NCG61/6: Programa de Doctorado Conjunto Erasmus Mundus en "User System & Experience Design (USED)

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The information below provides guidance on the type and scope of information to be provided by applicants under each of the five EMJD award criteria. Applicants should provide full but concise information on each point. Answers to the questions in italics should form part of this information. The information provided by applicants on the five EMJD award criteria should not exceed 25 pages in total (Font 11 - Times New Roman).

B.1 Academic and Research quality (25% of the max. score)

> **B.1.1** *Describe the EMJD **objectives** (including in scientific and socio-economic terms) in relation with the **needs analysis** in the field(s) concerned. To what extent is the EMJD offer justified (notably in terms of inter/multi-disciplinary, inter-sectorial and/or newly emerging fields), and how is it linked to identified needs in a European and worldwide context?*

The Erasmus Mundus Joint Doctorate (EMJD) in "User System & Experience Design" (USED) aims at establishing a common high-quality design doctor's degree across Europe that goes far beyond the traditional design education and will yield experts in the field of user experience, intelligent system design, and, human-technology interaction. The graduates will be educated in interaction and user experience design, evaluation, and specialize in intelligent systems, services and processes. The USED proposal is submitted by six leading European universities with long-time experience and cooperation in education and industry-driven research, stimulated also by an attentive review of the European policies on higher education and economic competitiveness. In a societal-cohesion perspective, preparatory needs analysis carried on considered the overall socio-economic framework and led to the definition of a PhD program that is suited both to contribute to the advancement of knowledge, including its professional context, through original and independent research and to improve the overall quality of doctoral education and research in Europe while reinforcing the links between universities and industrial/economic sectors.

Being at the heart of Europe's knowledge triangle (education, research, innovation), universities have the potential to be crucial drivers of Europe's ambition to be the world's leading knowledge-based economy and society[1]. In order to fulfil such potential, the Commission has proposed to make the modernisation of universities one of the priority themes in the new framework for policy cooperation on education and training within the Lisbon strategy[2]. As an innovative facet of this triangle, research in interaction and user experience design and evaluation of intelligent products, systems, services and processes, is providing exciting and thought provoking results. The future design challenges can only be successfully addressed with the right mix in expertise, i.e. for challenges in user interface and interaction design: design research, social sciences, and engineering.As the focus of the work of Interaction Designers has shifted from direct control-response interfaces to the design for behaviour and activity, the nature of our work has also shifted away from the design of discrete interactions to the consideration of complete, integrated systems. These systems are comprised of many discrete pieces, with the object of design being the behaviour of the system as a whole. That system includes, necessarily and intentionally, the people engaged in those discrete interactions; and must – also necessarily – take into account the variability inherent in people.

At this scale, the impact of a change in one individual component or element of the system can have a disproportionate effect on the operation the system as a whole. To use a scientific phrase, the system is non-linear. To address the design challenge inherent in such systems our approach must also be non-linear. The complexity of the behaviour of the system in response to changes in individual pieces cannot be fully anticipated or predicted using an incremental, linear approach. Direct causality is difficult, if not impossible to trace; and the impact of a change may not become apparent until long after the trigger event. The introduction of design methods, with an inherent non-linearity in the form of multiple, concurrent streams of concept definition, evaluation and refinement, appropriately addresses the uncertainty that exists when designing such systems.[3]

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[1] COM(2009) 158 final. A new partnership for the modernisation of universities: the EU Forum for University Business Dialogue.

[2] COM(2008) 865 of 16 December 2008: An updated strategic framework for European cooperation in education and training

[3] http://interaction12.ixda.org/blog/the-progress-of-interaction-design/

However, the broader economic and social impact of user experience of intelligent products, systems, services and processes as a multidisciplinary research field is becoming more and more relevant in current society. One of the deepest transformations in social life in modern times has been the huge transfer of population from agricultural employment in the countryside to industrial employment in towns. In the advanced economies, this was followed by a further shift from manufacturing into services, and further into a fourth economic sector of information and information-related services. Today, more than 56 per cent of the population of these economies works in this sector. What happens in this sector is crucial to the future of advanced economies in terms of both employment and productivity. Interactive and, increasingly, adaptive systems can represent a break-through in the design of people inspired effective services in different application domains. User System and Experience Design plays a key role in providing appropriate access to these services. Economists argue that the improvement of face-to-face accessibility of many service activities is the critical factor to make these services acceptable and to consequently raise productivity in the future. New theories and methods coming from the developments in design of better systems and cutting-edge user experience research can be a key aspect in overcoming this factor. If this research fulfils its potential, new methods with improved performances can be found which allow designing systems able to provide more effective services in real and virtual life, the result being an economic and social transformation providing a strong impulse.

Figure 1. Distribution of EMJD USED partners throughout Europe

Corresponding to this expected development line, given a variety of factors (globalisation, application of Information and Communication Technologies, changes in work organization), "the next decade will see an increasing demand for a high-qualified and adaptable workforce and more skills-dependent jobs"[4]. "Up to 2020, in EU25 17.7 million additional jobs could be created in high-skilled non-manual occupations such as administrative, marketing, logistics and sales managers, Information Technologies systems administrators, teaching pro-

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[4] COM(2008) 868, p. 7

fessionals and technicians"[5]. Thus, there is a clear need to significantly increase the reach and appeal of design higher education; especially in those more advanced sectors representing the forum where the new leading classes of the technical process receive their more specialized and creative education. This need is already concrete and urgent as demonstrated by the support to USED EMJD action by important companies (e.g., Airbus, Nokia, Philips, Sony, Volvo) that, operating in a variety of sectors, need new USED-qualified workforce as it is testified by the endorsement letters included in Annex 6.

According to the above statements, the proposed course will provide participants with a PhD degree matching the objective to improve scientific excellence of students in the field of User System and Experience Design technologies, which is the key for the development of effective and sustainable systems, products and related services able to not only transform a variety of economy sectors, but also society. Moreover, the program aims at opening to PhDs a broad panorama on the technologies, methodologies and applications for the design, implementation and deployment of smart environments that provide useful and usable services in different application domains (e.g. health, transportation systems, security, entertainment, etc.) to the served people enhancing the social pervasiveness of innovative tools. This will be achieved through a close collaboration among top-level European university research groups in the expertise areas design, social sciences, computer science, and leading industries from a wide range of domains, from ICT technologies development, automotive and aerospace, to media and design development and consultancy.

The research field of interaction design has raised a lot of attention, interests and expectations by industry. "The human-computer interface is critical to the success of products in the market place..." [1]. ICT companies have a growing need for ICT professionals with an increasing expertise in interaction design [2] [3]. What industry is looking for, are highly skilled *interaction designers* who can contribute to commercial success based on their profound design expertise, according to Donald Norman [4].

The Joint Doctoral Program in User System and Experience Design offers PhD candidates a research and education program in the complementary triangle of the design, computer science, and social sciences areas of expertise. Each of these three areas is represented by two of the six partners, and mobility between the partners and, more importantly even, different areas of expertise will ensure a broad set of skills and intensive multi-disciplinary experience acquired by the PhD candidates. The program empowers the PhD candidate in shaping her/his educational track, especially in view of the future career. The type/amount/content of the course work and project tasks will be ad-hoc tailored on the basis of the candidate's specific background and individual profile, also considering a multi-disciplinary research and education offer.

The program has three major focuses, which will be iteratively pursued during the whole progress of the candidate's track following guidelines promoted also by the European Charter for Researchers and the Code of Good Conduct for the Recruitment of Researchers:

1. The first focus concerns the acquisition and the formalization of knowledge in specific advanced domains, and it will be achieved through lectures and seminars. Addressed topics will involve: user experience design and evaluation; interactive and adaptive systems design and engineering; persuasive technology; participatory innovation; aesthetics of interaction; design theory and research; simulation of complex systems; interaction design for children; usability analysis, design and evaluation; experimental methods; prototyping and rapid application development in interaction design; programming for interactive applications; human factors and ergonomics; tangible interaction; information theory for complex systems; science and research methodology; interaction design methodology; methods of interaction analysis; cognitive ergonomics; user psychology; cognition science; and cognitive ergonomics. English language ad hoc modules together with modules made available at partner universities in related Master courses will be used to obtain a large and updated offer to PhD students.

2. The second focus will be related to maintain in strict touch PhD students with leading research groups that have proven experiences in research activities in basic disciplines necessary for the PhD course in the six partner universities. Thanks to the proven and updated experiences of the involved teams as well as even improved by the more enlarged view that is a specific added value of the trans-national Erasmus Mundus proposal, students will be addressed on research topics that are always on the edge of the current research. Moreover, the possibility of being directly advised by two supervisors from two different universities according to a quality scheme as well as to have check points common with students and tutors of other universities is expected contribute to improve the education level of USED PhD students in Europe.

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[5] COM(2008) 868, p. 8

3. The third focus will involve actual industry/academy joint research activities on projects in cooperation with leading ICT companies and customers. Such challenges will provide PhD students the chance of realistically facing concrete design issues strictly related to market and business opportunities. This creative, highly skilled environment that we have sketched above has the ambition to constitute an extensible and replicable excellence example. The example intends to involve universities, industries and institutions to promote the European educational system, values, skills and welfare/competitiveness in comparison with other affirmed or emergent economies and countries.

Moreover, the USED consortium intends to strongly collaborate in the context of the European policies and economy, thus offering a strong availability to follow the latest indications and to actively contribute to the social dialogue. This will be achieved by cooperating with the initiatives of the Erasmus program and, more generally, the DG Education and Culture (e.g. Culture, Lifelong Learning, Youth in Action programs), DG Information Society and Media (e.g. 7th Framework Program), DG Transport and Energy, where all the universities in the consortium and supporting companies are active since years. Beyond what indicated above, we also intend to setup innovative university governance schemas (performance monitoring, productivity awards, quality evaluation procedures, international coordination committees, supervision boards) that intend to open the university to the socio-economical requirements and to further spur excellence in the European knowledge triangle. As a special measure we will invest and promote joint publication within consortium members, and transparently measure this as a key performance indicator.

References

[1] Brad Myers, Yannis Ioannidis, Jim Hollan, Isabel Cruz, Steve Bryson, Dick Bulterman, Tiziana Catarci, Wayne Citrin, Ephraim Glinert, and Jonathan Grudin (1996). Strategic directions in human-computer interaction. *ACM Computing Surveys*, 28(4):794–809.

[2] Mary Czerwinski, Laurie Dringus, Andrew Sears, and Barbara Bernal Thomas (1996). Educating HCI practitioners: evaluating what industry needs and what academia delivers. In *Conference companion on Human factors in computing systems: common ground* (CHI '96), Michael J. Tauber (Ed.). ACM, New York, NY, USA, p. 425.

