The Design of Accessible Self-service Products, Systems and Services: Teaching Inclusive Design

Jenny S. Darzentas Department of Product and Systems Design Engineering, University of the Aegean, Hermoupolis, Syros, GR84100, Greece.

John Darzentas Department of Product and Systems Design Engineering, University of the Aegean, Hermoupolis, Syros, GR84100, Greece.

Abstract
This paper offers an account of how various teaching trajectories are being used to help design students combine the knowledge and skills they learn in separate classes into an interdisciplinary approach to contribute to creating solutions to complex real world problem situations. More specifically, it deals with approaches to teaching and learning in the area of designing accessible self-service including services, products and systems.

Self-service is fast becoming more ubiquitous in everyday life. However, many of the self-services available through public use technology located in public spaces are often inaccessible to older and disabled users. Classes in Design for All aim to teach future generations of students not to unwittingly exclude certain classes of users from the products, systems and services that they help to design. If Design for All solutions are to really address the deeper problems inherent in the non-accessibility of services, rather than just redesign certain aspects of self-service terminals, then a more holistic approach is needed.

The richness of the problem area and its meaningfulness to our service based economy offers a contemporary problem space where design students can bring to bear a range of knowledge sets and approach overall service solutions.

Keywords
Inclusive Design Education, Service Design, Self-Service, Self-Service Terminals, Interdisciplinarity

Introduction
Research as part of the eAccess network (Darzentas, Petrie and Power, 2013) has shown that designers of self-service solutions are not well educated in understanding the diverse needs of the general public. Nor are graduates of Design for All courses being employed in design and manufacturing of self-service terminals (SSTs). Yet research and development teams in the SST industry describe themselves as working for improving overall usability and ‘customer experience’. At first glance, there appears to be no more than superficial language use differences: the discourse of Design for All centres on expressions of accessibility and usability, while Service Design refers to “ease of use”

1 eAccess+ network (2010-2013) an EU funded project set up to look at eAccessibility in the areas of web accessibility, interactive digital television and self-service terminals www.eaccessplus.eu
"user acceptance" and of “providing access to services and supplying customer needs” (Glusko, 2010). However, the different communities can take very different perspectives on what these terms and expressions mean to them, amounting to speaking different ‘dialects’ and fostering different practices.

Such differences reinforce our general belief that students need to bring to bear on modern day problems a variety of knowledge sets, and with them a range of methodologies and tools, in order to be capable of tackling current and future problems in an interdisciplinary way. The task for universities and design schools is that for their graduating students to arrive at such a mature state, students need to build up knowledge through their various design courses, but also undertake research in areas that are not normally part of the design curriculum, such as business, management and marketing and economics. Only in this way will graduate become comfortable in interdisciplinary settings, able to understand the dialects spoken by different stakeholders. The debate around the “T shaped designer” (Brown, 2008), - that is, the need to be generalists, but also capable of being specialists- is a balance that is difficult to achieve, as has been noted by many writing about design (Norman, 2010; Kolko, 2011). What is important for those in design education, is to recognise that this balance is not just on the personal level of the individual, but also on the institutional level, in terms of fostering interdisciplinary thinking in students.

Interdisciplinarity has become highly valued by universities, research councils, business and government, for whom complex problems - such as urban governance and environmental management - require new combinations of qualitative and quantitative methods, humanities, social and natural sciences, and exploitation of digital media and visualisation tools. Indeed, recognising the value of design as a driver of innovation in business, the EU set up a European Design Innovation Initiative in 2011 to investigate what needs to be done to foster this approach. Their report, (European Design Leadership Board, EDII, 2012), notes that within Design Research, there is already an increase in interdisciplinarity: "designers working alongside scientists and social scientists, addressing issues and complex problems such as digital economies, sustainability, democracy and citizenship” (p.60). They continue, however, to report that although in Design Schools there are strong links to business and industry, “…this activity often remains at the level of a designed product or service concept.” (p.69). Elsewhere, work on facilitating interdisciplinary teaching and research focuses on the institutionalisation of such teaching, that is organising how instructors from different disciplines can work together (Oberg, G, 2009; Borrego & Newswander, 2010) and the need for and organisation of interdisciplinary research (Sa, 2007, Feller, 2006, Harris & Karri 2008). In both situations the main desired outcome from interdisciplinarity is more holistic solutions, and developing synthetic understandings of complex problems (Spooner, 2004).

