IDCnet

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D1.4a Summary of key findings from IDCnet

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Abstract:

This document presents an overview of the IDCnet network and its results. IDCnet is a Thematic Network funded by the Fifth Framework Programme of the European Commission. The network was born originally as a support to the eEurope Action Plan, that noted the need to create recommendations for a European curriculum for designers and engineers in Design for All (DfA). The project evolved into an initial support to the activities of the European Design for All e-Accessibility Network (EDeAN) related to curriculum. The network has completed its objectives, producing recommendations for an optimal graduate profile for DfA, a taxonomy for core knowledge and skill sets for model curricula, and a set of recommendations on DfA-related

Abstract:

higher education and research policies and strategies.

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1 Executive Summary

This document is a report of the IDCnet project that summarises the major outcomes of the project. The report is organised in six sections and four appendices. Section 2 gives a quick overview over the origins of IDCnet, its objectives and the results presented in this report. Section 3 explores the results of the network in regard to the needs of industry, mainly coming from our first workshop in Helsinki, and how these could be translated to a graduate profile. Unfortunately, the response of the industry was not the expected for that exercise, and the network members have looked into alternative ways to define that profile. Section 4 presents our attempt to classify the Design for All body of knowledge via a taxonomy, which has proven to be useful and has been validated through a series of teaching pilots all over Europe. Section 5 proposes a series of recommendations to advance the field of Design for All education in European higher education institutions, and how policy can help to that end. Section 6 presents some conclusions and the path that IDCnet members want to follow to further strengthen the results of the network. Appendix A (section 7) presents some samples of teaching materials, classified according to the taxonomy. Appendix B (section 8) enumerates a series of exemplary references that could be used to implement DfA curricula, again classified with the taxonomy. Appendix C (section 9) briefly discusses copyright issues. And finally, Appendix D (section 10) lists all scientific publications of the network.

2 Introduction

This report summarises the work undertaken in the IDCnet project towards formulating curricula recommendations in Design for All for designers and engineers, as proposed by the eEurope 2002 policy document,[1] and consolidates the network's key findings.

The rationale for including Design for All in the design and engineering curricula is based upon demographic data, combined with the increasing spread of technology, that argues that unless Design for All is included at the design stage, we will increasingly find ourselves with Information products, systems and services that are inaccessible to the majority of intended users. Without awareness of these issues, and the corresponding education in methods and techniques of Design for All, Information Society designers and engineers will unknowingly incorporate technological impediments in future, and we will find ourselves with the parallel of inaccessible built environments.

In addition, in the light of the Bologna agreement,[2] it makes sense to approach this endeavour in a European wide scale, rather than at a national level.

The starting point for the IDCnet project was twofold. On the one hand, there was concern that IDCnet recommendations should be in line with real world needs, and on the other, a commitment to follow the widely adopted curriculum formulation methodology, which has as a first step to delineate and describe the body of knowledge that is the subject of the curricula.

Aligning recommendations with real world needs, meant an attempt to describe what industry presently requires, and would be requiring in the future from graduates in terms of Design for All qualifications (see Deliverable D2.1, "The needs of industry and future technologies landscapes and the resultant requirements for the graduate profile", and Deliverable D2.2, "The Optimal Graduate Profile for DfA Based on the Needs of Industry and the Possibilities of/within Educational Institutions").

Using the curriculum formulation methodology involved 3 steps. Firstly, collecting information about the type of knowledge and skills being taught in the name of Design for All. Secondly, this information was organised into a taxonomy, and the categorisation validated for usefulness and completeness in several ways – in a practical workshop setting, by expert review, and by using it in a real teaching setting. For more detail, see Deliverable D3.1 ("What constitutes DfA Knowledge? Identification of a range of work that contributes to DfA. Baseline document for attendees of

[1] http://europa.eu.int/information_society/eeurope/2002/text_en.htm
[2] http://europa.eu.int/comm/education/bologna_en.html

the IDCnet Helsinki Workshop: Design for All Curriculum: Towards a synergy of the needs of ICT industry and education") and also Deliverable D3.2 ("Identifying Core Knowledge and Skill Sets for Model Curricula").

Thirdly, the taxonomy was put to the test in a series of teaching pilots. This exercise also yielded a wealth of best practice in teaching methods and materials, and these are described in some detail within Deliverable D3.3.

Throughout IDCnet, the **what** and **why** teach inclusive design have been widely accepted in the form of the taxonomy. However, it has been evident that experts wish to share experiences on **how** to go about teaching each category (e.g., as reported in the Joint Workshop of IFIP WG 13.1 on Education in HCI and HCI Curriculum and IFIP WG 13.3 on HCI and Disability, INTERACT, September 2003, Zurich). There is interest in sharing specific materials and practical exercises, rather than 're-inventing the wheel', in both issues related to design for all in general, and also specific areas related to ICT. Therefore, in the annexe to this report, specific topics are provided for different categories of the taxonomy, which illustrate how each category can be implemented in practice. Examples of specific materials used to teach a particular topic are then provided (for example, detailed workshop methodologies), again classified under a category of the taxonomy. IDCnet contributors to these materials have been asked to be aware of copyright issues (see Appendix C) and either:

- Seek authority to make this material available to IDCnet and EDeAN, or
- State that the material can be used with their permission.

Recommendations for core literature and Web sites are then provided to support each part of the taxonomy, although it is clear that such a list must be updated regularly as the field progresses.

Finally, IDCnet wanted to explore ways to influence the teaching of Design for All at the level of policy and strategy in higher education decision making. The work in this area involved a survey of the situation at present both in Europe and other countries, notably the USA, and an attempt to identify the organisations responsible in each case. This would provide best practice models as well as suggest some recommendations as to the ways in which education in Design for All might be further advanced.

In the sections below, each of these areas is discussed in more detail, although for fuller discussion, the reader is directed in each case to the deliverable publicly available on the IDCnet website.[3] The conclusions describe the exploitation and dissemination strategies used within the project lifetime and the plans for the future of the IDCnet results.

[3] http://idcnet.info/

3 Exploring the need in industry for graduates qualified in Design for All

This area of work proved to be the most elusive in terms of definitive results that would impact on curriculum recommendations. It transpires that industry does not have clear ideas about what it expects from graduates in terms of Design for All education and that it relies a good deal on its own in-house training.[4] One might speculate that apart from some large industry players, the small to medium companies are not particularly aware of Design for all, unless they are trying to make it part of their core business offering, through specialisation.

As regards trying to understand what the future landscape might hold in terms of requirements upon graduates, again there were no clear signs from industry regarding the technologies that they would need to know about. The techniques of asking industry directly both in workshops and with questionnaire based survey were not very fruitful.

Other indications, slightly less direct were to look at job advertisements for "alternate media specialists" and other similar titles, on lists dealing with accessibility and disability issues, job advertisements for user interface designers, Web developers, software engineers, usability and human factors engineers, and to check the work in e-skills fora.

While the first at least gave a list of some of the technical skills expected of accessibility experts, even on the forum in which these advertisements appeared, they were derided by other list members for being overambitious and unlikely to attract any candidates in view of the limited number of hours a week on offer (20 hours).[5]

A further problem with such job advertisements is that they are very much reliant on describing specialist assistive technologies, (e.g., producing Braille, tactile graphics) to cope with specific disabilities, e.g., vision impairment, and produce specialist results, rather than results that are designed for all.

The analysis of job advertisements in usability and human factors showed that these disciplines are not warming to the concept of Design for All: accessibility is rarely mentioned, and where it is mentioned, it is desired rather than required. Job descriptions for user interface designers, accessibility specialists, Web developers, software engineers and other vacancies were usually not very specific. In most cases, familiarity or experience with accessibility standards or Section 508 is the only relevant

[4] Indeed, the IBM Systems Journal (available online: http://www.research.ibm.com/journal/sj/) recently launched a call for a special issue on accessibility, where the emphasis was firmly on furthering the creation and use of accessible IBM products, systems and services, rather that being more generic.
[5] The job description is reproduced in Appendix B of Deliverable D2.2.

requirement in an advertisement. Occasionally, experience with accessibility testing, Web testing tools, assistive technologies (JAWS[6] is often mentioned, but also screen magnification, text-to-speech and voice recognition) and specific authoring tools (accessibility features of Macromedia Dreamweaver[7] and Flash MX are often mentioned) are also required.

A common problem with such a list of specific skills, is that it is certain that some of them are so tied to present day technologies that they are bound to be obsolete soon. This is a problem often encountered when using job advertisements as a guide to knowledge and skills required by industry: the prospective employers are interested in the here and now, and are not in a position to understand the types of knowledge and skills that graduates need to possess in order to continue to work with new technologies, without substantial retraining. This problem has been noted by Career Space[8] and the European Information Technology Observatory (EITO[9]), both of which have tried to analyse and describe e-skills shortages.

The e-skills shortage debate has also another dimension to it, namely that the population at large needs to learn new skills, in order to become computer literate, or at least have enough literacy to be able to use new technologies. In particular this debate has surfaced in the UK, where the e-envoy declared that 97% of the population was able to get access to Internet, but this is not the same as the websites on the Internet being accessible![10]

To conclude, the job advertisements are at least interesting in that they can show in which industry sectors jobs are being advertised. It would seem that in the education sector there is the largest demand for people with skills in creating accessible media. This can perhaps be attributed to the widespread use of online delivery of learning materials in the USA, Australia and Europe, in combination with legislation such as the Special Educational Needs and Disability Act 2001 (SENDA) in the UK, and its counterparts in other parts of the world.

[6] http://www.freedomscientific.com/fs_products/software_jaws.asp
[7] http://www.macromedia.com/software/dreamweaver/
[8] http://www.career-space.com/
[9] http://www.eito.com/
[10] Office of the E-envoy, (2003). Quality Framework for UK Government Website Design: Usability issues for government Websites, and Guidelines for UK Government Websites (Illustrated Handbook). Available at http://www.e-envoy.gov.uk/webguidelines.htm

4 Towards a curriculum: Defining a Design for All body of knowledge

As a central part of curriculum design methodology, the work in this area concentrated upon understanding what the core knowledge and skills sets within Design for All are.

According to curriculum design methodology, by establishing the boundaries of a subject, the areas contained within the boundaries and the linkages between them, there is common ground to make possible the design of curricula recommendations. This most often takes the form of deciding what knowledge and skill sets will be expected from graduates who claim to have Design for All expertise. As discussed in the previous section, this works well when there is a correspondence between academic offerings and industry needs, but it is common to find that these stakeholder groups do not use the same language, except in highly technical, well defined subject areas, and that academic offerings may be in advance of what the marketplace needs.

It is rare that subject areas can be well defined. Most emerge from existing areas and then become large enough to warrant attention as a separate subject. As an example, networks are usually part of informatics/electrical engineering/computer science courses, however they are presently the subject of a curriculum design task force looking to make them a separate subject.

For Design for All, it is not at all clear that it should be taught as a separate subject. The debate about whether to aim at mainstreaming Design for All in education, or to aim for having it as a separate 'value-add' course has its strengths and weaknesses, and this will be discussed in the next section.

The definition of Design for All knowledge and skill sets required surveying as broadly as possible the teaching and courses that go under the names of Design for All, Inclusive Design, and Universal Design, etc. It meant as well searching for topics embedded within courses in for example, Computer Science, HCI, Ergonomics and Design. From the outset, the brief of IDCnet was to concentrate on ICT related Design for All, but to consult the experience gained in the last three decades from Universal Design in the built environment.

