-learning materials between universities;

Pilot 4: feasibility of a European course information database;

Pilot 5: feasibility of using Shibboleth for digital identity sharing;

Pilot 6: providing advice and support to outgoing students.

Seminars

As part of the project we tested our ideas and findings in public seminars so that we could gain input from colleagues with experience and understanding in the area of student mobility. A report was produced from each seminar. One seminar took place early in the project in the University of Edinburgh, UK, a second came just as the student survey results were available and was held at the University of Tartu, Estonia. The final seminar was held jointly with another EC-funded project working in closely related areas ('Being Mobile') at the Online EDUCA 2006 conference in Berlin, Germany.

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GLOSSARY

Alumnus / alumni	Graduate of the university. Increasingly offered an association to belong to for life.
Authentication	Process of proving identity and right of access, usually in digital systems by login and password
Blog	A personal website in the form of an online journal, with new entries appearing in sequence as they are written. Especially as dealing with personal reflections or opinion.
Bologna Process	The Europe-wide process of bringing harmonisation to the very different degree structures in terms of credits per year per degree and years per degree level
Buddy system	The practice of working or travelling together with at least one other person, especially when undertaking something potentially risky or hazardous. For visiting students, usually another student already at the university to be visited.
Chat	To exchange text messages in real time through a computer network, as if having a face-to-face conversation.
Digital communications	Use of the internet, mobile phone networks etc for communications
Digital identity	An electronic method of proving identity, and hence legitimacy in transactions. Various technical solutions exist, depending on the transaction. Simplest form is the login and password.
Digital libraries	Libraries that have collections with electronic materials such as e-journals, online databases, e-books. Typically used to mean a library with a substantial proportion of this type of material.
ECTS	European Credit Transfer Scheme – a transferable and transparent credit-based system for higher education courses enabling students to move universities and have past courses recognised
EHEA	European Higher Education Area
e-learning	Teaching and learning facilitated via electronic media, now especially via the Internet
e-portfolio	An online collection of digital materials, outputs, creations of an individual, in educational settings usually accompanied by a reflective text by the owner.
Erasmus	The student and teaching staff mobility scheme in Europe organised and regulated by the European Commission.
Filespace	storage
Freemovers	Students who visit another university as part of their studies but do so independently and not as part of an organised programme such as Erasmus.
Gmail	A web-based e-mail system developed by Google for saving many e-mails. Free at point of use.
Hotmail	A web-based email system free at point of use.
ICT	information and communications technology based upon computers and networks
ICT infrastructure	In universities this means mostly the hardware of the network, wireless network, the microcomputer labs etc. It is also the national and international network and related services that the university uses to allow internet traffic to flow into and out of the university
Interoperability	the ability of software systems running under different operating systems and on different hardware to exchange information using the same file formats and protocols

IRO / International Relations Office	The university office usually tasked with responsibility for student mobility, recruitment etc
Mentor	A wise and trusted counselor or teacher – for visiting students this would be an experienced senior student at the host university
Peer support	Use of classmates and friends to provide help, advice, knowledge in how to carry out tasks, find information etc
Podcasts	Based on the name of the very popular MP3 player, the iPod, this is a mechanism to enable audio files to be accessed from the web. In some universities these are now being used to deliver audio recordings of lectures.
Portal	A website that brings into a single locus the services of an organisation. Typically for a university this would offer a single entry point for students to the sorts of services they would use, such as library, student record, e-learning, student association but might also allow 'feeds' from news organisations, TV etc
Protocols	A set of formal rules describing how to transmit data, especially across a network.
Quality Assurance	A mechanism to assure users that the quality of what they are about to use reaches suitably high standards. In higher education this implies quality of teaching, resources, assessments etc
Roaming access	Mechanisms to allow users to change location whilst still remaining connected to the phone or internet network even though the movement forces a change in service provider
Single sign-on	Need for only a single login and password to access a larger range of digital services (eg email, file space, e-learning materials, library)
Virtual mobility	Use of the internet to enable learners to take courses and participate in local communities at a remote physical university without needing to go to it directly. Often implies more than just taking courses but being able to access some of the cultural aspects.
VLE / virtual learning environment	A web browser dependant software system that enables online interaction between learner and tutor. It combines methods of online communication (such as chatroom, discussion boards and e-mail) with the ability to deliver learning materials (such as documents, articles and assessments)
VPN / virtual private network	A method of connecting to digital services of a university that makes the user appear to be on the campus and so entitled to the same digital services
Web 2.0	Use of the web to provide a means for users to create their own materials online, upload photographs, adds comments and modify the work of others. This is in contrast to Web 1.0 which was unidirectional information flow from provider to consumer.
Wiki	A wiki is a web application that allows users to add content, as on an Internet forum or discussion board, but also allows anyone to edit the content. Used for collaborative activities.
Wireless network	Connecting a computer (usually a laptop) to a network by radio frequency channels, and hence not requiring a cable or wire connection. Allows mobility within the range of the wireless network transmitter/receiver.

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