In the case of design schools, where curricula are already wide-ranging, we believe this framing of interdisciplinarity should also be focused on the learners in terms of helping them to combine different knowledge sets to encourage integrated “interdisciplinary thinking” (Jantsch,2007). This paper will relate our experience of how we believe that such thinking is being encouraged. We claim this because the teaching approaches being used enable students to contribute to creating whole solutions that deal with as much as possible of the problem space. Putting this in the example of SSTs, means going beyond “fixing the usability” of the machine interface to studying the whole service delivery and making suggestions for change. The main drive for holistic solutions is that of providing services for all.

The paper is organised as follows. In the next section, the background to the problem of inaccessibility of self-services is examined. Findings from the literature in terms of differences of perspectives from deployer and consumer viewpoints on self-services are
elaborated. Following this, we describe our approaches in students’ learning and project activities. Finally, we reflect on our experiences and the contribution of the choice of problem space to teaching Inclusive Design and fostering more interdisciplinary oriented thinking in order to create more holistic and effective solutions to contemporary problem spaces.

Background

Self-service based technology is becoming more and more ubiquitous in our everyday life. The industry reports rising numbers of self-service kiosk deployments (Holman & Buzek, 2012; Datatrend Technologies, 2009). Increasingly, both as consumers and as citizens, people are asked to interact with a wide range of self-service terminals (SSTs). Consumers get cash from Automated Teller Machines (ATMs); buy public transport tickets from self-service ticket dispensers; check-in for flights and luggage labels at airports kiosk machines; check out their groceries at self-service supermarket checkouts. Citizens can obtain a range of information based services and documentation via publicly located SSTs, including government and public authority licenses and certificates.

However, for those who have a disability, be it a sensory, cognitive or mobility related, using SSTs may be difficult or even impossible. For instance, for wheelchair users, getting close enough to the controls of a SST may be impossible. The most common reasons for this is because either because the wheelchair cannot be positioned close enough for the user to reach over to interact with the interface components, or because the interface components have been designed for people to stand in front of them, and the interface components are therefore sited too high for a person sitting in a wheelchair (see Figure 1).

![Figure 1: Difficulties to reach, difficulties to approach: Source Australian Human Rights and Equal Opportunities Commission, 2009](image)

For those with vision impairments, the print on the screen or the buttons may be too small or not have sufficient contrast. In addition, some people need longer to make some decisions; people may hesitate because of unfamiliarity with the language or the type of service, for example, buying a train ticket at a machine in a foreign country. Very often, SST applications are programmed inflexibly to time out, without offering the choice of having extra time. These can be a problem for older people who often do need more time to make the decisions asked of them by SSTs. Even newer, and more intuitive technologies, such as touch screens can be problematic for those who cannot reach them; or those who have hand tremors; and impossible for people who are blind.

Extrapolating from statistics of numbers of elderly and disabled people, this demographic may count for up to as much as 20% of the user population. This represents a considerable number of people who are being designed out. Moreover, it does not include people who are ‘temporarily disabled’ from accidents and injury, while situations may also
handicap: for instance, bright sunshine may make it impossible to see an SST screen (see Figure 2).

Figure 2: Difficulty reading the screen in conditions of bright sunlight: Source: Nasia Chroni, 2011.

Finally, we should not forget the numbers of economic migrants, for whom language literacy or access to technology, e.g. personal possession of smart phones, or access to internet may represent impassable obstacles. Being able to understand the language of the country that you are living in and being able to communicate verbally, does not imply that one can read and understand what is written on the screen of a self-service terminal. Figures from Eurostat for 2011 are shown in Figure 3 below.


If self-service technologies present such difficulties to use, then why are they so ubiquitous in the developed world? Part of the response is that it is now commonly accepted that we live not only in an Information Age, but also we operate within a service based economy, that is replacing the manufacturing based economy of the previous century (Chesbrough & Spohrer, 2006). According to Bitner (2006), one of the pressing current challenges for business and management research in service based economy, is that of ‘services infused with technology’, and offered via self-services. She notes that more research is needed into the questions of how firms should plan, implement and measure the impact of technology on service encounters, and what makes customers adopt or reject self-service technologies.

The most commonly accepted definition of what constitutes self-service enabled by technology is that people themselves perform tasks using technologies without direct personal assistance (Meuter et al, 2000, Glusko, 2006). Another way of describing the
move from interpersonal service encounters, where a member of service personnel mediates the delivery of the service, is that from “high touch-low tech” to “high tech-low touch” (Meuter et al, 2006). Self-service technologies, or technology based self-service design (TBSSs) refers to the fact that self-service can be delivered in a variety of ways. Online banking services may delivered via SSTs placed in public spaces; via websites using a PC in private space or via internet based applications accessed by personal mobile devices. In our teaching on with inclusive design, we focused firstly on self-service delivered via self-service terminals (SSTs), which we discuss next.