The survey (see Deliverable D3.1) described the existing body of teaching, the disciplines addressed, the audiences targeted and the methods of delivery.

More specifically, it found that the built environment is the most advanced in offering teaching on Universal Design, and that there can be some overlap between teaching Design for All for ICT, in terms of general awareness, while some teaching could offer good models for teaching methods. With regard to teaching in the ICT sector, much that is available

online is for teaching Web accessibility, and less well advertised are more general courses that deal with ICT products. In terms of the learners, courses were aimed at audiences from higher level education as well as professional development, especially in the area of Web accessibility. In terms of disciplines targeted, these encompass computer science, human-computer interaction, ergonomics and rehabilitation engineering, as well as product design. Regarding the depth and breadth of DfA knowledge, this was measured in terms of whether the teaching was a complete degree course, part of a course, a module within a course, or a one-off lecture or session.

The more central result was to classify the content areas identified, and associated topics for further elaboration. That is, the content areas and topics identified were grouped thematically into a two tier category system referred to as the taxonomy of Design for All Knowledge and Skill sets. The top tier of the taxonomy was designated General to all Design for All, such as the categories dealing with Awareness, while the lower tier of the taxonomy was specific to ICT, such as 'Accessible interaction' and 'Accessible content'.

The first preliminary version of the taxonomy was refined following the practical work with it at the Helsinki workshop (see Deliverable D3.2). The refined version is shown in the figure below (see Figure 1). This shows how sectors other than ICT, such as those for the Built Environment, or Transportation Systems could be represented in this taxonomy.

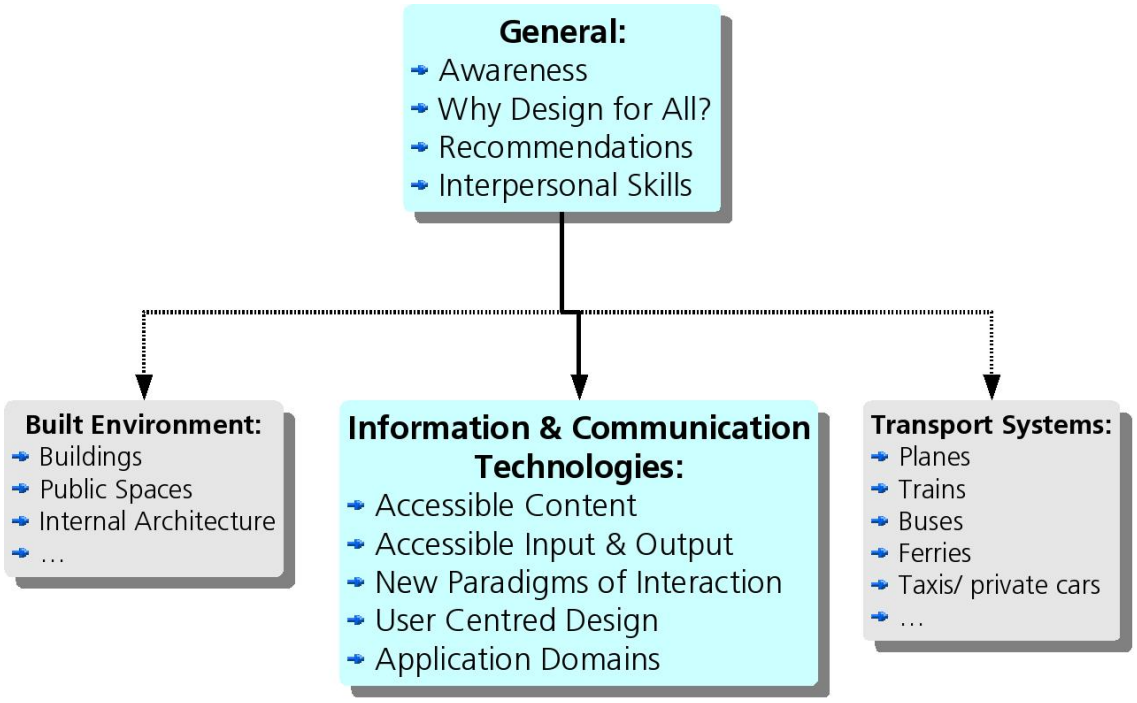

Figure 1. Taxonomy of Design for All Core Knowledge and Skill Sets.

The taxonomy is not meant to be prescriptive, but descriptive. This means that an institution where Design for All is being taught might concentrate on only some of the (sub) categories of the taxonomy, while using material from other categories in a lighter approach. An example might be

a computer science department which might spend a minimum time on awareness and why design for all, and a maximum on methods and techniques for producing accessible content. For a fuller discussion see deliverable D3.2 (Identifying Core Knowledge and Skill Sets for Model Curricula).

Also in Deliverable D3.2, each subcategory is associated with a learning outcome. Learning outcomes are defined as statements, which, in line with current pedagogical approaches, focus on learners rather than transmission of knowledge, and describe how the learners will be changed as a result of interaction with the knowledge and skills. In addition to learning outcomes for each subcategory, general learning outcomes as a result of learning about Design for All are posited. More specific learning objectives for topics within each subcategory would need to be formulated according to the context of the course and the study programme that make up the course. As stated above, the taxonomy is a superset of knowledge and does not in any way mandate the form that a specific course content might take in terms of emphasis, topics and depth/breadth of knowledge and skills.

Under each category, topics are listed that are further elaborated in the teaching pilots (see Deliverable D3.3 "Teaching DfA Core Knowledge and Skill Sets: Experiences in including Inclusive Design").

It was important that the taxonomy not be too large, in order to be usable. At the same time, it was necessary to adequately group and describe the different knowledge and skill sets that are covered in Design for All teaching. The teaching pilots validated the taxonomy for usefulness and completeness. This approach and its use in teaching pilots had several interesting positive results.

- It was reported that the taxonomy helped lecturers to plan their courses, in terms of thematic content, and to enrich existing courses with knowledge from other categories (see Deliverable 3.3, section 6).
- In a similar vein, new courses that were at the design stage were examining the taxonomy to plan content and structure of their courses and vary it for different audiences and teaching goals.
- One lecturer noted that the taxonomy was well advanced in terms of state of the art in accessibility, so much so that there was a considerable gap between what the computer scientists had learnt during their first degree course. It was, therefore, impossible to teach the elements of accessibility in terms of web services.
- The existence of a well described body of knowledge helps to get an overview of the present state of the subject by lecturers who are not yet teaching, but thinking of doing so.
- It is also useful as a classification system for researchers in the area, and others involved in classifying resources, such as librarians.

- From a teaching point of view, the examples given within the categories of topics to be taught provided useful sources of information as well as hints on teaching certain areas.

In the annexe to this report, an array of materials according to categories in the taxonomy are given and are described in the Introduction to this report.

The list of specific topics is by no means exhaustive, nor was it possible to reproduce all materials used by lecturers due to the need for copyright permissions (see Appendix C for some of these issues). There are also new sources of materials to be examined, notably for the design community there is the RSA toolkit,[11] which was launched in June 2004, whereas the Ariadne resource from EDeAN offers a wide variety of resources grouped by type as well as by theme.[12] Cooperation between IDCnet and D4All.net,[13] and in particular its SIG on curricula, will ensure that these materials are disseminated to the widest possible audience.

[11] http://www.inclusivedesign.org.uk/
[12] http://www.edean.org/
[13] http://www.d4allnet.gr/

5 Looking to the future: advancing Design for All education

The previous sections described the curriculum work related with the content of courses on Design for All. However, IDCnet also looked beyond defining the content to higher education and research policies and strategies to see how best to advance Design for All education in Europe.

One way of doing this was to separate the approaches into 'top-down', and 'bottom-up' approaches. The top-down concerned the organisations that were capable of implementing and/or mandating Design for All education, while the bottom-up approach would come from educators who through their teaching and research work would try to influence peers and present day research students/future colleagues. The work to further Design for All from the bottom-up is described in Deliverable D3.3 (Section 7) and briefly summarised here.

5.1 Bottom-up (educator) approaches

Two models of best practice were described: the first is the initiative from within Universities in Spain to collaborate nationally to introduce Design for All as compulsory in Computer Science courses. This initiative is run as a project and offers a model to other countries on how to coordinate curriculum activities.

The second model of best practice was from the Universal Design Education Project. This project started in 1989 and is concerned mainly with the built environment. It has described the lessons learnt as a result of an experiment undertaken in 1993-94, when twenty two design schools (higher education institutions) were funded to undertake Universal Design (UD) in the areas of architecture, landscape architecture, interior design and industrial design. The lessons they posit are compared in each case with the IDCnet experience. Specifically they concern:

- **A common curriculum**: UDEP found that it was not possible to implement a curriculum uniformly, rather each institution adapted curriculum recommendations appropriate to its needs. IDCnet never attempted to talk of a common curriculum given the wide range of disciplines involved in ICT education. However, the approach of the taxonomy has so far proven to offer common ground for all disciplines to talk about DfA content.
- **Mainstreaming Design for All**: The UDEP recommends strongly that UD be "infused" throughout the curriculum rather than as a standalone course, as it risked being marginalised. The IDCnet experience, as understood from the teaching pilot data, is that the infusion approach although logical, is difficult to achieve until there is critical mass within the teaching and research staff committed to DfA. However, it is possible to see the difference between the

pervasive and specialist approach along the continuum of breadth/depth of knowledge, where all students should be aware of DfA and its importance, but only those specialising in DfA should be expected to have a full understanding of all the issues and methodologies. This approach also allows for students with specialist knowledge to exploit this as competitive edge over other graduates.

- **Consulting the users:** The UDEP highlights the importance of using consultants/experts who are real users, rather than advocates. This was also the finding of IDCnet, for example with its very successful workshop at Loughborough University, involving members of ISdAC.
- **Dealing with the problem of continuity**: This problem came up in the IDCnet teaching pilots in no less than four separate pilots. The UDEP analysed some of roots of this problem as the culture prevalent in higher education which values individual efforts at research (publications) and questions curriculum development as a form of scholarship, all this against a background of the power of tradition, inertia in design educators attitudes and inadequate time for course development. UDEP was able to directly address the latter two issues because it used its funding to employ personnel to gather course materials and coordinate user consultants. In comparison, it is certain that the funding received by the IDCnet project was the mechanism that promoted collaboration and helped to sustain impetus. However, the funding of UDEP also provided for advisors' visits, which proved a very effective way of adding prestige and credibility to UD teaching. The future of the pilots carried out during IDCnet, e.g., those which must rightly pay for user involvement, may depend on whether or not the universities will provide the necessary funding.

The overall conclusion is however that dealing with these issues from a bottom-up approach only is not sufficient. Some collaboration with policy and strategy decision making bodies is required. In the case of IDCnet, the endorsement given by the Commission in the form of project funding was a powerful tool. It is also possible to see that the Spanish educators' effort has modelled its initiative upon the impetus given by the Council of Europe[14] which on 15th February 2001 adopted a resolution of the introduction of the principles of Universal Design into the curricula of all occupations working on the built environment. More specifically it stated that:

- New inclusive perspectives of universal design should become a compulsory part of the education and training for everyone working on the built environment
- That examples of good practice should be shared

[14] EU Resolution ResAP, 2001, at http://cm.coe.int/ta/res/resAP/2001/2001xp1.htm

- That member states revise their curricula in different educational and training institutions.

Such policy statements offer the vehicle for efforts to be extended from one discipline area to another, in the case of Spain, from the built environment to all courses in Computer Science.