[3] Anthony Faiola (2007). The Design Enterprise: Rethinking the HCI Education Paradigm. *Design Issues* 23(3), 30–45.

[4] Ben Shneiderman, Stuart Card, Donald A. Norman, Marilyn Tremaine, and M. Mitchell Waldrop (2002). CHI@20: fighting our way from marginality to power. In *CHI '02 extended abstracts on Human factors in computing systems* (CHI EA '02). ACM, New York, NY, USA, pp. 688–691.

B.1.2 *Justify the joint program's **added value and distinctiveness** compared with existing programs at national, European and international level. To what extent will the joint program contribute to the shaping of a European Doctorate model? How does it provide concrete added value to European education, research, excellence and competitiveness?*

The research on User System and Experience Design (USED) has a long track record with roots in industrial design, usability and interaction design research. A large variety of research activities and projects are carried out worldwide where scientific units both at academic and industrial level are increasingly specializing in these fields. Therefore, according to the economic and social needs highlighted above, the impact of appropriate interaction and experience design of industrial products and, consequently, in our everyday tasks is driving both to the growth of employment opportunities and to the birth of new professional figures which need to be properly trained at academic level through a post-graduate track capable of integrating knowledge, capabilities and skills coming from joint research and industry-related development activities. According to this statement, the USED aims at providing, through a comprehensive approach, heterogeneous competencies, basing of academic excellence of each partner in different but complementary sectors shaping students professional capabilities towards the design and implementation of future smart systems technologies. The main added value of the USED Joint Doctoral Program will be represented by:

- The integration of six European higher education institutions which represent excellence in interaction and experience design, human-computer interaction and human-technology interaction research activities ranging from ageing well and assistive technologies to smart industrial design and pervasive and multimedia technologies.
- The provision of knowledge and research skills that will make PhD candidates able to cope with a variety of issues spanning from information and communication technologies to an understanding of cultural, behavioural and social aspects.

- The strong cooperation with industrial partners which represent a key factor for the training of new professional minds able to a) strongly contribute to excellence in scientific research matters at European and International level, b) position themselves in job markets becoming spin-off contractors or independent advisors, c) represent a key resource for industries and enterprises that are looking for high quality technological system designers and developers, d) drive the economic and social transformation of our future society.

> **B.1.3** *Present the education, training and research program, including its **originality, innovative aspects and scientific quality** notably as regards research methodologies and approaches. How is the relevance between education / training activities and the research part articulated? What are the training activities in terms of core and transferable skills?*

The capability of evaluating and understanding user-centric perspectives of pervasive, interactive, and adaptive technologies and their user experience, as well as a deep expertise in the design of such systems and services is becoming a relevant skill which must be taken in account in the training of next generation professionals. According to this statement, a particularly innovative aspect, which derives from the strong integration and complementarities of the course, is that the PhD can be completed with an interaction design, human-computer interaction and human-technology interaction research focus, and several project oriented routes can be taken: intelligent product design, system design, service design, distributed systems, intelligent systems, adaptive systems, human centred computing, usability studies, and cognitive ergonomics. These routes can be mapped and are compliant with the topics of the 7th framework program of the European Commission.

The USED Joint Doctoral Program will be based on strong integration between academic and industrial sectors. From one hand, students will be provided of a relevant scientific and technical knowledge through the delivering of targeted and original teaching modules concerning the most advanced and innovative research activities with respect to state of the art.

The program focuses on defining, understanding and expanding the synergy of technology and learning/instructional systems theory. Such noteworthy academic excellence is ensured both from the relevant ranking of partner higher education institution (http://www.webometrics.info/about_rank.html) and from the accurate selection of the teaching staff which will be based on academic quality criteria (e.g. choice of supervisors' based on publications and patents, h-index).

On the other hand, leading companies in the creative industry, ICT sector, electronics and the automotive industry support the program and are present both in all involved partner universities countries and in other countries. They will contribute to the joint doctoral action through the provision of stages and joint activities able both to introduce students to issues strictly related to business and market environments and to test their attitude with respect to future professional careers. Moreover, the strict relationship between education institution and industries could provide to attendants a desirable way in order to be employed as system engineers and designers. More in detail, knowledge, capabilities and skills which students will be able to develop will be based on heterogeneous but inter-dependent activities as:

- Attend modules concerning their research interests and activities delivered by one of the partner universities (according to students preferences it is allowed to spend a short period in one institution in order to attend a specific course).
- Study in direct touch with senior researchers and active research groups that contribute in a measurable and proactive way to defining the "vision" and the research directions/solutions on the basis of consolidated state-of-the-art frameworks.
- Prepare research report (in the form of a conference or journal paper) describing her/his research activities from a technical/scientific point of view. This activity will train students in reporting which represent relevant aspects in both academic and industrial environments.
- Show and describe activities in oral presentations. This activity will train and improve the communication capabilities of the students.
- Spend stage periods working in a partner industry on the development of innovative solutions and technologies and/or be actively involved in tasks concerning R&D projects (e.g. FP7 projects).

The aim of these activities is to prepare students at an excellent scientific and technical level following Dublin Descriptors in terms of: (1) have demonstrated a systematic understanding of a field of study and mastery of the skills and methods of research associated with that field; (2) have demonstrated the ability to conceive, design, implement and adapt a substantial process of research with scholarly integrity; (3) have made a contribution through original research that extends the frontier of knowledge by developing a substantial body of work,

some of which merits national or international refereed publication; (4) be capable of critical analysis, evaluation and synthesis of new and complex ideas; (5) be able to communicate with their peers, the larger scholarly community and with society in general about their areas of expertise; (6) be able to promote, within academic and professional contexts, technological, social or cultural advancement in a knowledge-based society.

> **B.1.4** *To what extent does the program include **inter-sectorial and inter-organisational collaboration**? How does this collaboration provide added value for the candidate during his/her EMJD activities and for his/her future professional career ?How does it address societal and economical needs as well the issue of graduate employability?*

The Joint Doctoral Program in User System Experience Design is based on a high level of integration which will ensure to deliver joint PhD degrees between a couple of universities. We forecast that from September 2012, all participating institutions plan to deliver a joint degree during the five years of the program with respects to national and institutional regulations and legal requirements – see Annex 7).

To this aim, strong administrative/management cooperation will be a relevant part of the program implementation. The possibility of obtaining joint/double degrees is expected to improve the placement capabilities within the European market of PhD educated people. This aspect will be also important to improve the possibility that PhD awarded students will find attractive placements without having to migrate in countries outside European Union. The approval of this proposal could be a further added value to develop a fully integrated path aiming at the previously described strategic human resources Europe Union objective.

A Management Board (MB) composed by one administrative member of each partner institution (and other members – see Annex 5 for a more detailed description) will be the responsible for the management of grants, course monitoring, students' facilities, insurance schemes, course calendar, tuition fees budget and financial allocations in each partner institution. Moreover, each institution's international activities-related office, or departmental administration, will be involved in the program (as happened for the proposal preparation) as a counselling institution able to provide information and, eventually staff support, for any administrative/management incoming issues. Finally, the large experience of each partner in Erasmus-related and general student exchange-related mobility (e.g. Eindhoven University of Technology, the applicant organisation of this proposal successfully runs an international, highly competitive Post-Master program 'User-System Interaction Design' for over 12 years already) will ensure that program organization matches the required level of collaboration and mobility.

European collaboration among the consortium members is a crucial aspect and both status and development over time will be measured by key performance indicators such as the number of yearly co-authored publications from consortium partners. For years already, the consortium members are committed to international collaboration on university or department level, which involves not only joint work resulting in co-authored publications, but also exchange of key staff members (e.g. TUE and MCI, JYU and UGR).

> **B.1.5** *Describe the nature and quality of the expected **outcomes** from the innovative, educational, scientific and technological points of view, including in terms of skills and competences acquired.*

According to LLL requirements and to Dublin Descriptors, the USED Joint Doctoral Program will shape students future careers through the provision of a variety of "beyond-state-of-the-art" courses (see Table 1 for a not exhaustive list of teaching modules with a short description).

Table 1. Overview over areas of expertise and courses of all consortium partners

Area of Expertise	Course	Partner	Short description
HCI/ID	**Prototyping**	CUT, UPS, TUE	Tools for prototyping interactive systems
HCI	**Human-computer interaction**	CUT, UPS	The foundation of human-computer interaction
HCI	**Complex interactive systems**	CUT, UPS	An introduction to the engineering of complex interactive systems
HCI	**Simulation**	CUT, TUE	Tools to simulate complex interactive systems
HCI	**Programming**	UPS, CUT	Tools for programming interactive systems

HTI/HCI	**Experimental methods**	CUT, UPS	Methods for evaluating interactive systems
HTI	**Cognitive science**	JYU, UGR	An introduction to cognitive science
HTI	**Cognitive ergonomics**	UGR, CUT, UPS	The basics of cognitive ergonomics
HTI	**Usability**	JYU, UPS	Methods for usability analysis of interactive systems
HTI	**Ergonomics**	UGR, CUT	An introduction to ergonomics and human factors
HTI/ID	**User psychology**	JYU, TUE	Methods of user behaviour analysis and change
ID	**Aesthetics of interaction**	TUE, MCI, CUT	An introduction to aesthetics of interaction
ID	**Design research and theory**	TUE, MCI	Theory and design research methods
ID	**Participatory innovation**	TUE, MCI	Design of interactive systems while involving various stakeholders
ID	**Interaction design**	TUE, MCI, CUT	The fundaments of interaction design
ID/HCI	**User experience design**	TUE, MCI, CUT, UPS	Design and evaluation of the user experience

[HCI= Human Computer Interaction; HTI=Human Technology Interaction; ID=Industrial Design]

These modules, properly integrated with other more technical activities as service oriented application design by means of appropriate software development capabilities, will contribute to the growth of students' skills and competencies from the point of view of knowledge basis for developing a creative research.

The PhD course will also be innovative in providing a new education line for PhD students that includes knowledge acquisition aspects with systematic and quality managed exposition to a set of high level research groups working in European laboratories in this research field. The definition of a common credit assignment basis is a key aspect including the necessity for a PhD student of several annual reviews of their works as well as common check points among the six universities (e.g. summer school, internally reviewed papers, etc.).