**Self-Service Terminals**

As a paradigm, self-service kiosks or terminals (SSTs) are not new. There have been several types of self-service terminal around for some time. Vending machines selling mainly snacks and drinks have been around since the 19th century, while the first cash dispensers or Automated Teller Machines (ATMs) have been with us since the 1950s. ATMs in particular represent considerable investment in research and development for the finance sector. The ATM industry has been called to address the accessibility issues and has been most active in this area, in part because of regulatory pressure. Recent amendments to the regulations governing the Americans with Disabilities Act (ADA), set forth several new accessibility requirements that became effective in March 2012. Among other things, the new regulations require that all ATMs be equipped with voice guidance and raised key surfaces to assist visually impaired consumers. However, despite these new regulations, the Wall Street Journal reported on March 7, 2012 (Sidel, 2012) that at least 50% of the ATMs in the US remained inaccessible to the visually impaired. Some of these new regulations are expected to be applied to SSTs used in other services, such as flight check-in.

Collectively, the machines involved in self-service delivery can offer many benefits for both customers and deployers of self-service solutions.

Among the benefits claimed by deployers of self-service are those of maintaining high levels of service but with reduced staffing costs. Valuable and expensive staff is freed up from routine jobs that SSTs do well like dispensing tickets. The use of self-service solutions and SSTs is perceived as a ‘modern’ approach, which is good for the image of deployers. Increasingly, the SSTs allow for new services to be bundled in; such as offering travel information to train ticket buyers, or discount promotions to supermarket shoppers. Many deployers also find the design of kiosks offer ways to advertise to customers: many modern designs are surmounted by with large displays (often digital screens), that are used to ‘push’ advertisements out to queuing customers.

For the consumers of self service offerings, the most often cited benefit is 24/7 convenience, faster or less queuing and more control, although this last is debatable. Other more subtle benefits emerge. Mostly young people under the age of 35 interviewed claimed they preferred the non-personal interaction with machines, rather than dealing with “judgmental” employees for services such as train tickets, (Meuter, 2000).

New types of self-service are constantly being introduced and spreading to new application areas and the claims are that these offer improvement over human mediated services. For example, in casual dining establishments, diners can order via interactive surfaces (tabletops or menus); this is seen as especially useful in lunchtime restaurants for workers, where people want to eat, but not queue to order at a fast food outlet, or wait for a waiter to take orders in a traditional restaurant setting (Ziosk, 2013). In hospitals, patients and caregivers can book themselves in for emergency services. This helps with triage; gives patients, caregivers and staff a common understanding of where they are in the system, and frees up nursing and administrative staff from burdensome admission procedures by sharing the load (Slawsky, 2013).
Some of these types of service delivery are still in their trial stages. Yet many of the characteristics of the deployment of self-service terminals remain fairly consistent: they are designed for positioning in public areas; most are designed for ‘walk up and use’ with a minimum of instruction and learning, and most are used for executing for rapid transactions.

**Consumer concerns and accessibility worries for the future**

Despite the advantages to consumers noted above, consumers are not always happy with SSTs. When there is a choice then many customers will ignore the self-service option (Wang, et al. 2012). However, this choice is disappearing: there is an increase in the number and frequency of unattended machines and services unmediated by humans. For instance, many railway stations may be unmanned, and tickets and information only available from machines. What this means is that there are occasions when there is no other way to get the service except via the SSTs.

More worryingly, if the machine is not accessible (for instance, because of its design or where it has been placed), usable (perhaps because it is out of order) or understandable (maybe the language is unknown, or the type of service is not clear), then the service is unavailable. Worse than this, in some documented cases², such as air flight check-in and banking services, when there is a human mediated service in addition to the self service offering, the public has to pay extra to use it.

Another trend in self-service terminals is that self-service is moving from public use SSTs, to applications on our personal internet enabled devices. That is, it is possible to make our own personal devices act as our kiosks. Self-service scenarios are already emerging where consumers can walk through a shopping mall and buy goods and services that announce themselves to their devices (e.g. a smart phone or tablet) and pay for them online. There are no cashiers to deal with, just devices and applications (Tuttle, 2013).

The question that must be asked is what happens to those who do not own devices or know how to operate these applications. These could be people on low incomes, or people who have not adopted this kind of technology. While service providers will probably continue to provide traditional services, they already offer incentives and promotions to those who use these new services, in an effort to obtain, as is natural, a return on their investment. This leads to favouring the ‘haves’ and discriminating against the ‘have-nots’ and violating the first principle of Design for All/Universal Design which states “Equitable Use for All” (The Center for Universal Design, 1997).