5.2 Top-down (higher education and research policy and strategy making organisations) approach

With regard to the top-down approach, the work describing initiatives and decision making bodies that can influence education in Design for All has been documented in Deliverables D4.1 ("Report on update of Design for All and Design for All related higher education and research policies in EU member countries and USA") and D4.2 ("Analysis and recommendations on Design for All related higher education and research policies in EU member countries").

The recommendations in Deliverable D4.2 are based on the results from the desk survey on the state-of-the-art of Design for All related education and research strategies and policies, the experiences from the situation in the U.S., and the information gleaned from the questionnaire sent out to Design for All experts primarily in higher education, but also in the relevant ministries in the European Union member countries and experts at the EU level.

The recommendations are primarily targeted at the higher education institution level and most of the respondents to the questionnaire came from this level.

Further to these recommendations, in this section of this report, more specific measures based upon the Design for All content and the taxonomy, are elaborated with a view to proposing some more concrete ways to implement those recommendations.

5.2.1 Recommendation 1: Be sensitive to diversity in cultures

Design for All related strategies and policies, independent of the level their effect is targeted to, must be sensitive to the inevitable variation in people, place, curricular focus, culture of higher education institutions, and to the strategy and policy cultures in various European Union member countries.

5.2.1.1 Rationale

The development of recommendations for DfA education and research policies and strategies in Europe has been based on the recognition of the challenge already identified in the USA that strategies must be sensitive to the inevitable variation in people, place, curricular focus, and in strategy and policy cultures in various EU countries. The same issue was also discussed in the IDCnet workshops, both in Helsinki in February 2003 and

in Sankt Augustin a year later. Independently of these two workshops, the same challenge was again taken up in the Design for All in Education conference in Stockholm on 8 May 2004, jointly organised by the Nordic Council on Disability and EIDD Sverige, the Swedish branch of EIDD. The same message has been repeated over and over again during the IDCnet timeline, especially by the educational professionals in the higher education sector. This is why the first recommendation touches this very issue.

5.2.1.2 Implementation suggestions

This Recommendation also corroborates the findings from the teaching pilots (see Deliverable D3.3). There it could be seen that each institution had its own mission and aims, and its students were from varying backgrounds, studying a variety of courses, and the teaching itself varied from whole courses, to modules within a course. The link between these was the knowledge, and although teaching was not interchangeable, the academic staff were quite able to communicate at the level of core knowledge and skills sets, as given in the taxonomy. We believe that this can be the level whereby recommendations for curricula that are European wide can be implemented, while at the same time allowing each institution the freedom to teach those sets that it feels are relevant, and in the way most appropriate for its community of learners.

5.2.2 Recommendation 2: Develop Design for All related legislation

The role of Design for All related legislation as an incentive to develop Design for All education is recognised by the IDCnet project. This concerns both Design for All related legislation to improve equal access to products and services, and also legislation on inclusion related to equal access to education. The role of industry is of critical importance in the first approach, as much as the role of higher education institutions and governments in the second.

5.2.2.1 Rationale

The role of legislation as a primary incentive also to develop Design for All related education and research strategies has been taken up by a large number of experts involved in the IDCnet project. Many of the experts have referred to the role of legislation in the context of industry: legislation regulating the Design for All qualities in products or services is considered to create pressure to industry, and this pressure is expected to channel itself also towards education. The same reference has been made in the reports related to the identification of the needs of industry in the IDCnet project.

On the other hand, the role of legislation can be considered of importance also in the context of inclusion. Legislation on inclusion to support equal

access to education could become an incentive to develop Design for All related education, and especially encourage staff in educational institutions to train themselves in DfA.

As an example, the U.K.'s SENDA legislation (Special Educational Needs and Disability Act 2001[15]) puts the onus on members of staff who produce (electronic) teaching materials to ensure that these materials are accessible. The increase in awareness has led to the development of courses for academic staff to learn about these matters. For such courses one may examine the courses given by University of Linz (see D3.3) as well as content from the categories of the taxonomy such as "Awareness", "Recommendations", "Interpersonal Skills", as well as the more ICT specific categories of "Accessible Content", "Accessible Interaction: input and output".

5.2.2.2 Implementation suggestions

In order to advance Design for All teaching in the Design and Engineering professions a practical suggestion might be for guidelines (in the first instance) advocating the adoption of the curricular recommendations, in the form of the taxonomy of Design for All Core Knowledge and Skill Sets. Specifically, such guidelines might recommend and later mandate that **all** higher education institutions provide instruction in the General areas of Design for All (e.g., Awareness, Why Design for All, Recommendations and Interpersonal Skills for teamwork) and that individual institutions concerned with Design and Engineering take up teaching of specific topics within the category relating to ICT Design for All according to their interests.

5.2.3 Recommendation 3: Encourage knowledge transfer between industry and education

Industry and educational institutions should interact on a regular basis to identify and update industry needs in relation to Design for All education and research. The interaction is also needed to improve knowledge transfer related to the accumulation of Design for All knowledge in educational institutions, either through education or research. Existing European Design for All networks, such as EDeAN and AAATE, provide platforms for this interaction and especially knowledge transfer, which should be further supported. The role of professional networks (e.g., BEDA and national designer networks) and university networks (e.g., Cesaer and Cumulus) should also be strengthened.

[15] available at: http://www.hmso.gov.uk/acts/acts2001/20010010.htm

5.2.3.1 Rationale

The role of industry in the context of developing Design for All education and research strategies and policies has been well recognised by the DfA experts throughout the IDCnet project. The reports related to the identification of industry needs on Design for All education show on the other hand that a lot remains to be done. The awareness of industry to Design for All needs to be deepened, and in addition, more and relevant tools to implement Design for All by industry need to be developed.

As identified in the UK Lambert Review,[16] Sector Skills Councils, or SSCs,[17] encourage employers to take action collectively to meet their skill needs at a sector level. The report points out, however, that in order to effect change in university courses and curricula, the SSCs need to have a dialogue with universities, but it is not clear that a mechanism exists for this to happen.

The Lambert Review also pointed out that a large proportion of the initial skill-deficiencies reported by employers relate to skills and knowledge that are best acquired on the job. Furthermore, the review emphasised that employers from the creative media and IT sectors are particularly concerned that the recent explosion of courses in their subject areas has resulted in many courses that do not equip students with the intellectual, specialist or transferable skills that they require to undertake a career in those industries. The report also stresses that it is important for students, particularly science students, to develop entrepreneurial skills. To address some of these issues, the UK's Science Enterprise Centres have also been set up, using government funding at 13 centres involving over 70 universities nationwide.

5.2.3.2 Implementation suggestions

Higher education and research policy and strategy making organisations should be encouraged to engage industry in the awareness of Design for All. They should work to create climate for industry to appreciate, and eventually require, students with DfA knowledge and skills. Specifically, academics along with user representative associations, with the backing of research and education bodies could take the categories of "Awareness" and "Why Design for All?" from the IDCnet taxonomy and organise outreach events for industry representatives using these knowledge sets.

Sector Skills Councils, for example E-skills (which is the UK's SSC for IT, telecoms and contact centres) should be encouraged on a pan-European basis. Policies and strategies need to be in place to ensure that SSCs have

[16] H.M. Treasury (2003). Lambert Review of Business-University Collaboration. Final Report. Norwich: HMSO. Available at: http://www.lambertreview.org.uk/ or at: http://www.hm-treasury.gov.uk/media/EA556/lambert_review_final_450.pdf

[17] http://www.ssda.org.uk/pdfs/sscdguide.pdf

real influence over university courses and curricula, and government should facilitate this process.

In addition, it is important to increase and support the opportunities for students to gain experience of working with industry as part of their course, whether it be on a "day release" basis, through an additional year gaining a Diploma in Professional Studies, or through some other form of co-operative working This will give students experience not only in implementing Design for All good practice, but also will help to develop their entrepreneurial skills. Government funding should be sought to set up "science enterprise centres" across European universities in order to promote and facilitate this process.

It should be noted that the DASDA project[18] was aimed particularly at industry, and that its materials are very useful in this respect. DASDA has made a start, but the work must continue, and this time with the message coming from the higher education institutions, whose students are tomorrow's workers and industry leaders.

5.2.4 Recommendation 4: Support individual champions

The role of individual champions to develop Design for All education in higher education institutions has been recognised as essential. These early advocates of Design for All education should be recognised and supported. This can be done via supporting the champions through allocation of funding and using success in the Design for All approach as a quality criterion.

5.2.4.1 Rationale

Individual champions have been recognised by the IDCnet project to play a crucial role in the development of Design for All education and research in higher education institutions. The experience of this has been very much the same both in Europe and in the United States. It is acknowledged that the role of Design for All advocates should be strategically supported and recognised.

5.2.4.2 Implementation suggestions

In the IDCnet teaching report, there is a detailed account of the use of a champion (see D3.3). In this case, the University in question partially funded the collaboration, for example with regard to paying for accommodation of the visiting user to the inclusive design workshop. All involved agreed it was a great success, including academic staff and students, but also more peripheral services, such as the accommodation services. For this to be repeated, funding needs to be justified and seen

[18] http://www.design-for-all.info/

by all to be not just "added value" but critical expenditure, perhaps on the basis of the legislation as in Recommendation 2.

However, other measures that can be taken might be to make a registry of such champions, and disseminate this to relevant research communities, as in the case with other specialities, so that the prestige from guest speakers/participants can encourage their support from Universities. These advocates are often engaged in "awareness" activities, and can be called upon to help out whenever that category is discussed, although many of them, by virtue of being champions, will be experts in other areas of the taxonomy.

5.2.5 Recommendation 5: Train the trainers

Higher education institutions are encouraged to deepen the Design for All knowledge base of their whole staff, not only teachers. A solid Design for All knowledge would support institutions also in the implementation of inclusive strategies related to equal access to educational institutions.

5.2.5.1 Rationale

Many DfA experts and individual champions have recognised in the higher education institutions context that it is difficult to awaken the interest of other teachers in Design for All. To improve the situation, further training of staff on DfA is necessary. This is important also, because Design for All is essentially a cross-disciplinary activity, and integrating Design for All contents in existing courses is considered one of the more effective ways to develop DfA education.

National programmes aimed at curricula change are instrumental in keeping the national level of education current, and their worth and benefit is well recognised. On the European front, the Socrates and Erasmus programmes, amongst others, of DG Education and Culture are largely responsible for curricula change and equivalence between different countries and have made possible much mobility within Europe, adding to an increasingly mobile professional class, able to function in more than one European culture. With extension of the Union it is even more important to reward those who work in curriculum design for their contribution to strengthening Europe. As regards Design for All, now more than ever before, there is the danger of slipping into a two speed Europe, with some parts of the Union implementing Design for All, and others not. Some of the practical parts of preventing this would be disseminating the IDCnet taxonomy, the exchange of ideas/materials with new members in the form of workshops, customisation/translation of materials, and of course, promoting training the trainers.

5.2.5.2 Implementation suggestions

As identified in D3.3, several obstacles exist to overcoming ignorance and apathy on the part of colleagues towards Design for All. Amongst these

are true unawareness, or more frequently, partial awareness where colleagues believe that DfA is ethically correct, but a very specialised area of work, dealing with minorities who are disabled or elderly. Another obstacle is the tradition which sees curricular design activity as "donkey work".

Given this state of affairs, higher education and research policy and strategy making bodies should actively seek to elevate the status of, and reward effort in, curricula development, recognising the usefulness to society in seeking to change established attitudes and be progressive. Initiatives that reward collaborative endeavours on curriculum design might include decreeing that such work be noted in CVs, or even providing opportunities for individual promotion and salary benefits. This has lately been the case in some member states when individual academic staff design and promote new MSc courses. Such status elevation would help to encourage converts to DfA who would not otherwise spare the time from their schedules, because of lack of recognition of their efforts.