Finally, the close cooperation with a large number of industries and companies occupying leading positions in the creative industry, ICT sector, electronics and the automotive industry (see annexed endorsement letters – Annex 6) will involve attendants in the design and implementation - typically in multi-disciplinary work teams – of innovative solutions that take into account the needs of the end users and the expectations of the stakeholders broadening students' perspective beyond academic environment. Therefore, from an educational, scientific and technological point of view USED, will represent:

- A challenging program with a strong multi-disciplinary context where interaction and experience design, human-technology and human-computer interaction are blended into a single research and practice field.
- A program where students will need to know/learn design processes and design tools, software and hardware prototyping, programming, special interfaces, sensors and mathematical tools, communication and media specificities, generation and structuring of meaning, social uses of interactive media, design theory, and art.
- A program where social cohesion and exchange of experiences will be part of students growth through a well suited mobility program selected on the basis of attendants needs, competencies and research interests.
- A program characterized by a strong integration and cooperation both between partner higher education institutions in order to provide academic excellence in heterogeneous fields related to user system experience design and between universities and industrial sectors, being business and market environments of great relevance for attendants future career perspectives.

B2 Partnership experience and composition (25% of the max. score)

This award criterion will be used to assess the adequacy of the partnership to the objectives of the program and in particular the scientific excellence of the consortium partners as well as their education, research and innovation capacities.

*B.2.1 Justify the relevance of **the consortium composition** and the expertise of the key **academic and research staff** involved to achieve the EMJD objectives. Justify the expertise (in terms of capacity, expertise and experi-*

The USED consortium is composed of six universities corresponding to excellence not only in different but complementary areas of expertise related to User System and Experience Design, but also in promotion and development of international cooperation actions aiming at improving quality of educational offer at European and pan-European level. Eindhoven University of Technology (TUE which leads the consortium) and its part- ners' commitment and experience is well demonstrated by a large range of international activities both at insti- tutional and academic/educational level aiming at: a) contributing to the advancement of knowledge, including in its professional context, through original and independent research, b) addressing new challenges in scientific but also in socio-economic terms, c) contribute to reinforcing the links between universities/ research organisa- tions and other sectors and d) become a reference at the partners' (understood as both the institutions and the key academic, research and administrative recognised capacity, expertise and experience to achieve the EMJD objectives; European level and thus contribute to improving the overall quality of doctoral education and re- search in Europe. Form more detailed description of partners' capacity, expertise and experience see Annex 1.
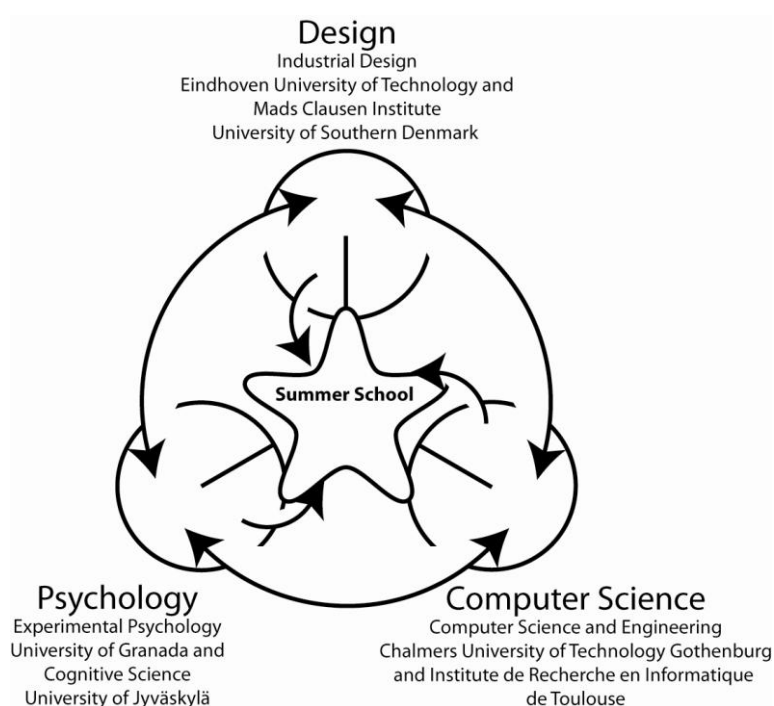

Figure 2. Overview of all USED partners by area of expertise (design, psychology, computer science)

The multidisciplinary nature of the joint doctorate in User System and Experience Design requires knowledge, expertise, and research track record in the expertise areas of *interaction design* (Mads Clausen Institute, Univer- sity of Southern Denmark in Sønderborg and Department of Industrial Design Eindhoven University of Tech- nology), *human-computer interaction* and *development of interactive systems* (Department of Applied Informa- tion Technology, Chalmers University of Technology Gothenburg and Institute de Recherche en Informatique de Toulouse) and *human-technology interaction and user evaluation* (Cognitive Ergonomics Group, Depart- ment of Experimental Psychology, University of Granada and Department of Cognitive Science, University of Jyväskylä). These expertise areas and responsible partners integrate well with each in the form of a strong con- sortium and mobility promise (cf. Figure 2).

The USED consortium represents an array of highly qualified universities at international level. The strength of the USED members is represented by the capacity of integrating different but complementary areas of expertise related to User System and Experience Design. The aim of the USED educational offer is to form a new genera- tion of professionals that will be able to exploit (and further enhance) cutting-edge ICT technologies, design

processes, and user evaluation techniques to design and implement - typically in multi-disciplinary work teams - innovative solutions that take into account the needs of the end users and the expectations of (industrial) stakeholders. A particularly innovative aspect, which derives from the strong integration, complementarities, and multidisciplinarity of the course, is that the PhD aims at am actionable integration of interaction design into human-computer interaction and human-technology interaction research and, the PhD can be completed via several project oriented routes: intelligent product design, system design, service design, distributed systems, intelligent systems, adaptive systems, human centred computing, usability studies, and cognitive ergonomics. These routes can be mapped and are compliant with the topics of the 7th Framework Program of the European Commission.

As a matter of fact, geographical diversity as well as differences in institutions organization, having been afforded also in previous cooperation activities (e.g. EC funded projects, joint thesis supervision, etc.), has been even more considered by the USED partners as a remarkable opportunity for promoting integration of heterogeneous cultures and approaches to education and training of researchers. Moreover, previously experienced joint activities represent a basis for ensuring a proper development of all activities ranging from implementation of mobility schemes to definition of students educational tracks and leading to the delivering of joint/double title. Finally, another added value with respect to the USED strategies is represented by the strong involvement of partners, coming from both industrial and academic environments. These partners, whose support, which is strictly related to partner diversity in terms of competencies, will broaden students' growth and career opportunities, will represent a key resource also for reinforcing links between universities/research organisations and industrial sector overcoming regional and/or national diversities and borders.

> **B.2.3** *Present the partnership track records in terms of **networking and cooperation** activities (through their joint involvement in EU/international research and/or education projects).*

The consortium is based on a strong cooperation between all partners built during a relevant number of joint activities both at research and educational level but will also allow for new collaborations to emerge. The USED partners have previous working relationships, both within the areas of expertise (see Figure 2), e.g. Design and Social Sciences, and crossing expertise areas (Design–Computer Science). These relationships go well beyond co-authoring of publications: exchange of faculty members, (co-)supervision, and exchange of BSc. and MSc. students. The USED partners also have extensive experience in joint PhD programs, e.g. with the Interactive Digital Media Institute at National University of Singapore and Industrial Design Institute at Zhejiang University, China.

Apart from that, the USED consortium aims at strongly cooperating with third country external partners (refer to Annex 6) which will represent an added value in order to broaden the scope of cultural/educational exchange opportunities which will drive to an advancement of knowledge, including in its professional context, through contacts with original and independent research activities developed worldwide. As a consequence, we plan to involve such academic partners (along with key industrial partners) in the USED consortium as associated partners within the start of the first year of the course according to their national administrative and institutional rules. These associate partners will have an influence on curricular decision making, offering of stage periods within the USED mobility scheme, and will contribute their expertise not only in the organisation of the EMJD USED Program, but also in yearly summer schools and other concerted USED events.

Each USED consortium partner is well-experienced in managing international activities as multiple participations in EU projects. In particular each university employs dedicated administrative staff which is composed of International Relations and Activities Officers responsible for promotion, organization and administration of international relations and exchange programs. These offices help both incoming and outgoing students in dealing with various issues in academic and administrative matters such as accommodation, insurance, etc. At the same time, the offices strive at supporting students' integration into local context which is of special value for the USED program in which direct contact to regional users and (industrial) stakeholders is highly beneficial and strongly encouraged.

As well, each partner has a long track of research projects funded by European Community under the framework program (FP6, FP7, etc.) which have represented and actually represents the high level of involvement in international actions both at educational (Erasmus Mundus, Jean Monnet, Tempus, Marie Curie programs; see also application form)) and development level (FP6-IST, FP7-ICT (see application form)). Moreover, the USED partners are currently delivering double or joint titles at M.Sc. and PhD levels demonstrating a relevant expertise and great effort in educational-based cooperation activities at international level (see Annex 1 and B.2.4).

The USED PhD title will be based on a heterogeneous range of research-oriented and industry-oriented activities spanning from attending scientifically advanced teaching modules to spending internship or visiting research periods at leading Creative Industries (Design, Media, Consultancy), ICT, Electronics, Automotive, or Aerospace industries contributing to the development of cutting-edge technologies. This scientifically and technically sound offer is based on the strong cooperation of all partner institutions with the industrial sector which has driven all promotion and dissemination activities played out by the USED consortium members during the proposal preparation phase.

As a result, we have acquired the support of some of the most important Creative Industries, ICT, electronics and automotive industries, academic networks (e.g. DESIS network), European initiatives (European Institute of Technology–EIT), and universities worldwide (e.g. National University of Singapore). These partners' efforts will be devoted to different cooperation and support activities as:

- Lectures and seminars delivered by external and visiting professors representing world academic excellence in interaction design, user experience design, system design, intelligent environments able to empower educational offer of USED courses and as a consequence, overall quality of doctoral education and research in Europe;
- Participation of deserving graduate students coming from external partner universities to the USED program in order to enhance existing cooperation activities and to broaden European borders towards an integration of cultures and experiences both at scientific and technical level;
- Involvement in joint research activities contributing to the advancement of knowledge beyond the state of the art, based on a continuous sharing of information and experiences (e.g. joint publications in referred scientific journals and/or conferences, as already experienced by USED partners) and following the regulations in force regarding intellectual ownership (described in Annex 4). Moreover, basing on partner doctoral agreement, a detailed IPR agreement will be signed by all partners before the starting of the course;
- Development of joint research-industrial activities (internships, projects, innovative technologies design) driving towards the addressing of new challenges in socio-economic terms as reinforcing career perspectives of USED course attendants and pushing the USED course to become a reference at European level;
- Monitoring of course activities through the appointment of delegates coming from partner industries and external partner universities as members of the USED supervision and quality boards (as described in detail in section B.3.1 and B.3.4);
- Assistance to course delivering activities (e.g. promotion of joint undertakings aiming at empowering scientific and technical value of educational offer) within first five years and plan, in cooperation with the USED member institutions, proper sustainability actions beyond EC funding.