Some suggestions for ensuring implementation of the above recommendation might be push for change in the culture of academic practice, instituting a requirement to show that academics undertake activities that demonstrate that their teaching and research is up to date. Presently, their publication and conference attendance record serves as evidence, pressure from higher education policy and strategy decision making bodies to show other evidence more specific to curriculum currency and renewal and to require that academics show activity in this area. For example, the Research Assessment Exercise (RAE) in the UK could be encouraged to take on board activities in Design for All as evidence of 'Esteem'. Design for all as an attitude impacts every single academic discipline, thus topics from the general category of the taxonomy could be introduced into every subject, from humanities based courses through to scientific based courses. The European Commission could support and promote such esteem by including another category, "Academic contribution to Design for All Curricula" in its Design for All Award scheme.

In addition, educational funding bodies should take more account of the views of groups who benefit from skilled graduates, such as employer-led bodies, a recommendation that emerged from the UK's Lambert Review

5.2.6 Recommendation 6: Strengthen Design for All research

Research on Design for All should be developed to strengthen the Design for All related knowledge base. Higher education institutions, national and European research development bodies are encouraged to give Design for All related research a high priority in their agenda. They are also encouraged to ensure that knowledge transfer of research results is organised to support effective implementation of DfA knowledge and to encourage continuous interaction of research actors with other actors in society.

5.2.6.1 Rationale

Design for All research was identified by the DfA experts in the IDCnet project as one of the most effective means to support development of Design for All strategies both from bottom-up and top-down. Research is essential in strengthening the Design for All related knowledge base and thus providing material for Design for All education. It has also a direct impact on the status of the field. Efficient knowledge transfer from universities and research institutions to industry, professionals and social actors is the other important issue here, to ensure that relevant actors have easy access to knowledge produced.

5.2.6.2 Implementation suggestions

Normal channels are bottom-up, in this case where researcher and academics push Design for All on to the agenda of conferences, or hold specialised conferences (e.g., INCLUDE, CSUN, AAATE conferences). However, specific statements from education research and policy bodies, supporting the inclusion of Design for All topics and approaches within a wide variety of conferences, not normally associated with Design for All, would help to increase interest in this, possibly with measures such as funding support, awards such as those recently begun by the European Commission, etc. Promotion of such awards should, however, be disseminated more widely and not just to the already "converted" audiences. Suggestions could include targeting the publicity for such awards to mainstream associations and conferences to get Design for All on their agendas. The development of conference tracks aiming specifically at young researchers, such as "Conference on Vision and Hearing Impairment (CVHI[19])," should also be promoted.

5.2.7 Recommendation 7: Use a cross-disciplinary approach

Higher education institutions are encouraged to recognise the cross-disciplinary nature of Design for All and to develop Design for All education through integrating the approach to existing curricula, courses and modules in relevant academic fields. Courses with a specific focus on developing Design for All are reasonable when the knowledge and research base needs be further deepened.

5.2.7.1 Rationale

It has been recognised by the Design for All experts in the higher education institutions involved in the IDCnet project that one of the best ways to develop Design for All education is to integrate DfA in existing courses and curricula, rather than solely through developing separate DfA

[19] http://www.elec.gla.ac.uk/Events_page/CVHI/

education. This is also related to the fact that Design for All is essentially a cross-disciplinary activity.

5.2.7.2 Implementation suggestions

Further development of topics in each of the categories of the taxonomy, with indications from topic owners of the disciplines that make use of the topics, will help to provide concrete and practical aspects to the multidisciplinarity of DfA. For newcomers, following such topics with their accompanying indications will provide an entry point to the taxonomy.

5.2.8 Recommendation 8: Make Design for All visible

Efficient knowledge transfer, making good Design for All practice visible and sharing experience on developments of Design for All education are all identified as effective strategies to develop Design for All education and research. Higher education institutions are encouraged to document their Design for All related developments both to share the experiences with other actors and to have support to the long-term strategy development on DfA related education. Dissemination of these documents should be supported by the DfA related networks, e.g., the EDeAN Curriculum Special Interest Group.

5.2.8.1 Rationale

When asked how higher education institutions could be encouraged to commit to Design for All education, DfA experts came up with a large variety of approaches. Many of the approaches were related to making Design for All interesting to relevant actors, including industry and professionals and professional organisations. Demonstrations of the effectiveness of DfA approach were also taken up when most effective means to support Design for All bottom-up was discussed.

5.2.8.2 Implementation suggestions

Some suggestions for ensuring implementation of the above recommendations might be the imposition of a time line by which all Universities have to have taken steps to include DfA topics and have documented proof that DfA Information Days, Seminars, Workshops etc. have taken place to its academic staff, and even to representatives from industry. Such a recommendation would have to be imposed by the education and research policy and strategy making bodies using the means they have at their disposal in the various member states both to enforce such recommendations, or possibly to encourage the uptake of such recommendations, by such means as awarding funding for such activities, "merit points" in RAE exercises, etc. Again these bodies could use the taxonomy to make more specific the requirements, by asking that various categories be presented, e.g. (Awareness, Why Design for All) at an introductory phase.

5.2.9 Recommendation 9: Include Design for All in the quality criteria

It is proposed that bodies developing quality criteria and quality assessment for higher education institutions would consider implementation of Design for All approach as part of inclusive strategies in educational institutions as a relevant quality criterion.

5.2.9.1 Rationale

Design for All education is linked to the inclusive strategies of higher education institutions. The Design for All approach needs to be discussed as a holistic concept in higher education: it is related to the content of education, but it is also part of access to the built environment, access to communication and equal access to education in higher education institutions. This link would be essentially stronger if the Design for All approach, as part of inclusive strategies of universities and other higher education institutions, would be recognised as a quality criterion for higher education. A consequence of this would be that DfA would also become linked to public funding for universities. Design for All as a quality criterion affecting funding would be a stronger incentive for universities to develop Design for All strategies for education and research.

5.2.9.2 Implementation suggestions:

As partly suggested above in the rationale section, teaching DfA and practising it within the educational environment is a practical measure to endorse inclusion strategies. As with other recommendations, the endorsement of higher education and research policy and strategy making bodies need to make provision for recognition of efforts that would need to be rewarded, either with funding, awards, or a combination of both.

5.2.10 Recommendation 10: Support interaction of top-down and bottom-up approaches

All actors in Design for All education and research strategy and policy development are encouraged to support developments both top down and bottom up. This essentially requires efficient networking and efficient knowledge transfer.

5.2.10.1 Rationale

Many Design for All actors participating in the development of DfA related education and research strategies and policies in the IDCnet project agree that interaction between top-down and bottom-up approaches is essential. This understanding seems to have evidence base in some of the more advanced European Union member countries in relation to DfA education or research strategies, especially Sweden, Norway, Greece and Great Britain, where numerous actions have been taken to develop DfA

strategies in legislation, in ministerial level policies and in concrete educational projects in higher education institutions. The development of curricula and educational projects has often been led by early Design for All advocates and individual champions. These advocates have often also been essential to the development of ministerial level activities.

5.2.10.2 Implementation suggestions

As an example, in Greece, a Task Force on "Universal Access and Usability in the Information Society by all citizens, including people with disabilities and other disadvantaged groups", was established in April 2002 in the context of the 3rd Community Support Programme, Secretariat for the Information Society, Hellenic Ministry of Economy and Finance. The Task Force has an advisory role to the Secretariat for the Information Society on issues related to Universal Access and usability of Information Society Technologies in all planning and implementation phases of the Operational Programme "Information Society". Additionally, it is in charge of formulating proposals for actions promoting eInclusion in the context of the implementation of the eEurope Action Plan at a national level, according to the principles of Design for All, as well as proposals for legislative, policy and awareness-raising actions. Additionally, the National Greek Network on Design for All (GR-DeAN[20]), has started its activities as a member of the European Network on Design for All (EDeAN) since 2003. The GR-DeAN Network aims to promote the wide application of the "Universal Access and Usability" and Design for All principles in Greece, and to support activities towards equal participation of people with disability to the Information Society in Greece. Finally, a study entitled "Universal Access and Equal Participation of people with disabilities in the Information Society", has been very recently conducted by the University of Crete, targeted towards: (a) an in-depth investigation of the current situation concerning technological, market, legislative, regulatory and policy issues affecting access of people with disabilities and other disadvantaged groups in the Information Society; and (b) the proposal of holistic measures and specific practices in Greece.

A further example is the cooperation between a consortium of Spanish Universities and the relevant higher education and research policy and strategy making bodies, as described in deliverable D3.3.

[20] http://www.e-accessibility.gr/

6 Conclusions and ways forward for IDCnet members after IDCnet

As a network, IDCnet has been strongly focused on dissemination and outreach throughout its funded phase. An impressive number of conference papers have been produced given the timeline of the project. A list of these is available on the IDCnet website[21] and in Appendix D.

Besides targeting communities aware of Design for All, such as those working in assistive technology, (AAATE,[22] ICCHP[23]) for example, IDCnet has also tried to take its message to fora that do not have Design for All as a central tenet of their research policies and strategies, such as the research groups involved in speculating about the use of Future and Emerging Technologies (FET) and those involved in Computer Ethics, dealing particularly with questions of computer security, surveillance systems, and privacy rights, and leaving aside questions of accessibility and disenfranchisement. Another forum was education in Industrial Design. In the lifetime of the project there was only time for the seeds to be sown, and it is still too early to judge whether they have borne fruit. It is encouraging though, that the organisers of the Disappearing Computer Conference have asked for a contribution to their Convivio magazine[24] to describe the contribution of Design for All to FET, while the contacts formed with delegates from ICSID[25] have led to a suggestion for a stream devoted to sustainable design in the next conference.

As a group, the IDCnet community has formed close associations and plans to continue its activities using the infrastructure provided by D4ALL.net project, within the EDeAN Curricula SIG. The majority of IDCnet members belong to their national EDeAN associations or are National Contact Centres. With regard to conferences and workshops, IDCnet has actively participated in the EDeAN-AAATE Workshop "Education and Training in AT and DfA," organised in November 2004 in Düsseldorf.

Further existing infrastructures, with individuals having a dual (or even triple) role in EDeAN, IDCnet and IFIP WG13.3 on HCI and Disability, can also be used to promulgate the work on Design for All curricula. At the Annual General Meeting of IFIP WG 13.3 held at ICCHP (July 2004) it was suggested (as documented in the minutes) "that WG13.3 is an excellent contact point to get the message across and to promote design for all in the curricula. In this regard, there could be more integration with the

[21] http://idcnet.info/pubs
[22] http://www.aaate.net/
[23] http://www.icchp.org/
[24] http://www.convivionet.net/
[25] http://www.ifdesign.de/icsid_index_e

work of the IDCnet project, which is making recommendations for curriculum work on Design for All, in terms of content and in terms of sustainability. Although the funding of IDCnet is officially at an end, materials and recommendations are feeding into the EDeAN SIG on Curricula. Those who have a dual role in both EDeAN and WG13.3 will be approached, and ways of collaboration can then be investigated. For example, the literature/website list developed by IDCnet will be circulated to WG13.3 members for comment and additions."

The exploitation strategies of the IDCnet project are described in deliverable D3.3, Chapter 8, and include:

- **Creating a vibrant research community:** at present the community is quite small and disparate, IDCnet members will continue to encourage research students and peers to collaborate.
- **Infiltrating other research communities:** many research communities such as FET mentioned above have little awareness of Design for All.
- **Making strategic alliances with other disciplines in terms of teaching materials and course offerings:** HCI and Ergonomics are two disciplines where Design for All is closely related to the teaching on offer. Other more distant alliances might be forged with business and management disciplines, information science, etc.
- **Continuing to network:** IDCnet will now be absorbed in EDeAN. The alliances forged between the members of IDCnet will continue, with teaching visits and exchanges between the institutions and also using consultants from ISdAC[26] and other user organisations, rewarding their contributions, as recommended in the FORTUNE Project.[27]
- **Pooling of resources:** The IDCnet deliverables are already available in the ARIADNE resource, and the teaching materials and core literature and web sites (in the Appendix) will be integrated and comments and improvements sought from the SIG. In addition, members of the network have and are contributing to the RSA's Inclusive Design Resource.

[26] http://isdac.org/
[27] http://www.fortune-net.de/

7 Appendix A: Examples of teaching material per category of taxonomy

This appendix covers examples of topics and teaching materials covered in different IDCnet pilots (see Deliverable D3.3 «Teaching DfA Core Knowledge and Skill Sets: Experiences in including inclusive design», for further description of the pilots). This appendix must be used in coordination with Appendix B, where concrete pointers are given.

7.1 Awareness of Design for All

- The Information Society and its dimensions of diversity
- Demographics, statistics and classifications
- Physical/psychological capabilities of users
- Social, functional and medical models of disability. See, e.g., the International Classification of Functioning, Disability and Health from the World Health Organisation (WHO), available online at: http://www3.who.int/icf/icftemplate.cfm
- Bell curve, designing for diversity of users, not a 'typical' user, temporary and permanent disabilities
- Definitions: Design for All, inclusive design, AT, etc.
- DASDA at http://www.design-for-all.info/
- Simulation exercises
- Awareness of issues such as "stigmatisation"
- Diaries from BBC Ouch! Website (http://www.bbc.co.uk/ouch)
- "Web sites that Work" video, available at (see README file before downloading): ftp://ftp.fit.fraunhofer.de/bika/WebSitesThatWork/

7.2 Why Design for All? Ethical, legal and commercial considerations

- Demographics, statistics and classifications
- Business case for DfA, particularly emphasizing the ageing population
- Business case of Web standards compliance
- DASDA at: http://www.design-for-all.info/

- Case studies – successful design for all: Oxo,[28] cordless kettles, Ford Focus
- Social responsibility
- Legislation (see recommendations), for example
    - Progression from 1948 Declaration of Human rights to adoption of equal opportunities for all
    - Push of ADA and the pull of Section 508
    - EU directives (education, transport, etc.)
    - National legislation and initiatives: the right to health benefits, the right to work, etc.

7.3 Recommendations, guidelines, standards

- eEurope 2002 and 2005
- W3C-WAI
- WCAG 1.0 and draft 2.0 (guidelines, checkpoints, techniques, all taught with an example)
- U.S., European and national legislation, e.g. DDA, and educational oriented, e.g., SENDA
- Standards and Working groups (CEN, CENELEC, ETSI)
- Guidelines from companies (Microsoft, Sun, IBM, etc.)
- 7 Principles of Universal Design (exercise for students: finding examples of each of the 7, see if they can find an 8th).
- WHO's ICF and emphasis on functioning rather than disability
- Best practice examples (IBM Accessibility Design steps, BT's Intranet)

7.4 Interpersonal Skills for Teamwork and Communication

- See, e.g., the Inclusive Design Workshop from the sample material
- Individual and Joint projects
- Collaboration between departments and multi-disciplinary teams, where possible
- Searching for and presenting examples of good and bad design
- Submitting material electronically and ensuring accessibility

[28] http://www.oxo.com/

- Making accessible presentations: good practice in making presentations to an audience with diverse abilities, making presentations under unfavourable conditions
- Making presentation materials accessible (converting PowerPoint format to html, hints for supporting materials, etc.)

7.5 Accessible Content

- Importance of content to Information Society
- Digital and non-digital content
- Comparison of usability with accessibility of user interfaces
- Managing and developing on-line applications
- Importance of structure: e.g., using Cascading Style Sheets
- Use of different types of media to convey different info, e.g., text description of a task compared to a diagram (may be redundant but offers reinforcement). Students invited to find counter examples
- Example of Athens Olympic Website: problems for people with colour blindness, and `lang` attribute missing from English version of the site
- Web Evaluation and Repair tools (manual vs. automatic)
- Improving accessibility of student's own GUI: keyboard-only use or screen-reader testing
- Examples from augmentative and alternative communication systems

7.6 Accessible Interaction: input and output

- Alternative Keyboards, displays and mice
- Accessibility options in Windows, MacOS and Linux
- Assistive devices and software and how they interface to standard environments and applications (screen readers, speech synthesis and recognition, switches, scanning interfaces, etc.)
- Demos of software (e.g., demonstration of software for dyslexia, TextHELP Read and Write)
- Paper prototyping a novel interface (blindness, sign language users)
- How some AT has been taken over by mainstream design, e.g., voice recognition, vibrating and flashing mobile phone alerts
- Videos from WebAIM (http://www.webaim.org/) showing a blind student demonstrating screen reader (Comment that non-native English speakers, with poor room acoustics, and poor quality of speakers on computer meant captions on WebAIM would have made

video more accessible!); and 'Websites that Work', with captions in different languages

- Develop a 3D tactile model for the Phantom force feedback device
- Finding pictures on the internet
- Designing your own devices
- Involving disabled people to demonstrate, or possibly lend you, what equipment they are using
- Asking students to use email without a screen display
- Using Lynx for text navigation, whereby all the images disappear
- Obtaining demo versions of scanning interfaces
- Case studies of inclusive design (e.g., site at University of Pretoria designed without graphics because it is easier to download, making it more accessible to people with visual impairments): conflicting needs

7.7 New Paradigms of Interaction

- Some of the technologies:
    - Virtual realities (immersive environments, including avatars, mixed realities, etc.)
    - Haptics and force-feedback
    - Sensing and scanning technologies, for location awareness and context sensitivity (Radio Frequency Identification, GPS, sensors, biometrics)
    - Robotics (Animatronics, Teletronics)
    - Convergence of some or all of these: new uses, new paradigms
- Non-visual interaction
- Smart computing applications (smart homes)
- Pervasive and mobile computing
- Ambient intelligence
- Sensor-based interfaces
- Digital TV and interactive services
- Emotional computing
- Wearable computing
- Futuristic, e.g., Cyborgs

7.8 User-Centred Design

- User requirements and evaluation methods/tools in the context of design for all
- USERfit
- How to include a diversity of users, why that is useful for all design
- Core tools and their appropriateness for different user groups
- Role of ergonomics in Design and the AT sector
- Problems with User-Centred Design in AT
- Abandonment of AT
- Activity analysis, Occupational performance, as related to computer use
- Design exercise and the use of anthropometric data
- Case studies:
    - of the whole design lifecycle
    - universally accessible interactive applications and services
    - the Third Age Suit

7.9 Application Domains and Research

- eLearning (e.g., Loughborough University's LearnServer, and UK's SENDA)
- Environmental control systems
- Smart homes (e.g., TIDE CASA project)
- Motorised wheelchairs
- Intelligent disability aids, e.g., smart wheelchairs, electronic prosthetics
- AAC (e.g., IST WWAAC project)
- E-health
    - Telemedicine
    - Patient records
    - Patient monitoring
- Bionics
- Products, work and transport
- Leisure: sports and tourism
- E-Government

7.10 Sample Material for Awareness of Design for All and Why Design for All: Empathic Modelling Workshop

Materials prepared by Colette Nicolle from Loughborough University.[29] The following has been extracted from the following reference (with an additional section on ICT tasks now included), and with permission from Lawrence Erlbaum Associates:

> Nicolle, C. and Maguire, M. (2003). Empathic Modelling in Teaching Design for All. Proceedings of HCI International, Crete, June 2003, Lawrence Erlbaum Associates.

The method that has been used to conduct an empathic modelling workshop with students, lasting for 1½ to 2 hours, is described below. Naturally, flexibility is the key, and with a bit of imagination further useful activities can also be developed.

7.10.1 Method

Before the students arrive in the room, move the tables at the back into two L shapes in the two back corners of the room. One L shape, furthest from the window, should be the 'Dexterity Station.' The other, with one section near the window, should be the 'Visual Station.' There will also be Hearing and Mobility Stations to be situated in the room where appropriate.

Set up the products/activities on tables along the sides of the room (see Materials below). There will be some overlap, e.g. coins need to be picked up and identified and these will form part of both visual and dexterity activities.

For each table, attach some instructions on the wall behind each activity, e.g. 'Read instructions for cooking on the back of the packet' and 'Open one of the packets on the table'.

Ensure there are sufficient tables remaining for all the students to sit down. Describe what has been set up around the room and how to affix buttons on the knuckles of each finger with tape. This will simulate the effect of older and arthritic fingers, causing discomfort or pain to carry out certain tasks. Emphasise that they should have a button on each of the two knuckles on each finger, and even on the underside if they wish. Affix a button onto each knuckle with surgical tape (more expensive!) or sellotape (painful to remove!). Cover hands with surgical gloves to hold it all together.

Try to divide the class into 2 groups.

[29] http://www.lboro.ac.uk/

7.10.1.1 Group 1 – blindfolded person + guide

Put the students into groups of two, and blindfold one of the two. Explain the need for care and safety, and also if possible to keep the blindfold on for the duration of this exercise. Tell them they have 15 minutes or so to walk around outside the classroom, and then they should come back to the room, at which time swap them over, so that the visually impaired person can become the guide.

7.10.1.2 Group 2 – visual, hearing, mobility and dexterity tasks

The students should explore the activities on the tables around the room (see Materials below). Emphasise that when they have finished at the tables there is still the opportunity to explore the room and maybe their own bags and everyday activities such as looking at the overhead projector or finding a plug socket. They should concentrate on the experience. It is not a competition to see who can perform the best or most — it is an experience that they should think about and consider its further implications.

7.10.2 Materials

Visual tasks will require the following types of materials:

Newspapers, simulation spectacles, ordinary spectacles and sunglasses smeared with Vaseline, paper, pens (different colours and thicknesses), application forms, lamps (with different watt bulbs), blindfolds, and cotton wool pads.

The following types of activities can be undertaken:

- Reading various newspapers, using different intensity light sources
- Completing application forms and other documents
- Identifying the contents of different tins and packets of food
- Trying to read the instructions for preparing the packets and tins of food
- Writing on paper, with different coloured papers and different sizes and colour of pens
- Counting a pile of money

Hearing tasks will require a few audio cassette players, with tapes playing ‘white noise’.

Mobility tasks will require the use of crutches, walking sticks, or wheelchairs (if enough space is available).

Once buttons have been taped onto the knuckles, as described above, the Dexterity tasks will require various packets, roll of plastic bags (e.g., from the vegetable counter at the supermarket), scissors, pens, paper, jars, biscuits, crisp packets, coins, etc.

The following types of activities can be undertaken:

- Opening packets of various kinds
- Opening the plastic bags, putting objects into them and tying them up
- Untying plastic bags and removing objects
- Putting objects into jars and closing them
- Opening jars and taking objects out
- Drawing on paper with different sized pens and cutting out the drawings with scissors.