B3 European integration and functioning of the program (20% of the max. score)

This criterion will focus on issues related to the way the EMJD will be implemented in and between the partner institutions as concerns the delivery of the doctoral program itself.

The USED partners will deliver a joint PhD degree to students limited to university pairs (see Figure 1). According to this statement, for each successful applicant student two supervisors and three tutors (qualified members of school boards can play one of these roles) will be designed from the two universities which will be involved in the mobility scheme (supervisor) and from the other three partners (tutor). Moreover, an external tutor will be designed representative of one of the partner industries of the consortium (usually coming from a partner industry strictly related to primary supervisor university). These actors will compose for each attendant the Supervisory Board (SB) – see For a more detailed description of activities please refer to Annex 2.

Table 3. This model ensures a fair involvement of all partners as primary supervisor tenures (institution where the student intend to spend the main part of her/his PhD); in fact being enrolled 15 students per year (8 coming from Third-Countries and 7 coming from European countries in odd years and 7 coming from Third-Countries and 8 coming from European countries in even years), each institution will host at least two PhD students per year. Moreover, a secondary supervisor will be designed to represent the reference for the other university (from a different expertise area) where the applicant intends to spend part of her/his course (at least one year).

In such way, a proper balance among all partners and among all research activities will be guaranteed by also taking into account students' interests. The second host country will be indicated by students in the application form according to their research interests or background and the school selection and admission committee will decide about this basing on equal enrolment of students among partners and academic relevance criteria. Finally, four tutors will be designed after candidates' selection among the remaining institutions and the partner industries. The selection procedure both for supervisors and tutors will be based on candidates' career excellence (e.g. research statement, CVs).

In every year, a Summer School (that will last at least one week) will be organized involving in different sessions all students, part of the boards' members and part of the teaching staff (see Figure 2). In particular, in the first days of the school modules and seminars will be organized by professors of the different universities/areas of expertise in a conference style. Supervisors and tutors will be present during the last two days of the school which will be dedicated to oral presentation and evaluation of students' activities; at least one delegate from each partner industry will be invited to participate to the event. The school will be held, during the first five years life-cycle of the USED course in a different partner country each year. The aim of this meeting will be both technical and social. From one hand, all applicants, even if pursuing the same course, have not the chance of meeting but in the web space their colleagues that have selected two different countries for their track, so the Summer School could represent an outstanding opportunity of social integration between students and students and professors. On the other hand, the chance of exchanging their experiences, acquired knowledge and compare different research groups' activities will contribute to the professional growth of students in the perspective of their future academic or business careers. For even better multi-disciplinary integration and exchange, summer schools can be organized in conjunction with research events co-organized by partners in Europe (e.g. conferences like INTERACT, NordiCHI, EICT, Measuring Behaviour, etc.).

The PhD track will be based on, in addition to partners' national and institutional criteria, the achievement of 60 ECTS credits per year (a total amount of 180 ECTS along the course). Credits assignment will depend on three different criteria (see Table 2):

- Skills: stages, R&D projects, patents, seminars participation to conferences, etc.;
- Capabilities: written and oral description of activities according to learning outcomes of the course;
- Knowledge: participation and successful overtaking of advanced teaching modules.

Table 2. Credits assignment (1 year)

Criterion	Activity	Type of exam	Nr. of ECTS
Knowledge	Following at least two teaching modules offered by the six partners	Oral presentation of a research topic related to the courses evaluated by the lecturer	**10 (5+5)**
Capability	Research report (in the form of a conference or journal paper)	Review of the paper (performed by supervisors and one tutor)	**15**
Capability	Thirty minutes oral presentation to show and describe activities (at Summer School)	The capability of managing this task in a brilliant way, under the evaluation of the SB and of the PhD Steering Committee (see Annex 5)	**15**
Skill	Stage period spent working in a partner industry on the development of innovative solutions and technologies	Evaluation by the SBs with the contribution of the industrial external tutor	**Up to 20***
Skill	Active involvement in tasks concerning R&D projects	Evaluation by the SBs with the contribution of the industrial external tutor	

[* some skill activities contribute to the obtainment of the a total amount of 20 ECTS]

For a more detailed description of activities please refer to Annex 2.

Table 3. PhD Supervisory Board (SB)

Two supervisors	Primary supervisor + secondary supervisor
Three academic tutors	Coming from other universities
One industrial tutor	Coming from industrial partners cooperating with the primary Institution
In total: Six members in the supervisory board	Five Academic + One Industrial

*B.3.2 Justify the relevance and appropriate organisation of the mandatory **mobility periods** of the candidates in the participating institutions. Describe the structure of the EMJD for what concerns the relevance and appropriateness of the mandatory mobility component. In what way is the coherence with the overall content of the program ensured?*

Each PhD project lasts three years and during this period a mobility scheme ensures that students will spend training / research periods in at least two different higher education institutions. Such mobility periods will last at least six months each.

The USED Joint Doctoral Program is based on a flexible mobility scheme: Two compulsory periods will have to be spent by each student in at least two different partner countries (denoted as primary and secondary institutions). The primary institution represents the reference university for both administrative and educational aspects, and the student will have to spend at least one year and a half in this institution (mandatory). In addition, each student will have to spend at least one year in the secondary university (mandatory). The residuary period (six months) can be spent either at another partner (university) or at the primary (reference) institution. Note, that to ensure not only European mobility, but also multi-disciplinarity, primary and secondary institution must belong to different areas of expertise.
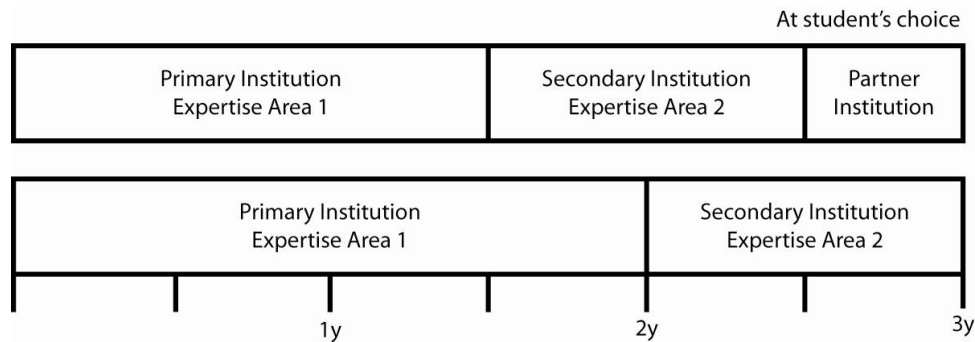

Figure 3. USED enrolment and mobility scheme.

For instance, a student might subscribe to a mobility scheme involving three institutions spending 30 of 36 months in the primary (e.g. DESIGN area of expertise) and secondary institution (e.g. COMPUTER SCIENCE area of expertise) and the remaining 6 months attending a stage period in a consortium partner industry, preferably cooperating even with one of the other four consortium partners (universities) and, consequently, is located in a different country than the primary and secondary institutions (see Figure 3 for examples). Students will be registered at partner institutions in accordance with their regulations.

*B.3.3 Describe the **common standards** and mechanisms developed by the consortium for the **application, selection, admission and review of doctoral candidates** (European and third-country). What measures are proposed to ensure the recruitment of the best candidates? How does the consortium ensure that these mechanisms are transparent, fair and objective? What are the provisions to take into account the equity issues and gender balance? How does the consortium explore alternative ways of recruitment considering the Life Long Learning requirements?*

Candidates must hold a Master of Science (M.Sc.) degree or equivalent title. Should have proven track record in at least one of the USED areas of expertise, e.g. for the design area: research on or through design processes that require analysis, synthesis within a certain industrial or social context. They also should demonstrate an in-depth understanding and interest in the USED triangulation of design, computer science, and social sciences. Furthermore, candidates should demonstrate their ability to use their knowledge and skills to cope with possibly unfamiliar/unexpected/unpreceded problems and situations, and design suited solutions, typically with the in-

volvement of a multi-disciplinary team. The Consortium aims at admitting highly qualified graduate students (at M. Sc. level or equivalent title) from a wide range of countries (i.e. third countries students and Member states students following European Commission and Erasmus Mundus Program eligibility requirements). Basing on a transparent and objective admission strategy, the following criteria will be applied on a maximum score of 100 (see Annex 3):

1. Academic potential (class rank, GPA, etc...): max. 40
2. Relevance of M.Sc. degree to USED: max. 10
3. Quality of home institution having awarded the M. Sc. Degree (according to http://www.webometrics.info/about_rank.html): max. 20
4. English level: max. 15
5. Motivation letter: max. 5
6. Letters of recommendation: max. 5
7. Other aspects of Curriculum Vitae (multiple degree, work experience, professional qualification, extra-curricular activities): max. 5

Moreover, aiming both at tackling equity issues and following LLL requirements, a comprehensive strategy will be developed in order to fulfill the needs of:

- Improving equal opportunities (e.g. enhanced support to the learning opportunities of the socially disadvantaged and improved access to education and training at worldwide level focusing particularly on third countries);
- Strengthening the links between the education and training system and the labor market (e.g. continuous counseling and monitoring of students as well as career guidance in cooperation with industrial partners and harmonization of education itinerary with labor market needs and opportunities);
- Enhancing the efficiency of education and training (e.g. giving a foundation knowledge basis and offering concrete update opportunities for alumni and adults).

The primary aim of the doctorate is to achieve excellence; therefore the selection of students will be based on this criterion. If during the selection the same score will be reached by a male or a female or a disabled the preference will normally be given to the one whose category is in minority in the composition of the selected class. As well, in case of equal score reached by two candidates of the same gender the preference will be given to the one whose personal experience is more relevant in terms of previous mobility periods and/or candidate's array of achievements.

The consortium is aware of the societal relevance of a PhD course, thus fully committed to support a balanced gender participation and inclusion of disadvantaged students/scholars with disabilities or special needs. This is addressed in several aspects: The doctoral course has been designed to favour a greater participation of females, which is a clear requirement in order to attract a category of persons that could give a strong contribution in terms of creativity, competence and engagement, but is usually not inclined to ICT-related studies. The opposite is, however, true for the Social Sciences and Design areas of expertise. So, due to the complementary composition of expertise areas in the USED Program, a good gender balance is expected, and this issue will be clearly less critical as compared to more mono-paradigmatic Programs. Female participation (which would give more variety to ICT courses that are usually attended by an overwhelming majority of males) is expected to be favoured by giving concreteness to the studies, highlighting application domains of User System and Experience Design that provide concrete benefits to the life of everybody, in several contexts (e.g. healthcare, transports, cultural heritage, education and training, security). The application fields specifically targeted by the USED consortium should be able to attract the interest of women, thus broadening the basis of ICT professionals. Given the importance of women, special attention will be spent by didactic and logistic managers in tackling their needs, especially in the cases of maternity.

Candidate USED students' with disability, if admitted, will be supported by special facilities (see also B.4.2). All the university in the consortium have premises and facilities compliant with the national rules on architectonic barriers. The website of the course will support accessibility by complying with Web Content Accessibility Guidelines (WCAG) 2.0[6]. Finally, as a part of the quality assurance procedures, a yearly monitoring of applicant students will be performed in order to extract statistical data concerning the gender and the social status of PhD's attendants. This measure aims at keeping under control the principle of equal access to the course and in case to provide significant indicators in order to assess and eventually modify defined policies.

The USED course participation costs have been calculated with respect to each national tuition fees and to the services provided by each partner to students as a basic assistance during their study periods. Participation costs will be annually paid to the hosting institution according to students' mobility scheme. This pattern will ensure a proper balance in the management and sharing of grants among partner universities according to the USED fellowship scheme, which foresee the enrolment of 2-3 granted PhD students per year in each partner institution. A different cost has been established for EU and third-country students (10,000€ for EU students per year and 11,800€ for non-EU students per year).

Table 4. Details of participation costs

Service provided	Annual estimated cost per student
Registration and de-registration of (foreign) students	200 €
Study assistance	1,500 €
	2,000 € (EU students) 2,900 € (third-country students – visa)
Language courses for foreign students	400 € (average value subject to change)
Various alternative forms of health insurance (E106/E109/E120/E121/E33/E37)	600 € (average value subject to change)
Organisation of trips, excursions, and events for a better integration in social life	400 €
Technology-based facilities (laptop, website, laboratory-based equipment)	1,300 €
Didactic manager for counseling, coaching and coordination of management of course resources	1,200 €
Logistic Manager for supporting students in their administrative and logistic issues in the university and in the city/country (e.g. housing, language and culture/customers, security, banking, residence permit, social security, leisure time and cultural activities, documents, pension rights)	1,600 € (EU students) 2,500 € (third-country students)
Brand Manager for supporting the follow-up of the USED graduates careers	800 €

This figure has been calculated both with respect to partner national rules and fees and taking into account the relevance of administrative and tutorship services provided as well as USED Program-wide remote cooperation and collaboration means (see B.5.1 and Annex 5). For instance, concerning third-country students, additional administrative efforts will be devoted to the management of visa (see B.4.4) and to the provision of specific accommodation services in order to introduce students to European and national laws and regulations concerning social life aspects as health assistance, money management, public services exploitation, designated places of worship for all faiths, etc. Finally, should the fees established by the consortium be higher than maximum participation costs contribution, then the consortium will grant the Erasmus Mundus fellowship holders a fee waiver for the fee amount in excess of the fixed contribution.

The program empowers the PhD candidate in shaping her/his educational track, especially in view of the future career. The type/amount/content of the course work and project tasks will be ad-hoc tailored on the basis of the

candidate's specific background and individual profile, also considering a multi-disciplinary research and education offer. As a general rule, in order to ensure academic excellence at supervising level, a proper selection of students' supervisors and tutors will be managed by consortium members and in particular by PhD Steering Committee (see Annex 5) according to fixed and already recognized criteria (e.g. at least 10 publications in the last five years in referred international journals and conferences, h-index, relevant experience in PhD. students tutorship, cooperation with industries in research oriented activities strictly related with USED, etc.). Finally, the proper monitoring of students' tracks will be performed at the end of each year by the Supervisory Boards (see B.3.1) which will be responsible of collecting students activities reports and evaluating the successful completion of each activity (i.e. achievement of 60 ECTS) and of eventually decide on an extension of the course duration.

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*B.3.6 What is the kind and nature of the **degree(s)** awarded? If applicable, what are the measures taken or envisaged by the consortium to deliver a fully accredited and recognised **joint degree**? How the joint program is integrated within the partners' doctoral programs catalogues? What is the recognition status in each of the partner institutions? If applicable, describe the ongoing recognition/accreditation process in the relevant countries and the actions taken to award a joint degree on behalf of the consortium partners. If available, provide a copy of the proposed degree(s)*

The PhD degree awarded by the USED Program partners will be a joint degree between pairs of partner institutions that will receive the additional mark "USED Erasmus Mundus degree" provided that they will follow rules described in the proposal. Only in the case that a partner university might not be able to issue a joint degree, a double degree will be issued. However, this case is currently not foreseen. All partners have demonstrated the intention (see endorsement letters in Annex 7) to design and deliver a fully integrated joint title. According to this, the USED institutions and administrative staff joining the Program, will work together to establish by September 2012 all the agreements needed to deliver a joint title basing on a previously stipulated document (see Annex 4) even if the possibility that double title is offered is also considered.

In particular, the title will be awarded by the institution selected by each student as primary and secondary university (a proper selection scheme ensures an equal participation of students to programs delivered by different universities). This selection corresponds to the common feeling of partners that: a) the research of a PhD student must be specialized to be efficient, b) supervisor pairs in partner universities can have common excellences but it is more difficult to find 5 supervisors really excellent in a specific topic, c) as a tradition of PhD a local supervisor is required by a university and a discussion (defense) of the final work has to be done in each site to provide a PhD title, d) as a consequence a joint title among 5 universities has the risk of requiring too much not defined activities and to loose the specific excellence of each university. Therefore it is more appropriate that a PhD title can be provided by university pairs (primary and secondary institution) as the maximum number of supervisors for coordinating in an efficient way the research of a single PhD student is two. More supervisors involved would bear the risk of research becoming too generic. Thus, we can state that:

- The USED will be a mark that provides a meta-level assessment that is applicable to joint degrees of partner universities. We aim at consolidating this level at the end of the five years funding period as a fully sustainable and integrated joint degree mechanism;
- Joint degrees are the final objective of the consortium (however, this objective has to be evaluated: some students could prefer to have in the initial phase two titles recognizable by the involved universities (at least until the USED Program is consolidated): therefore an experiment with a double degree is accepted in the USED consortium).

Finally, beyond Erasmus Mundus joint doctoral program the USED partners are already working in order to deliver and subsequently maintain a joint PhD title as a key driver for the overtaking of new challenges in scientific but also in socio-economic terms at European level. A joint PhD degree is also a strong European brand for excellent USED education and research (see also B.4.1).

B4 Provisions for EMJD candidates and fellowship holders (15% of the max. score)

This criterion will address aspects such as the overall promotion and marketing strategy, the existence of arrangements for the administration of the fellowships, the recruitment conditions and the support to the candidates as regards linguistic aspects, career prospects and services.

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*B.4.1 Present the **information and promotion strategy** envisaged by the consortium to reach out potentially interested **candidates,** in particular those from third countries? What type of promotion / visibility mechanisms*

The USED partners will setup a central website able to guarantee a proper promotion of the Program course worldwide. Flyers and PDF brochures will be made available on this website. Moreover, all partner universities, associate partners, and endorsing industries will strive to promote the participation to the course in their respective websites contributing to the enhancement of information and promotion strategy. Complementing this promotion strategy, each partner university will advertise the course in their websites, by the provision of USED brochures to students who are attending the last year of relevant M.Sc. (e.g. the HCI Master Program at IRIT and Industrial Design Master at TUE) or Post-graduate tracks (e.g. User-System-Interaction Post-Master Program at TUE) and in their university alumni magazines.

Concerning third countries potential attendants, a remarkable effort will be made by each partner, which, basing on previously cooperation and collaboration activities with third country universities, will promote the participation of third country students to the course through the establishment of an agreement between the partner institution and the already connected third country universities in order to select one or two students per year that, according to their excellent educational track, will be invited to apply for the course selection phase.

Furthermore, national research and education websites and related forums are preferred outlets to promote the USED Program, and the consortium will reach out to relevant international education fares, job fares for university graduates, and HCI/Design Conferences (CHI, DIS, EIHCS, HCII, INTERACT, TEI, etc.) also via special interest magazines (e.g. ACM Interactions) to gain maximum visibility.

Finally, the consortium acknowledges social networks, especially professional social networks, as key promotion channels. Social networks such as LinkedIn, Facebook, Xing are considered main channels, but also more specialized alumni forums and USED topic-specific forums shall be covered. Complementing social networks, are (semi-)professional tech and design blogs as important thought leaders and well-trusted distribution channels. USED consortium members have sought such coverage successfully in the past and foresee great impact also through these channels.

The USED partner universities have a long experience in nationally and European funded research projects and therefore in the acceptance of excellent foreign students (for instance, TUE alone hosted over 1300 foreign students in 2011). The USED attendants will be assisted by university staff in their accommodation and will be provided of all relevant facilities (housing, coaching, language courses, etc.). More in detail, according to national rules, each partner university international affairs office and staff, operating under the supervision of the Management Board (see B.3.3), will offer a list of services as:

- Registration and de-registration of (foreign) students;
- Complete administrative support (e.g. social security number, registration statement from the Registry office (for European students) and residence permit (for non-European students) in order to guarantee an equal treatment to candidates applying in all partner universities;
- Study assistance;
- First accommodation for foreign students;
- Language courses for foreign students, completely free of charge;
- Welcome by "colleagues" who take foreign students to their residence or to the University offices;
- Various alternative forms of health insurance (E106/E109/E120/E121/E33/E37);
- Organization of trips, excursions and events for a better integration in social life.

Finally, great attention will be devoted to students with special needs. Either people with disabilities or students with family will be supported according to each partner national rules and facilities, standing the provision of the same services as for other attendants. More in detail, some specific services will be provided to disabled students as: a) individual mobility support within University Campus, b) specific didactic and/or administrative tutorship and c) special disabilities services (e.g. acoustic devices for deaf).

In the following, the vast amount of possibilities and services provided to USED PhD students is illustrated in the example of TUE, the consortium leader:

EDUCATION: TUE offers a range of education opportunities and courses for PhD students through PROOF:

1. First year courses include Intercultural Communication & Cooperation, Science and Intellectual Property, Scientific Integrity and Taking Charge of a PhD Project.
2. Second year courses include Supervising Master Students, Teaching and Learning in Higher Education for PhD Students, The Art of Presenting Science and Writing Articles and Abstracts in English.
3. Third year courses include Individual Personality Analysis, Technology Entrepreneurship and Career Consult.

The Center for Languages and Intercultural Communication (CLIC) provides courses in Dutch for foreigners (from beginner to advanced NT2), English and Intercultural Communication. Furthermore, TUE provides various Master modules and classes, which are also available and very relevant for USED PhD students (see http://w3.id.tue.nl/en/education/learning_activities/modules/ for an overview of the modules and classes offered for academic year 2011/2012 Semester B).