7.10.3 Specific visual and dexterity tasks related to Information and Communication Technologies

Using a computer, emphasising:

- the display accessibility options provided in the Windows environment, and
- the keyboard, and alternative Keyboards, displays and mice

Using a mobile telephone:

- Navigating through the menu options
- Making a call
- Sending a text message

7.10.4 Follow-up

Following the workshop it is necessary to leave at least ¼ hour for discussion about the students' experiences. Some actual comments from students in the past have been provided below in order to demonstrate not only the value of this exercise, but also suggestions for future improvements:

- With the blindfold on, other senses come to the fore.
- With the cotton wool pads under the blindfold, it was impossible to look around.
- The person guiding a blind person is a 'guide', not a 'carer'.
- When blindfolded, we were walking around an area that was already known by sight, which reduced the benefit of the simulation.
- When blindfolded, everywhere seemed larger.
- Going up or down stairs is an automated process.
- Handrail was bent at the top to tell you to stop stepping.
- Since multiple disabilities are so common, it is useful to combine the tasks, i.e. hearing + visual, visual + dexterity.

7.11 Example of Coursework for Awareness of Design for All and Why Design for All: Essay on Design for All

Materials prepared by Colette Nicolle from Loughborough University.[30] Discuss and evaluate, with examples, the concept of 'inclusive design,' 'universal design' or 'design for all' for older and disabled people with relation to one of the following:

- Products/technologies to promote independent living
- Information and communication products, systems and services

7.12 Sample Material for Interpersonal Skills for Teamwork and Communication: Inclusive Design Workshop

What follows is sample material from the Inclusive Design Workshop, taught by Colette Nicolle in Loughborough University.[31] This has been developed as a result of the GENIE project and with reference to:

> Dekker, M., Nicolle, C., and Molenbroek, J. (2004). GENIE workshop for curricula with user involvement and inclusive design. Gerontechnology 2004; Vol. 3, No. 1.

The aim of this workshop is to:

- Integrate the knowledge covered earlier in the module,
- Emphasise requirements capture and evaluation techniques with older and disabled people, and
- Rehearse more effective interpersonal Skills for Teamwork and Communication in the context of Design for All.

7.12.1 Setting the Scene (15 min)

You are taking part in a design team meeting, where we shall be looking for new concepts for advanced technologies that follow the principles of inclusive design. There is not much time for such ambitious goals (which is often normal practice), and so facilitators will help you decide when it is time to move on to the next activity.

There will be 4 different scenarios to work with, and you will divide up into groups, each covering one of the following areas:

- Mobility
- Work
- Housing
- Information and Communication

[30] http://www.lboro.ac.uk/
[31] http://www.lboro.ac.uk/

The groups will be organised in such a way that different disciplines will work together wherever possible. One person in the group will be asked to 'role play' as an older person or a younger person with a disability, whereby situations and daily activities can be explored from another point of view.

The objective of the workshop will be to define a new or modified technology, designed to be as inclusive as possible, in the chosen topic area. The discussion will start from a higher abstract level (defining threats and opportunities for the older or disabled population in society) and (hopefully!) ending up with a more practical solution or idea that will be accessible and usable by a wider range of users, including people who are older or disabled.

7.12.2 Step 1 – Opportunities and Threats (10 min)

For each older or disabled person:

While the rest of the group defines opportunities and threats (see below), the 'older or disabled persons' will spend time defining their particular needs and problems. With the help of a facilitator, it will be helpful to visualise someone you know who is elderly or disabled, and also to reflect back on the Empathic Modelling session at the beginning of term.

For the rest of each group:

Define the opportunities and threats to older and disabled people when considering their mobility, work, housing, or information/communication needs. For example in the field of mobility, some possibilities are:

7.12.2.1 Opportunities

- Wanting/needing to continue getting around.
- Maintaining independence.

7.12.2.2 Threats

- Walking:
  - Difficulties or inability walking long distances.
- Driving:
  - Decline in motor performance, reaction times, vision, hearing and information processing.

Discuss these opportunities and threats. What requirements might they identify for new advanced technologies that can optimise the opportunities or reduce the threats?

7.12.3 Step 2 – User Requirements (30 min)

Develop your methodology for defining a new technology that would improve an older or disabled person's mobility, work, housing, or information/communication needs.

Discuss what methods or tools could be used to learn about older or disabled people's needs and preferences. Involve your older or disabled person in this discussion of their requirements.

Suggestions:

- Develop a series of questions you want to ask the end-user, including, e.g., whether to focus on walking, driving or public transport. Identify tasks/activities that cause particular problems for that person.
- Define the user's needs

7.12.4 Step 3 – Development and Evaluation (30 min)

Create a concept for this new technology:

1. Involving the older or disabled person as much as possible, identify possible solutions to the identified problems that can optimise their opportunities or reduce their threats to mobility, work, housing, or information/communication needs.
2. Choose one (or more) possible solution(s). Draw it or describe it.
3. Ask the older or disabled person to evaluate and discuss its utility, accessibility and usability.

7.12.5 Step 4 – Feedback (45 minutes)

The design teams and the end users should be prepared to feed back their ideas and overall reactions at a plenary session the following week.

Ideally, a visiting expert who is older or disabled should participate throughout the entire workshop. However, in this pilot, our visiting expert from ISdAC (Information Society disabilities Challenge) participated only in Step 4. The class began with a description of ISdAC and then the *what*, *why* and *how* of inclusive design. After a short break, the students then presented their solutions and invited feedback from the plenary group, which included the rest of the class, two lecturers and two representatives from ISdAC.

7.13 Sample Material for User-Centred Design

Materials prepared by Colette Nicolle from Loughborough University[32] (with specific references at the end of this section).

7.13.1 Choosing the Most Appropriate Method

7.13.1.1 Questionnaires

- Printed lists of questions used to find out what people think and feel about a particular issue, product or service.
- Structured (closed questions), semi-structured, or open questions.
- Quantitative or qualitative data.
- Can incorporate ratings scales, yes/no questions and discursive questions.
- The format of the questionnaire needs to indicate clearly what form of answer is required.
- Can be used as postal or email questionnaires, self-administered, possibly followed up by phone call. Can also be used as a tool during face to face interviews, but strengths and weaknesses below do not refer to this usage.

Strengths	***Weaknesses***
Cost Effective. Time Effective. Large Sample (where interviewer is not required). Reach isolated people. Test a large variety of factors. Large amount of data in a fixed format, leading to easier comparison and analysis. Privacy, Anonymity (leading to more honest answers on sensitive issues.) Overcome mobility problems. Data free of investigator's bias.	Questions need to be worded very carefully so that they are not biased or leading. Could be problems with comprehension/language use. No control over misunderstood questions. Poor response rate. Returns may not be representative. Questionnaires can seem impersonal.

[32] http://www.lboro.ac.uk/

7.13.1.2 Tips for Questionnaires

For all:

- Pilot questionnaire first.
- Enclose a pre-paid return envelope.
- Keep questionnaire short and concise (more likely to increase return rate).
- Avoid negatives.
- Use Active rather than Passive voice.
- Left-justified margin preferred, with ragged right edge.
- Use illustrations + text to aid performance.
- Consider size, contrast and style of font to improve legibility:
  - 12-14 pt. Avoid all capital letters.
  - Sans serif (without finishing strokes, like Helvetica, Arial), rather than serif, like Times.
- Consider layout: spacing, chunking information into small segments, headings, numbering, cues (e.g. bold for emphasis).

For all older and disabled people:

- Keep language simple and clear. Consider particular needs of user groups beforehand. Ask them or other experts!
- May need help in completing questionnaire or a questionnaire in a different format. However, if someone helps them to complete it, or answers on their behalf, answers may not be wholly the recipient's. If someone else helps out, need to decide who is best placed to answer for another person: carer? family?

For people with particular impairments:

Visual impairments:

- Third party could complete it, but this may influence data.
- Questionnaire could be read out during a face to face interview or over the telephone. If the user has a screen reader, the most efficient way might be to send it by email.
- Offer materials in print, large print, audiotape, Braille or electronic formats.
- For people with low vision, use 16 pt font with clear and simple layout.
- If considering Braille or other tactile-based language, ensure your respondents can use it.

Hearing impairments:

People may have problems with reading and writing, so avoid postal survey or self-completion. Should instead hold an interview with a facilitator if reading or writing is considered a problem.

Speech/Language impairments: • Complete the questionnaire during an interview, and either use trained interviewers or a facilitator to help interpret the responses. Allow plenty of time. • Investigate alternative formats for materials, and ask what is most suitable, e.g. using symbols to enhance text.
Skeletal (Physical) impairments: • Third party could complete it, but this may influence data. Ensure that users read the question themselves, with helper's role minimised. • Consider electronic version of the questionnaire which can be completed with user's own assistive input devices.
Cognitive impairments: Not recommended for this user group, and face to face interview or observation more appropriate, with the interviewer making notes onto the questionnaire.

7.13.1.3 Interviews

- Interviews are conducted talking to the user, either directly or on the telephone.
- Used in conjunction with other methods, e.g., with a structured or semi-structured questionnaire.
- Face to face individual interviews more appropriate for sensitive questions or complex information, but not for large samples.
- Group interviews better for large samples.
- Can be formal (all questions specified beforehand, with no deviation).
- Can be semi-formal (questions specified, but areas where the interviewee can speak in their own words, or make side comments).
- Can be informal, where the interviewer may or may not have any written questions, and the interviewer and interviewee agree what topics are to be discussed in the interview.

Strengths	***Weaknesses***
Can collect individual opinions and subjective preferences. Can be open-ended or structured. The interviewer can draw the interviewee out (through reading body language, etc.), leading to more information than if it had	More time-consuming than self-administered questionnaires. Resource intensive. Time intensive. Researcher could bias the answers by leading questions. Could be lack of consistency

been a self-administered questionnaire.	between interviewers and the way they ask questions. Answers may be difficult and time consuming to analyse.

7.13.1.4 Tips for Interviews

For all:

- Keep questions simple.
- If using tape recorder, ask permission first.
- Use two interviewers if possible – one asking the questions and one taking the notes. This is easier than transcribing from a tape recorder.
- Train the interviewers to ensure consistency in collecting the data.

For all older and disabled people:

- Ensure that the interview does not last too long – may need to divide into two sessions.
- Room should be free from background noise and reverberations.
- Ensure environment is accessible (building, toilets, parking, etc.)
- Consider transport needs, if they are travelling to you.

For people with particular impairments:

Visual impairments:

- Show/describe the layout of the room and other facilities.
- Describe any visual aids, illustrations, overheads, etc. that have been prepared.
- Offer materials in print, large print, audiotape, Braille or electronic formats.
- For people with low vision, use 16 pt font as a minimum for any written material, with clear and simple layout.
- If considering Braille or other tactile-based language, ensure your respondents can use it.

Hearing impairments:

- Use trained interviewers or a facilitator to interpret the responses, e.g. in sign.
- Lip reading: avoid bright light behind the speaker.
- Participants should face each other.
- Speak clearly but not abnormally.
- Use normal volume.
- Provide visual aids where possible.

Speech/Language impairments:

- Use trained interviewers or a facilitator to interpret the responses.
- Speak clearly and slowly, facing the participants.

• Allow plenty of time. • Investigate alternative formats for materials, and ask what is most suitable, e.g. using symbols to enhance text.
Skeletal (Physical) impairments: • Ensure environment is accessible (building, toilets, parking, etc.) • Consider transport needs, if they are travelling to you.
Cognitive impairments: • Interviews well suited for this group, but questions should be specific and simple. • Use examples and be prepared to explain things in different ways. • Involve someone who is trusted to ensure that the interviewee feels secure. • Allow plenty of time.