RESEARCH: Within the department of Industrial Design of TUE with its four research groups PhD students are offered a range of themes (Wearable Senses, Out of Control, Changing Behavior, Next Nature, Playful Interactions, Comfort and Bonding and Light.Time.Space.Move) in which students can work on their PhD projects in a more contextual setting, involving other students for collaboration and direct evaluation. Supervision of PhD students is guaranteed by leading researchers in the field of interaction design that work both in the research groups as well as in the themes.

Students will have access to the services provided by the Information Expertise Centre including (non-) scientific information from and for the TUE community and other online resources and the TUE library. Furthermore, they have access to prototyping facilities including the e -lab (basic electronic prototyping), D/search Labs (3D printing and laser cutting facilities), Vertigo (wood and plastics workshop), and the Equipment & Prototype Center (EPC) that offers technologies both in the design trajectory as well as the manufacture of exhibits/products. The EPC has full access to highly-regarded and cutting edge technologies on several divergent fields. Finally, students will have the opportunity to participate in a variety of conferences or workshops.

ADMINISTRATIVE AND HOUSING: PhD candidates working at the TUE will fall under the Collective Labour Agreement (CAO) of Dutch Universities. The International Office will apply for both your visa and residence permit of foreign students upon arrival. Finally, the Education and Student Service Center of TUE provides a range of services to foreign students, including help in finding accommodation. All exchange students are accommodated in single furnished bedrooms with basic utilities in student houses. The rent of a student room is approx. € 350-450 per month including utilities, services and internet.

CULTURAL/SOCIAL: The TUE offers an Introduction Program to foreign students arriving to the Netherlands, including an introduction to TUE student services; Assistance with organizing insurance, opening a bank account, and enrolling at the TUE; Meeting all kinds of student associations and societies and getting to know the campus and city center of Eindhoven from a student's perspective; Dutch language introduction workshop; Training sessions in cultural awareness, working in intercultural groups and developing social skills; Introduction to your department/faculty, including information on your academic program, research activities, procedures and rules, faculty student associations, interdisciplinary projects, etc. Furthermore, the Students' Sport Center on the TUE campus offers students the opportunity to sport the most extensive and modern sports facilities of all Dutch universities for €74 per year.

CAREER OPPORTUNITIES AND BUSINESS COLLABORATIONS: The Netherlands is an internationally oriented and innovative country, located at the heart of Europe. Higher education in the Netherlands has an excellent reputation around the world. Dutch scientific research is also highly regarded internationally. Eindhoven Region has become one of the leading regions in Europe in the field of high tech, knowledge and design[7]. Many top international high-tech companies (ASML, IMEC, Philips, and Océ), SMEs in the creative industry (Van Berlo Studio) and a wide-range of small agencies (Strijp-S) are located in the Eindhoven region. Furthermore, the TUE has collaborations with various national and international companies such as Adidas, TomTom, Frog Design, and Microsoft Research.

The TUE considers it important that the knowledge gained finds its way into society. Therefore, the TUE Innovation Lab translates scientific results into products and processes that are practicable. Eindhoven is the main

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[7] The Intelligent Community Forum (ICF) named the Eindhoven Region of the Netherlands as the world's Intelligent Community of the Year 2011 [see http://www.intelligentcommunity.org/index.php?src=news&refno=629]

city in Brainport, the technological heart of the Netherlands. Brainport is an incubator for innovation and home to world-class companies and knowledge institutions. The TUE has successful partnerships with industry and stimulates start-ups that are both located at the University Campus as well as the nearby High-Tech Campus. Through the Brabant Center of Entrepreneurship (BC-E) we work together with the University of Tilburg to encourage entrepreneurship competence among students.

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*B.4.3 Describe the **language policy** of the consortium. How does the consortium address the linguistic aspects of candidates' mobility (e.g. training facilities, mentorship, local language learning, etc.)? What are the arrangements in place regarding language courses in the joint program (e.g. integration, availability, costs coverage, recognition of the language courses in the joint program). How does the consortium intend to meet the objective to offer candidates the possibility to use at least two different European languages?*

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The default language of instruction is English. Local language learning and integration in the local society is a key interest for the consortium partners and will be actively promoted through introductory courses and university staff support. Especially in USED, local language skills are a key success factor to enable PhD students participating in user requirement studies (ethnography) and cultural probes with real end-users of this particular country.

The partner universities will organize language courses for foreign students, completely free of charge. The major aim of the courses is to provide students with the linguistic tools, which will enable them to make the best of their stay in each country. The courses will be available only for students who will select one university as primary or secondary institution (i.e. will spend at least six months in the country). The courses will be divided into levels from A1 (breakthrough) to C2 (mastery) in keeping with the criteria laid down by the Common European Framework of Reference for Modern Languages of the Council of Europe.

The students will have to participate in an entrance test and will be part of mixed classes, involving also other foreign students (for instance attending an Erasmus Mundus Master Course or following a Erasmus mobility program). The classes will be established on the basis of the test results, which usually coincides with the beginning of the course, and do not exceed 25 students. All the teachers will be specialized in teaching mother tongue language as a foreign language. Students completing the course will receive an attendance certificate bearing the total hours attended and the level reached.

The course Management Board will be responsible for the definition of the structure and the duration of the courses. In particular, each student will be provided with a calendar reporting the total amount of hours of lesson (beginners 50 hours, intermediate and advanced 40 hours), lesson-rooms, timetable and starting dates of the courses (at least three courses each year will be organized).

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*B.4.4 What administrative arrangements are foreseen for the **award of the fellowships** (including health care, social security and pension rights) and the **distribution** of the fellowship holders among the EMJD partners? What are the concrete actions and steps the consortium plans to take for the appointment of Doctoral candidates under **employment contracts** (including among other aspects the use of single or multiple contracts, provisions of research posts, issuing of work permits etc)? What are the measures taken to deliver the **fellowship scheme** (distribution of grantees among institutions, the financial management of fellowships and consortium lump sum)?*

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According to national rules, the USED partners have established an internal agreement for the provision of health and insurance services to students; in case the PhD candidate becomes employee of the university, health insurance and a pension scheme are contractually included. From an administrative point of view, the Management Board will be responsible for addressing candidates' rights taking into account the laws that are in force in each country. Therefore, each partner university will delegate part of its staff as a support to the USED Management Board staff in order to manage students' arrangements. For instance, TUE as part of FSAS activities will provide assistance for getting administrative documents as:

- Fiscal code: it is issued by the local Revenue office upon presentation of: a) valid passport and visa or residence permit (non-European students); b) valid identity document (European students);
- Registry Office registration: students need: a) an enrolment certificate from the Eindhoven University of Technology, b) a proof of sufficient financial resources: a photocopy of credit card or of bank account statement, c) health insurance (public or private);
- Health insurance coverage: for instance it is possible to get a private insurance policy at any post office. The insurance covers the cost of emergency medical treatment and hospitalization. The staff of Eindhoven

University of Technology will help foreign students with preparing and submitting the insurance policy whose cost will be part of tuition fees;

- Residence permit (non-European students only): it can be obtained by filling in the relevant form (yellow kit), which is available at any postal office; FSAS staff will help foreign students with filling in and submitting the application form;
- Pension rights: each partner will be responsible for ensuring that national rules concerning pension rights and taxes related to student's grant will be respected.

As a general rule, students' grants will be appointed basing on national laws and rules. The consortium will appoint recruited candidates under employment contracts except in adequately documented cases (e.g. related to institutional or national practice) or where national regulation would prohibit this possibility. However, a partnership agreement has been established among the USED consortium institution in order to manage the distribution of grants and the fellowship scheme under the framework of equality and fairness (see B.3.3).

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*B.4.5 Describe the measures taken by the consortium to ensure the candidate's **career prospects** and to monitor his/her career development once graduated.*

The proposed course will provide participants a high level PhD degree matching the objective to improve scientific excellence of students in interactive systems design, which is key for the development of effective and sustainable products and services.

The USED's PhD candidates will be addressed towards knowledge and research skills that will make them able to cope with a variety of issues spanning from information and communication technologies to an understanding of cultural, behavioural and social aspects. Also, the operational part will ensure a deep, hands-on investigation in a range of selected domains.

This approach will guarantee participants a top-level academic quality as well as the sharing of experiences and cooperation with leading ICT companies, which will give the opportunity to drive career perspectives towards levels of excellence.

In addition, a proper administrative person (Brand Manager - BM) will be devoted to monitoring of fellows careers as described in section B.5.1. Moreover, the close cooperation with a large number of industries and companies occupying leading positions in the Creative Industries sector and leading ICT, Electronics, Automotive, or Aerospace industries (see Annex 6) will ensure notable career prospects to the USED attendants in industrial sector as well as course academic excellence may lead, for most valuable students, to a prominent academic career.

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*B.4.6 Describe the nature and comprehensiveness of the **Doctoral Candidate Agreement**. What are the joint course implementation rules and mechanisms, mutual rights, obligations and responsibilities of the two parties as concerns the academic, administrative and financial aspects of the student's participation in the EMJD? Specify in what way the consortium adheres to and implements the European Charter for Researchers and the Code of Good Conduct for the Recruitment of Researchers.*

The Doctoral Agreement (see Annex 9) is a contract that will be stipulated by every PhD student before the start of the course. The hosting institution (which corresponds for USED program also to primary supervisor institution) guarantees to help the student with all the administrative procedures related to his/her participation in the program through the staff at disposal of the USED course.

The agreement states the amount of the year grant from the EC and commits the local coordinator to transfer it to the student's reported bank account. Monthly payments are specified (12 instalments of € 2,800 each as employment contract and of € 600 as fixed contribution for laboratory-based course) together with the lump sum (€ 7,500) for traveling expenses recognized only to third-country students. The student engages her/himself to pay the tuition fees (€ 11,800 for third-country students and € 10,000 or EU students).

Basing on European Charter for Researchers and the Code of Good Conduct for the Recruitment of Researchers, the contract states the conditions under which the USED consortium may stop the monthly payments: non-payment of tuition fees; not regularly attending to teaching modules or not successful completion of yearly activities (i.e. 60 ECTS), unjustified missing participation in any of the program's activities (e.g. the evaluation and quality assessment exercises); insufficient proficiency in terms of acquired capabilities and skills (e.g. capability of writing a conference/journal paper), or not compliance with the usual rules of conduct implicit in his/her registration at the institution. Moreover, proper regulations concerning Intellectual Property Rights

(IPR) will be part of the agreement in order to specify the rights belonging to attendants and the benefits of the exploitation (if any) of their results through appropriate legal protection.