7.13.1.5 Focus Group Discussions

- Method for gathering information from 6-8 people in a group discussion on how they think and feel about an issue, product or service.
- Can be conducted in various ways, from the very structured, in which everyone, in a designated order, expresses themselves on a well-formulated issue, to the very open, where only one clue or one of the main points is provided, and the discussion is allowed to take its own course.
- The precise themes should be determined, questions written and their order defined. It seems better to have the set of questions ordered and written, in order to be sure that the discussion will not deviate from the topic of interest.

Strengths	***Weaknesses***
Obtain a good overview of the issues, which can then be investigated further. Can obtain ideas/themes rather than individual responses. Focussed discussion, interaction among participants, guided by researcher. Some participants may be more relaxed and outspoken in discussions with others, rather than a more formal question/answer session. Subjective, qualitative data.	Unnatural environment. Discussion created/directed by researcher. Moderator can influence interactions. Opinions may be withheld that may be expressed in private. More extreme views may be expressed in a group than in private. Answers may be difficult to quantify.

7.13.1.6 Tips for Focus Group Discussions

For all:

- Send an invitation letter (purpose of study, background info, introduction to the topics).
- If using a tape recorder, ask permission first.
- Use two interviewers if possible – one asking questions and one taking notes. This is easier than transcribing from a tape recorder.
- Provide Introduction, overview, establish ground rules: e.g., speak one at a time, avoid interruptions.
- Arrange refreshments.
- Hold 'small talk' to foster openness prior to discussion.
- Be aware of dominant talkers, self-appointed experts, shy people, ramblers.
- Speak slowly and clearly.
- Ask participants to complete a subsequent questionnaire for personal details and further thoughts.
- Send a thank you letter (using 14 pt for older and disabled people).

For all older and disabled people:

- Send an invitation letter in 14 pt, sans serif font (like Arial).
- Subsequent questionnaire in 14 pt, plus offer help in completing it.
- Consider length of discussion: keep as short as possible (aim at 1½ hours, with break).
- Participants may need more time to process information and give responses.
- Consider a Moderator of similar age or needs. Facilitators may also be needed.
- Ensure environment is accessible (building, toilets, parking, etc.)
- Ensure room is free from background noise and reverberations.
- Consider arranging the discussion during existing meetings/venues, e.g. local clubs.
- Consider their transport to the site.

For people with particular impairments:

Visual impairments:

- Establish a 'cue' to indicate when a person wishes to speak, e.g. raising the hand.
- Provide name cards.
- Offer materials in print, large print, audiotape, Braille or electronic formats.
- For people with low vision, use 16 pt font as a minimum for any written material, with clear and simple layout.
- If considering Braille or other tactile-based language, ensure your

respondents can use it.
Hearing impairments: • Consider layout of room, especially the position of the co-ordinator. • Participants should sit near the moderator. • Participants should face each other. • Lip reading: avoid bright light behind speakers. • Use trained interviewers or a facilitator to interpret the responses, e.g. in sign. • Speak clearly but not abnormally. • Use normal volume. • Provide visual aids where possible.
Speech/Language impairments: Individual interview more suitable.
Skeletal (Physical) impairments: • Ensure environment is accessible (building, toilets, parking, etc.) • Consider transport needs, if they are travelling to you.
Cognitive impairments: Individual interview more suitable.

7.13.1.7 Observations

- Watching what actually takes place, and recording events that are considered to be of importance.
- Conducted in a laboratory setting or in the field.
- Data can be directly recorded by an observer, or data can be captured using a video recorder, with later analysis.
- The task can be provoked (the task given to the user is to get information from an info-kiosk for example) or non-provoked use (the user is in the area and sees a new device and decides by him/herself to use it).

Strengths	***Weaknesses***
What to observe can be closely defined, or can be informal. Can be conducted on prototype or on end products. Can observe subjects in natural environment or in a laboratory setting. Data can be recorded by an observer or video. Data often open to statistical	Can only observe actions, not thoughts. Verbal protocol (the user talking his/her way through a task) can help to overcome this. Observation or monitoring can be seen as intrusive, and may make people feel ill at ease. Ethical considerations are needed, especially with those unable to give their informed consent. Resource intensive/expensive.

analysis and interpretation. High external validity. Collecting data 'as it happens' avoids post-hoc rationalisation for actions. A human observer can pick up new observable data that may appear.	Video recordings: long time to analyse. May lead to people making special efforts (the Hawthorne Effect). This means any data being collected could be non-representational of the real-world situation. Presence of an observer could influence behaviour. People need to be able to leave the study at any time, but may feel awkward. Difficult to know when to intervene. Differences between observers, or between the same observer at different times, can lead to data not being as accurate as may be assumed. Can collect a mass of data in a short time, leading to overloading at the analysis stage. Does not necessarily place the observed phenomena in context.

7.13.1.8 Tips for Observations

For all: • Explain presence of investigator to the user and the purpose of the study. • Ensure informed consent is obtained. • Take video recordings only with consent.
For all older and disabled people: • Ethical considerations are needed, especially when person is unable to give informed consent (See, for example, BMA in references). • Investigator needs to allow time for social interactions, but also establish ground rules. • Careful not to rearrange items or disrupt person's home. • Users likely to get tired more quickly.
For people with particular impairments:
Visual impairments: • Inform the user of presence of investigator. • Remind user of the time or length of the session. • If observation happening in person’s own home, keep layout the

same. • Offer materials in print, large print, audiotape, Braille or electronic formats. • For people with low vision, use 16 pt font as a minimum for any written material, with clear and simple layout. • If considering Braille or other tactile-based language, ensure your respondents can use it.
Hearing impairments: • May need facilitator or translator to ensure understanding of the procedure. • Speak clearly but not abnormally. • Use normal volume. • Provide visual aids where possible.
Speech/Language impairments: • Need to know communication methods of the user – may need facilitator. • Investigate alternative formats for materials, and ask what is most suitable, e.g. using symbols to enhance text.
Skeletal (Physical) impairments: • Ensure environment is accessible (building, toilets, parking, etc.) • Consider transport needs, if they are travelling to you.
Cognitive impairments: • May be most suitable form of data collection. However, need to ensure that informed consent is obtained. • Explain presence of investigator to the user. • Allow plenty of time for user to get used to the situation.

7.13.2 References

This information on methods has been compiled from the following sources (and through experience working in the field) by: Colette Nicolle, Research Fellow, Ergonomics and Safety Research Institute (ESRI), Loughborough University.

Barrett, J. (2000). The Information Needs of elderly, disabled elderly people, and their carers. Oxford: The Disability Information Trust, Mary Marlborough Centre.

Barrett, J. and Kirk, S. (2000). Running focus groups with elderly and disabled elderly participants, *Applied Ergonomics,* Vol 31(6), pp. 621-629.

British Medical Association and the Royal College of Nursing (1995). *The Older Person: Consent and Care.* London: British Medical Association. This is an example of useful documents available from BMA Medical Bookshop

at:
http://www.bma.org.uk/ap.nsf/Content/The+older+person+-+consent+and+care

Marin-Lamellet, C.M., Burnett, G. and Nicolle, C. (1999). *A Methodology for the Assessment of Telematic Applications for Travellers who are Elderly or Disabled* (CEC Transport Telematics Project TR 1108, TELSCAN Deliverable 4.2).

Nicolle, C. and Burnett, G.E. (2001). Accessible Systems for Transport, in *Inclusive Design Guidelines for HCI*, Nicolle, C. and Abascal, J. (eds), Taylor and Francis, London, pp 193-207.

Poulson, D., Ashby, M. and Richardson, S. (eds) (1996). *USERfit—A Practical Handbook on User-Centred Design for Assistive Technology*, (Brussels, Luxemburg: ECSC–EC–EAEC). (This can also be found on the EU INCLUDE project's Web site at www.stakes.fi/include/. Go to Design Methodologies and Tools, then Specific Design Techniques. Possible to download PDF file from USERfit manual for each technique.)

Robson, C. (2002). *Real World Research*, 2nd edition, Blackwell Publishing.

7.14 Example of Coursework for User-Centred Design: Assessment of Need

Materials prepared by Colette Nicolle from Loughborough University.[33] The aim of this project is to assess the needs of people who are older or disabled with regard to one of the following:

- Products/technologies to promote independent living
- Information and communication products, systems and services

Using human factors methods and tools, identify the problems and needs of a specific individual, for example, a particular elderly person you know who has mobility problems or is beginning to become forgetful, or a friend or relative who has a hearing or visual impairment. Analyse and discuss the implications that those requirements have on the design of products, technologies, or services in your chosen application area.

7.15 Sample Material for Accessible Content: SMIL Workshop

These materials were prepared by Rafael Romero from the University of Valencia.[34] The aim of this workshop is to:

- Learn the different features that an accessible multimedia should integrate,
- Know the basics of Synchronised Multimedia Integration Language (SMIL), and

[33] http://www.lboro.ac.uk/
[34] http://acceso.uv.es/

- Create captions for an accessible video in electronic format using SMIL+RealText.

The workshop length is 4 sessions of 2 hours each.

7.15.1 Materials needed

- Short video clips (of 3 to 5 minutes) in MPEG format. It is recommended to use to use a video with content related to the topic. For example, the different scenes from 1999 Microsoft Video Enable.[35] This video has an accessible version in the second half of the tape with closed captions and descriptive narration.
- Other source for video clips and materials is: http://www.microsoft.com/enable/casestudy/videos.aspx
- A png or jpeg image file, with the same size as the video clip, with a coloured background and a short text in bold like: "Design for All exercise: captioning"
- Text files with the transcript of the clip dialogues.
- RealPlayer: http://europe.real.com/player/
- A software for captioning. For example, Magpie or Hi-Caption. See more tools at: http://www.w3.org/AudioVideo/#Authoring
- A basic bitmap editor like Windows Paint or Paint Shop Pro.
- A computer room with multimedia PCs and Internet access. Screen projector and loudspeakers connected to one PC.

Note 1: During 2003 and 2004, the only popular player that implemented advanced features of SMIL, like the SWITCH command to show a different file depending on the locale settings, was RealPlayer. QuickTime player also has a limited support of SMIL. For an updated list of players see: http://www.w3.org/AudioVideo/#SMIL

Note 2: For the future, it will be better to use the W3C TimedText recommendation for the captions file, instead of using player-dependant formats like RealText. See http://www.w3.org/AudioVideo/TT/

7.15.2 Web references

- W3C - Synchronized Multimedia: http://www.w3.org/AudioVideo/
- SMIL - basic example of code: http://www.xml.com/pub/a/2002/05/29/smil.html
- SMIL - advanced example: http://www.xml.com/pub/a/2002/07/17/smil.html

[35] Available at: http://wwwx.cs.unc.edu/Research/assist/et/notes/enable/index.shtml and http://www.americasathletes.org/newsletter/issue300/issue200_page3.html.

- SMIL - Real Producer Guide: http://service.real.com/help/library/guides/production8/htmfiles/smil.htm
- Real Text Markup: http://service.real.com/help/library/guides/realone/ProductionGuide/HTML/htmfiles/realtext.htm
- General Captioning Conventions - NCAM guidelines: http://ncam.wgbh.org/cdrom/guideline/appendix.html#app3
- Access to multimedia presentations for users with sensory disabilities - NCAM Guidelines, n.2: http://ncam.wgbh.org/cdrom/guideline/guideline2.html

7.15.3 Session 1: presenting SMIL (2 hours)

- Show a short SMIL presentation including a video with closed captions and some time slides made with static jpeg or png files. Prepare the SMIL file to show different caption files and static images depending on the system language in the player.
- Introduce the basics of the SMIL language.
- Following the lecturer instructions, each student prepares individually a basic SMIL presentation with the following sequential features:
  - The introduction image for 5 seconds
  - The video clip shown in parallel with the image
- Let the students find out more about SMIL in the suggested links.