Any conflict among the parties signing the contract would be brought to the attention of the USED program's supervisory board, which will decide on the best way to resolve it. The local supervisor will be responsible for the formalization of the contract upon the student's arrival. The student, the local supervisor, and the consortium coordinator will sign this contract.

B5 Program Management and Quality Assurance (15% of the max. score)

This criterion will explore the overall organisational arrangements and cooperation mechanisms within the consortium and will also look into the foreseen evaluation and sustainability plans as well as the existence of complementary funding.

> *B.5.1 Describe the quality of the **organisational arrangements and cooperation mechanisms** within the consortium and the specific role played by each of its members. What is the degree of institutional commitment of the consortium's partners, and what financial and human resources are allocated to the program? Is there a management and supervision board? How clearly defined and active is the role of all partners? How will a feed-back system be established and used? Does the consortium foresee detailed partnership agreements covering the academic, scientific and administrative aspects of the program and how are they going to be used?*

EMJD USED will be coordinated by Prof. dr. Matthias Rauterberg at the TUE who has played a leading role in earlier EU projects. For several years he was director of an interdisciplinary research centre (ca. 120 research staff), he is the chair of the departmental research committee, and is serving as a reviewer for project proposals internationally (e.g. panel member of ERC grants) and for reporting on EU research projects. The delivering of a joint course is also strongly related to partners' capabilities of dealing with management, financial, educational and administrative issues concerning each candidate activities. According to this statement, some boards will be created in order to supervise and monitor each aspect related to the delivering and the progress of the USED course. The overall structure described in Table 5 and depicted in Figure 4 shows a clear engagement of all the partners of the consortium under the leadership of the coordinator. Before starting the program, the consortium is committed to sign an "EMJD USED agreement", of which an outline has already been signed by all the partner coordinators (see Annex 7). For a more detailed description of organizational arrangements see Annex 5.

Communication regarding both academic, scientific and management issues will be done using various forms. Day-to-day communication will be addressed through e-mail and phone and TUE as the Coordinator will seek to implement an "open door" policy where all consortium partners are welcome and encouraged to seek answers and guidance immediately, instead of waiting until the next planned meeting. The Coordinator will be in contact with all partners throughout the project to ensure that the project is progressing as planned and to get feedback on all scientific progress. We will set up an internal website and file sharing facility (e.g. Dropbox) to allow fast and easy communication; email addresses and telephone numbers of each participating individual will be distributed after the first meeting, as well as "Skype" contact details. An external project website will be created. The website will contain among others a description of the project and the consortium partners.
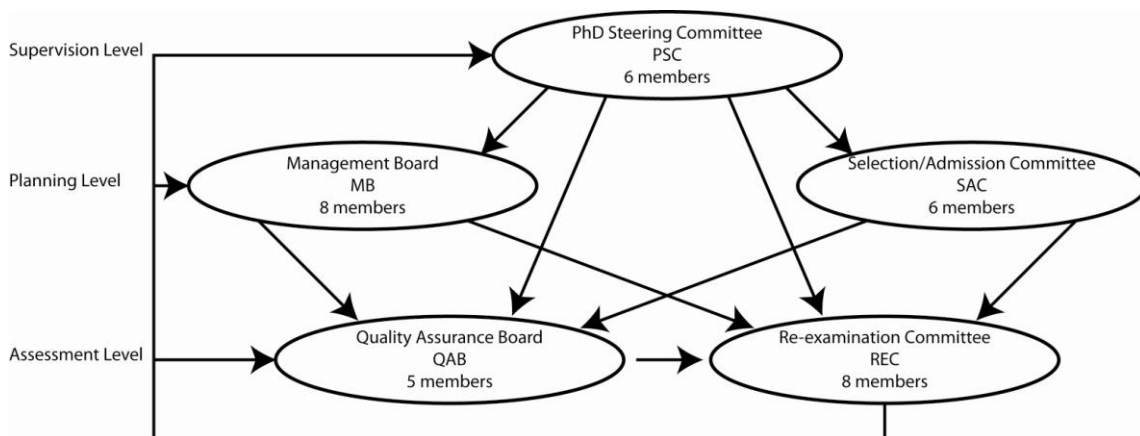

Figure 4. The USED supervision and monitoring boards/committee structure

The project will employ a variety of meeting types. The annual USED convention will allow for physical meetings to help build strong relations between the partners, and subsequently ensure a strong collaboration in the

consortium. The meetings will be chaired by the Program Coordinator, who will send out an agenda for each meeting no later than two weeks before the meeting. The Management Board will meet regularly, using an established web-conference tool (e.g. Skype). However, in case needed budget flight connections are available between the cities composing the consortium with Eindhoven as central hub Eindhoven - London Stansted - Tampere (Jyvaskyla), Eindhoven - London Stansted - Gothenburg City (Chalmers), Eindhoven - London Stansted - Billund (Sønderborg), Eindhoven - Amsterdam - Montpellier (Toulouse), Eindhoven - Malaga (Granada).

Table 5. Management structure

Board	Members	Duties
PhD Steering Committee - PSC	6 – one per institution	• Strategic orientation of the project • Issue recommendations to other boards • Political and strategic operations of the action • Program of activities • Teaching modules and general and learning objectives
Management Board - MB	8 Chair of PSC, Chair QAB, one per institution	• Management of grants, students' facilities, insurance schemes, course calendar, tuition fees and budget and financial allocations • Responsible for the organization of the yearly Summer School • Physical resources allocation (e.g. rooms, laboratories, etc…) • Course monitoring
Quality Assurance Board – QAB	5 – One representative per area of expertise (Design, Social Sciences, Computer Science), one representative of industrial partners (yearly turnover) and one external expert	• Monitoring of the quality of the course
Selection/Admission Committee - SAC	6 – one per institution (yearly turnover)	• Evaluation of applicants • Internal evaluation of students at the end of each PhD year
Re-Examination Committee - REC	8 – members of PSC and two other representatives, a partner industries delegate, and an external academic delegate	• Assessment of course achieved results (based on internal and external quality evaluation)
Didactic Manager - DM	1 global and 6 local persons (for each partner institution)	• Support students and professors in their educational activities
Logistic Manager – LM	1 global and 6 local persons (for each partner institution)	• Support students in their administrative and logistic issues
Brand Manager - BM	1 person globally	• Responsible for the promotion and dissemination of the PhD brand • Support to follow-up of the USED graduate careers

*B.5.2 Describe how the consortium's **development and sustainability plan** is designed in order to ensure the proper implementation and continuity of the joint program beyond Community funding. What strategies have been envisaged, and over which period? What are the enrolment projections and the mid/long-term benefits for*

For homogeneity, this section also includes our answers to the section B.5.3. The USED proposal has a long term perspective, also beyond Community funding, and its sustainability is mainly related to the fact that it intends to meet the ever stronger requirements of European companies, of various sizes and application fields, that need ever more bright, flexible and creative people skilled in User System and Experience Design (see also B.1.1). The strong industrial involvement in the USED Program is unique in terms of breadth (from ICT technologies development, automotive and aerospace, to media and design development and consultancy) and offers multi-disciplinary research and career opportunities. Industrial supporters are large global players such as Airbus, Nokia, Philips, Sony, and Volvo, but also SMEs leading in their field (e.g. in Interaction Design). These supporters have a long-terms strategy to which USED is very much aligned (as shown by the endorsement letters). The endorsement letters we have received from a wide range of companies acknowledges this. Most of the companies - with which there is a long-time partnership - have been involved in the definition of the structure of the doctorate, and are available for being part of the PhD boards (e.g. QAB, SB, REC), organizing seminars, providing and tutoring stages, developing joint research projects, teaming up for innovation development and technological transfer initiatives. Apart from this, USED skills enable PhD graduates very to start their own companies, as their complementing skills perfectly facilitate entrepreneurship. The USED partners support these trajectories by campus-located facilities, such as the InnovationLab at TUE.

Also from a scientific point of view, the USED proposal has a strong foundation and sustained interest, which promises a consistent future. This interest is confirmed by academic endorsement letters from various universities from several world countries, academic international research networks (e.g. DESIS), and by the existence of important scientific conferences (CHI, TEI, EICS, etc.) and journals (International Journal of Design, Personal and Ubiquitous Computing, ACM Interactions, International Journal of Human-Computer Studies, Human-Technology-Interaction, etc.) in the USED areas of expertise. The involved partners will strongly benefit from the USED proposal under various aspects, as it is an opportunity for them to team up and exploit the scientific and potential-business synergies due to the union of high-level, complementary research groups that operate in the expertise areas of design, social and computer science. Also, it is an important opportunity to modernize and improve the governance (e.g. by involving representatives of industries in the PhD management boards, and implementing policies that reward business-university cooperation in terms of career and rewards), and to define, experiment and promote new funding schemes that are expression of a strengthened cooperation between companies and university.

Another important advantage will be given by the incentive to strongly upgrade the relevant university structures for student mobility and third-countries relationships, which will have an ever more strategic importance in the future to a) contribute to the advancement of knowledge, including in its professional context, through original and independent research, b) become a reference at European level and thus contribute to improving the overall quality of doctoral education and research in Europe.
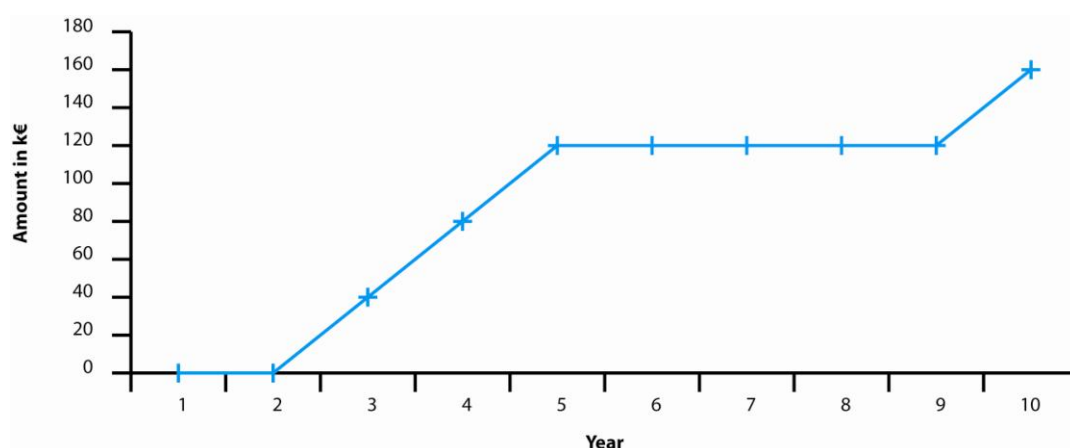

Figure 5. Target scheme for complementary funding

All these premises are the basis of an implementation and sustainable development plan that USED partners have discussed and that relies on the following. First, all the partners commit to support the master with additional resources by the universities because the course provides added value to the educational offer, research prospect, visibility and quality of the institution. However, the Erasmus Mundus program offers an opportunity

to experiment new models of university organization (also considering internationalization), governance, and funding that rely on a strict cooperation with the industrial world, which is useful and consistent in the context of an engineering doctorate school. These models, if tested successfully (according to proper cultural and socio-economical criteria), could be (possibly corrected/enhanced) replicated and spread to other EU universities.