7.15.4 Sessions 2 and 3: prepare complex SMIL presentations (2 hours + 2 hours: 4 hours)

- Divide the class into groups of 2-3 people.
- Each group is given a short video clip with the transcript in the original language and the template bitmap file.
- The group has to prepare an SMIL presentation using the software provided with the following features:
  - 5 seconds with the provided bitmap template modified to show the title of the clip and the name of the students in the group
  - The video clip showed in parallel with RealText captions previously created with the captioning software. Use also some markup to format the captions: font type and size, colours, bold, alignment …
  - Show a final slide for 10 seconds with credits, or interested links.
  - Prepare also captions in another language and let SMIL show the original or the alternate content depending on the player

language setting (SWITCH command and SYSTEM-LANGUAGE property).

- If more time is available, students could be asked to prepare also an audio track with narrated descriptions for blind and integrate it in the SMIL presentation.

7.15.5 Session 4: show SMIL presentations (2 hours)

- Show each finished work to the rest of the class.
- Final comments.

7.16 Sample Material for Accessible Content: Human-Centered Interfaces

These materials were prepared by Gerhard Weber from the University of Kiel and Multimedia Campus Kiel.[36] The aim of this workshop is to:

- Acknowledge the need for user stereotypes in Web based presentations,
- Know the attributes of user profiles, and
- Develop redundancy for enriching time-independent and time-dependent media.

The workshop length is 4 sessions of 2 hours each.

7.16.1 Materials needed

- XML documents, preferably XHTML pages containing mark-up of enriched sections ()
- CSS files for different requirements in layout (large, very large, inverse background, simple)
- XSLT files to transform the XML documents, some sample rules for applying personalisation rules using a user profile
- A computer room with multimedia PCs and Internet access. Screen projector and loudspeakers connected to one PC.

Note 1: Pre-requisites are knowledge of Internet programming, especially XML, XHTML and CSS.

Note 2: A sample version of the Multireader reading software.[37]

[36] http://hci.mmc-kiel.com/
[37] http://www.multireader.org/

7.16.2 Session 1: Prepare media

Review the benefits of CSS in separating layout and contents. Each student develops contents for a page in a cookbook or a travel guide in her preferred media.

7.16.3 Session 2: Enrich media

Refer to the need for enrichments of deaf or blind people, and allow students to develop additional media supporting their original media for recipes or sightseeing stops.

7.16.4 Session 3: Personalize media

Integrate the newly developed media based on user settings store in XML files and develop separate output for each kind of user attribute.

7.16.5 Session 4: Evaluate result

Review user-centred design principles. Ask students to develop their testing criteria for checking coherence of the resulting personalized documents and ask them to evaluate results of other students, or if possible invite expert users and ask students to evaluate together with them the transformation results.

8 Appendix B: Core literature and Web sites' references to support the IDCnet Taxonomy

This appendix contains references to core literature and Web sites that the IDCnet Network members use for their Design for All teachings. The list does not intend to be exhaustive, but contains most of the core elements for every taxonomy element.

8.1 Awareness of Design for All

Anogianakis G., et al. (Editors) (2000). Advancement of Assistive Technology (Assistive Technology Research Series), IOS Press.

Alliance for Technology Access, Stephen Hawking (2000). Computer and Web Resources for People With Disabilities: A Guide to Exploring Today's Assistive Technology, Hunter House.

Bain, B.K., Leger, D. (Editors) (1997). Assistive Technology: An Interdisciplinary Approach, Churchill Livingstone.

Ball, S. and Rousell, J. (2004). Virtual Disability: Simulations as an Aid to Lecturers' Understanding of Disability. In Miesenberger, K., Klaus, J., Zagler, W. and Burger, D. (eds.), Computers Helping People with Special Needs, Proceedings of 9th International Conference, ICCHP 2004, Paris, July 2004. Springer Lecture Notes in Computer Science 3118. Heidelberg: Springer-Verlag. For the simulations which can be used in accessibility training of academic staff (and students), see http://members.aol.com/srousell/sim-dis/index.htm

BBC – Ouch! (an interesting site for perspectives on disability): http://www.bbc.co.uk/ouch/

Brewer J (ed) (2004). How People with Disabilities Use the Web, W3C Working Draft, 2 March 2004. World Wide Web Consortium. Available at: http://www.w3.org/WAI/EO/Drafts/PWD-Use-Web/

Center for Universal Design: the 7 principles of universal design: http://www.design.ncsu.edu/cud/univ_design/princ_overview.htm

COST 219 – Information about the European Cost219bis project on future telecommunication and telematic facilities for disabled and elderly people: http://www.stakes.fi/cost219/index.html

DASDA Web site, created by an EU-project to help improve knowledge on design for all — http://www.design-for-all.info/

Design for All portal (DASDA project): http://www.design-for-all.info/50006,32175994.xml

Disability Rights Commission: a review called 'Inclusive Design' written by Ricability, a charity that carries out research for older and disabled consumers. Available at: http://www.drc-gb.org/whatwedo/publicationdetails.asp?id=154&section=1

Faulkner Information Services (2001). State of the Marketplace: Assistive Devices, Faulkner Information Services.

Flippo, K.J. Inge, K.J., Barcus, J.M. (Editors) (1997). Assistive Technology: A Resource for School, Work, and Community, Paul H Brookes Pub Co.

GENIE (Gerontechnology Education Network in Europe): http://www.gerontechnology.info/genie/

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Royal National Institute of the Blind: http://rnib.org.uk/. A number of useful publications and resources from RNIB on-line at:

- http://www.tiresias.org/reports/subject.htm, and

- See It Right pack, accessible Website Audit, Checkpoints and Techniques.

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www.trace.wisc.edu/docs/whats_ud/whats_ud.htm

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http://www.trace.wisc.edu/docs/univ_design_res_proj/udrp.htm

Universal Design Education Online. Examples of Universal Design collected by Center for Universal Design, N.C. State University; IDEA Center, University at Buffalo:
http://www.udeducation.org/resources/examples/index.asp

Unlimited By Design - a project of the Rehabilitation Engineering and Research Center on Universal Design at the University at Buffalo "a celebration of designers who have embraced the challenge and opportunity of universal design":
http://www.ap.buffalo.edu/idea/ubdweb/index.htm

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http://www.lboro.ac.uk/info/usabilitynet/

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DO-IT Videotaped Presentations with Support Publications:
http://www.washington.edu/doit/Video/

Computing@UW-Madison. Accessibility and the Web:
http://www.doit.wisc.edu/accessibility/video/index.asp

Jobability cinema campaign:
http://www.jobability.com/jobability/cinemacampaign.asp

«Web Sites That Work» video, re-edited by the IDCnet project, providing accessible captioned versions. Available for download from:
ftp://ftp.fit.fraunhofer.de/bika/WebSitesThatWork/ (FTP client must be set to passive mode.)

WebAIM: Keeping Web Accessibility in Mind. Available from:
http://www.webaim.org/info/asdvideo/

8.2 Why Design for All? Ethical, legal and commercial considerations

Americans with Disabilities Act (ADA) (USA):
http://www.usdoj.gov/crt/ada/adahom1.htm

Barrierefreie Informationstechnik-Verordnung (German decree on Web Accessibility of Federal Web sites):
http://www.bmi.bund.de/dokumente/Artikel/ix_90156.htm

Disability – info about acts and action for people with disabilities:
http://www.disability.gov.uk/index.html

Disability Discrimination Act (DDA) (UK):
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Disability Rights Commission (UK): http://www.drc-gb.org

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- http://www.section508.gov
- http://www.access-board.gov/sec508/508standards.htm#Background
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- IBM Accessibility Center: http://www-3.ibm.com/able/
- Macromedia Accessibility: http://www.macromedia.com/macromedia/accessibility/
- Microsoft: http://www.microsoft.com/enable/
- Sun Microsystems Accessibility Program: http://www.sun.com/access/

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NCAM guidelines - General Captioning Conventions:
http://ncam.wgbh.org/cdrom/guideline/appendix.html#app3

NCAM Guidelines, n.2 - Access to multimedia presentations for users with sensory disabilities:
http://ncam.wgbh.org/cdrom/guideline/guideline2.html

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- basic example of code:
  http://www.xml.com/pub/a/2002/05/29/smil.html
- advanced example:
  http://www.xml.com/pub/a/2002/07/17/smil.html
- SMIL - Real Producer Guide:
  http://service.real.com/help/library/guides/production8/htmfiles/smil.htm

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WebAIM (Web Accessibility in Mind), a project at Utah State University: http://webaim.org/

W3C - Synchronized Multimedia (Accessible multimedia):
http://www.w3.org/AudioVideo/

8.6 Accessible Interaction: input and output

AbilityHub - an Assistive Technology related web site for people with a disability who find operating a computer difficult or impossible.
http://www.abilityhub.com

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Telscan project: http://hermes.civil.auth.gr/telscan/tesc.html

The Application Home Initiative (TAHI). This site provides an overview of developments in smart home technology and its use in the assistive technology sector. It includes an extensive literature review and detailed descriptions of current smart home installations in the UK and Europe. Available in PDF form and at: http://www.lboro.ac.uk/research/esri/smarthomes/

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9 Appendix C: Copyright issues

We recommend users of the preceding materials to become aware of copyright issues. In general, the use of printed or online materials is allowed in academic environments by the editors or publishers of those materials, but it is advisable to review the licensing policy of these resources. As an example, we can refer to the copyright policy of the ACM (Association for Computing Machinery) available online at: http://www.acm.org/pubs/copyright_policy/, which estates explicitly:

"ACM grants gratis permission for individual digital or hard copies made without fee for use in academic classrooms and for use by individuals in personal research and study. No further reproduction or distribution is allowed without explicit permission."

As an example, we offer a template of a letter which can be used to ask for copyright permissions to an editor. Feel free to use it and modify it:

Dear Sir/Madam, I am one of the authors of the following paper:

XYZ

This paper describes XYZ. A project to which I contribute (XYZ and URL) needs to provide specific materials that we use to teach Design for All, or Inclusive Design. I understand that the authors of the proceedings retain the following: "The right to make copies of all or part of the material for use by the author(s) in teaching. The right to use, after publication, all or part of the material in any book by the author(s)." Provided I include a notice of the copyright of the publisher, can this paper be included/used in the report/project XYZ? Many thanks for your consideration, Yours sincerely,

10 Appendix D: IDCnet publications

1. Darzentas J S, Darzentas J (2004). 'Design for All': Socially Responsible Design or just good sense? In: Bynum T W, Pouloudi N, Rogerson S, Spyrou T (eds), Challenges for the Citizen of the Information Society (Vol. 1 of Proceedings of the 7th International Conference Ethicomp 2004, 14-16th April, Syros, Greece), pp. 237-249. Aegean: University of the Aegean Press.
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6. Dekker M, Nicolle C, Molenbroek J (2004). GENIE workshop for curricula with user involvement and inclusive design. Gerontechnology, 3, 1.
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11. Engelen J (2003). eAccessibility and eEurope. Contribution to the background information section of the CENELEC website, http://www.cenelec.org/ (July 25, 2003).
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