In case a partner university does not have, USED will establish a fund-raising office with the aim of a obtaining a match (complementary) funding as sketched in the following graph. Our objective, after a two years running-in period, will be to have one co-funded grant for each USED consortium member and to maintain or possibly increase this trend also beyond EC funding (Figure 5).

The sources of the complementary funding will be: companies and institutions (also including regional technological districts), with three levels of sponsorships (platinum, golden and silver). This funding will be used to complement the EU grant for the fellowships and to enhance the services, also continuing to sustain the internationalization aspect of the course. Figures are not high, but represent a down to earth result in the scenario of present academy. Also the timeframe is long, but this is due to the fact that first benefits arising from such a post-graduate academic excellence- based activity are necessarily in a long-term perspective. Advantages for supporting companies/institutions and associate partners include:

- Visibility of the brand: in the campus, website, summer school, press (local and international), international conferences contests in which the USED attendants will be encouraged to participate and/or involved. Proper visibility rules will be defined based on the different sponsorship levels;
- Possibility of a strict cooperation with the university (shared definition/discussion of academic training activities, provision of industrial stage periods, and joint participation to EU research projects). The USED supporting companies expect to exploit the scientific and potential-business synergies due to the union of high-level, complementary research groups that operate in the USED expertise areas;
- Possibility of evaluating students' capabilities and liability in performing industrial-oriented tasks in order to spot and eventually employ best students.

A fundamental aspect of support from companies will be given through internships and stages, which will include "in kind" resources, thus representing a clear engagement for the supporting companies/institutions. A final and fundamental sustainability will be due by the continuity in the advancement of knowledge, including in its professional context, through the promotion of original and independent research activities. This is a challenge we aim at addressing both in scientific and socio-economic terms.

As a matter of fact (see also B.1.1), the transformation of our society is driving to an increasing need of new user- centered technologies and of professionals able to design and implement such innovative smart solutions. Therefore, following and sometimes foreseeing European Community guidelines (e.g. FP7 Future Emerging Technologies (FET) research theme), we will continuously broaden the USED partners research objectives that is the USED attendants educational/training activities towards new approaches and solutions in the USED areas of expertise. Finally, the support to be acquired from Erasmus Mundus for the USED Program shall help to access further complementing funding streams both from EU and national bodies. The reported targets are part of the Quality Assurance plan (B.5.4), and will be continuously monitored and pursued at all levels in the doctorate.

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*B.5.3 To what extent have **complementary funding** possibilities been explored and/or secured? How do these possibilities provide additional (full or partial) fellowships to additional doctoral candidates and, if applicable, top up the difference between the fixed program contribution to the candidates' participation costs and the actual cost for the consortium?*

This topic has already been addressed in conjunction with B.5.2. Additionally the partner universities agreed to support if necessary the EMJD USED by matching the difference between the fixed program contribution to the candidates' participation costs and the actual cost for each partner university.

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*B.5.4 Describe the nature of the **internal evaluation** (by the institutions themselves? through candidates/scholars feed-back systems? etc.) and **external quality assessment** (by e.g. national, international or professional bodies) envisaged. How (and with what periodicity) will these evaluation exercises be organised (by the institutions themselves, through an integrated approach agreed by all partner institutions, with questionnaires and feed-back systems, etc.)? What will the roles of the national, international or professional quality assurance bodies be, if any? How will the actors (Doctoral candidates / professors) be involved in this exercise? Will external experts be recruited for this purpose and - if yes - on what basis and how often? What meth-*

According to this statement, for each successfully applicant student two supervisors and three tutors (qualified members of the boards (i.e. PSC, MB, and QAB – see Figure 4) can play one of these roles) will be designed from the two universities which will be involved in the mobility scheme (supervisor) and from the other three partners (tutor). Moreover, an external tutor will be designed representative of one of the partner industries of the consortium (usually coming from a partner industry strictly related to primary supervisor university). These actors will compose for each attendant the Supervisory Board (SB) – see Table 5. This model ensures a fair in-volvement of all partners as primary supervisor tenures (institution where the student intend to spend the main part of her/his PhD); in fact being enrolled 15 students per year (8 coming from Third-Countries and 7 coming from European countries in odd years and 7 coming from Third-Countries and 8 coming from European coun-tries in even years), each institution will be able to host at least three PhD students per year. Moreover, a secon-dary supervisor will be designed who will represent the reference for the other university where the applicant intends to spend part of her/his course (at least 6 months). In such way, a proper balance among all partners and among all research activities will be guaranteed taking into account also students' interests (the second host country will be indicated by students in the application form according to their research interests or background and the PSC will decide about this basing on equal enrolment of students among partners and academic rele-vance criteria). Finally, four tutors will be designed after candidates' selection among the remaining institutions and the partner industries (the selection procedure both for supervisors and tutors will be based on candidates' career excellence and belongs to the PSC).

According to the disposals of European Association for Quality Assurance in Higher Education (ENQA), the PhD course will be continuously monitored on the basis of high level quality assurance. We have already de-scribed (B.5.1) the composition and responsibilities of the USED Quality Assurance Board (QAB) and its inte-gration with an important role in the context of the overall course management. The course-level QAB will op-erate in strict cooperation and based on the information from the local QABs, one for each course site. Every local QAB will provide a Self-Evaluation Report (SER). The report will describe the achieved quality level of the course (both as a product and as a process) with respect to previously defined objectives. The Methodology and Model for the Evaluation and Quality Certification of University Study Courses[8] will be followed, or an-other European model, for instance, EUR-ACE/ENAEE[9], as it will be considered more appropriate by the PhD Steering Committee before the start of the doctoral course. The methodology will include an internal and exter-nal quality assurance, which will reference to the QA procedures of partner institutions as necessary, to ensure that national and institutional regulations are met. The internal QAB will involve 5 members, of which 2 pro-fessors involved in the PhD as supervisors and/or tutors, 1 technician, 1 student and 1 representative of support-ing companies. The evaluation model will involve the following dimensions:

- **Management system**, which includes: processes for PhD management and documentation; organization structure for the needed decision processes; communication; periodical re-examination of the PhD man-agement system (in cooperation with Re-Examination Committee – see B.5.1.
- **Needs and objectives**. Needs of the involved parties (teachers, students, business), with particular reference to the socio-economical context; PhD quality policies; PhD quality objectives. This dimension includes the Quality of Leadership and Institutions (QUIL) component of the Erasmus Mundus Handbook of Quality10 (EMHQ), which involves: quality of academic staff, course Brand, securing and institutional commitment, international teaching and research, continuity and leadership, succession strategies and financial sustaina-bility.
- **Resources**. Teaching and education personnel, technical/administrative personnel, educational infrastruc-tures, technological equipment, financial resources, international relationships, external relationships (in particular business and institutions), context services and events (e.g. secretariats, tutoring, didactic manag-er, websites, Summer School, guided-tours, alumni events and association), student follow-up management, gender equality and support to disadvantaged students, Facilities, Logistics and Finance (FLAF), according to the EMHQ, which includes: student application and verification, travelling and inter-university move-

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[8] http://www.fondazionecrui.it/certificazione/

[9] http://www.enaee.eu/enaee/presentation.htm

[10] Support services related to the Quality of ERASMUS MUNDUS Master Courses and the preparation of quality guidelines, http://ec.europa.eu/education/programmes/mundus/doc/qafinal_en.pdf

ments, introduction to European academic practice, placements and internships, finances, student communication and consulting, alumni association.

- **Educational process**. This dimension maps to the Quality of Teaching and Learning component of the EMHQ, and includes: curriculum design, planning, career management and monitoring, objectives and outcomes communication, assessment methods, course review, ethical standards, learning skill development.
- **Academic collaboration**. Co-authored publications between USED consortium partners, especially between different areas of expertise, will serve as a mean to assess the quality of research integration.
- **Results, analysis and improvement**. Results mainly concern: attractiveness of the PhD, input students, effectiveness of the educational process, quality of teaching and of research, quality of cooperation with industry and in European partnership projects, quality of acquired skills and capabilities with respect to other PhD courses offered in partner universities, user (students) and stakeholder satisfaction (questionnaires, focus- groups), utility of the awarded title. Sample quantitative performance indicators (that require a strong involvement also of the follow-up graduate office, especially in view of sustainability) include: time to get the first employment, quality of the employment, career performance (including number of students pursuing academic career), course evaluations, number and quality of business related activities (e.g. internships, stages, etc.), projects, funding, contracts and cooperation with companies, patents, publications, seminars, available spaces, etc.

The fourth EMHQ component, Joined-up Practice and Integration (JUPI), concerns the consortium level, and is addressed by the global QAB, considering issues such as: student selection, consortium information system, course fees, division of labour, global quality assessment process, consortium management policies for awarding the PhD degree. Structured along these dimensions, the Quality Report will provide a qualitative and quantitative evaluation that will be checked by the subsequent external quality assurance procedure, which is described below.

The External Quality Assurance (EQA) mechanism will be performed on behalf of the USED consortium by external experts in order to analyze the choices done and results obtained by the PhD, together with the managed processes and the improvement actions adopted. The verification will be performed by independent parties and objectively compared with other masters. The EQA process will be tied to the internal mechanism, thus following the European model (e.g. EUR-ACE/ENAEE[11]), as it will be decided by the PhD Steering Committee before the start of the doctoral course. The EQA's evaluation group is expected to produce an Evaluation Report (ER) that gives a critical analysis of the content of the SER, also relying on the outcomes of an evaluation visit. The evaluation group is constituted by at least 2 experts, one coming from a university external to the consortium and the other coming from outside the academic world. A sample of the evaluation process is provided.

Putting things together, the overall quality evaluation process will involve a first step in which each partner university will produce a local SER and the corresponding ER. Then, on the basis of these documents, a course-level (international) SER and an ER will be produced. The results of the evaluation will be comparable with other similar PhD courses delivered worldwide and the partner universities, thus providing a fundamental tool for a continuous improvement of the PhD, by highlighting its strength points and weakness areas. Finally, REC will analyze internal and external reports defining new guidelines for the improvement of the USED educational offer. As an evidence of transparency, the external assessment reports together with internal ones will be made public on the USED website to make it visible the reached quality of the USED PhD.

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[11] http://www.enaee.eu/enaee/presentation.htm