**Manufacturer concerns**

Designers who work for and with manufacturers of SSTs are not very aware of the need for Design for All. Field research (Darzentas et al., 2013) carried out by the eAccess+ network at a series of self-service kiosk industrial trade fairs, revealed, that with very few exceptions, manufacturers had little understanding of what was needed. There is some awareness of regulatory approaches, such as those specified by laws against discrimination. These tend to deal with matters of reach, screen height, and space and approach for wheelchairs. Beyond this ‘physical ergonomic’ type of accessibility requirement, there is little understanding regarding the need for information to be accessible. That is, awareness that the information on screens and buttons should follow interface accessibility guidelines. Nor is there awareness about other interaction guidelines, such as ‘tolerance for errors’; ‘or intuitiveness and simplicity’ of the interaction

² For example this from Ryanair: All passengers are required to check in online and print their own boarding pass. Passengers arriving at the airport without a pre-printed online check-in will have to pay €70/£70 as of May 2013  [https://en.wikipedia.org/wiki/Ryanair](https://en.wikipedia.org/wiki/Ryanair)
style, or 'perceptible information' in the sense of extra modalities (for example, audible beeps).

Current practice is that manufacturers rely on their designers to produce computer aided (CAD) models of what is needed for adjusting existing designs to regulatory requirements such as statutory screen height and then work from them. User testing with the designs is not common practice. Finally, manufacturers report that they are not often asked for “accessibility features” and place the responsibility with the deployers of services.

**Student learning and project activities in Self-Services Design**

From within the perspective of inclusive design education, the subject of self-services can be viewed as a problematic area that yields interesting challenges for student learning and project activities. Furthermore, binging the 'philosophy' of Design for All (Darzentas & Darzentas, 2012) into self-service design has been recommended to help this situation both by industry (Rogers, J.; Birnie, S.; Pengelly, J. & Adams, R., 2006) and by those investigating on behalf of policy makers (Petrie & Darzentas, 2011). Meanwhile, Castro et al. (2010) in a policy think tank and recommendation document, call for the setting up of academic research centres to work on accessible self-service design.

This area proved so rich a source of contemporary subjects of concern that it offered itself with interesting challenges for project work in other courses. The courses that were involved, besides Design for All (Inclusive Design), were Ergonomics; Information Design; and Systems Thinking. In addition, our students met and worked with students from other Universities during an Erasmus sponsored “Intensive Program” (IP) of two weeks duration on Sustainable and Service Design.

It should be remarked that there was no one complete brief on self-service carried on throughout these various courses as one overall project. Such an approach is sometimes taken in other design schools. While there are merits to this approach, our intention was to use the area of self-service in such a way that it became a familiar reference point for students as they encounter it again, for their new design learning. This meant that other problematic areas were often used, but when appropriate, exercises and project work drew upon this area so that students themselves could start to feel their way in bringing in their knowledge sets to bear in a more integrated or interdisciplinary way.

The next paragraphs briefly describe the kinds of learning and activities undertaken by the students in different classes. They are not intended to be exhaustive accounts, but to give the flavor of how one contemporary “problematique” can be used to raise concerns and draw in student learning from different perspectives.

**Design for All**

Design for All is a course offered at our University to introduce students in the Human Interaction Design direction to expand their designs from “the user” to “users” of all types. The curriculum followed by this course is aligned with the European curricula recommendations set up by the IDCnet project and continued by the DfA@eInclusion project and well as taking note of teaching styles practiced by other institutions (Dong, 2010). The organization of class is described in more detail in (Darzentas & Darzentas, 2012). For student project work in this class, we have chosen various aspects of self-service terminals (SSTs) as the entry point for students into this problem space of self-service offerings. This is because above all, these machines are nearly always intended

---

3 IDCnet Project (Inclusive Design Curricula network project) [http://www.idcnet.info/index.html](http://www.idcnet.info/index.html)
4 DfA@eInclusion project [http://www.dfaei.org/](http://www.dfaei.org/)
for use for the general public, they are nearly always situated in public spaces, but they are very often not accessible to all would-be users. Students are encouraged to look beyond the delivery touchpoint of the service, the SSTs, to the whole service encounter, to present both suggestions for micro improvements to service delivery, as well as suggestions for macro improvements to the service as a whole.

More specifically, in this course, as part of the project work, students are asked to study existing self-service systems and evaluate them for accessibility, using traditional field studies for collecting data (e.g. by observing users on site, by interviewing them, etc.). Further to their analysis of problems found, they were asked to “diagnose” designs that posed accessibility problems, and to propose improvements and changes.

These proposals range from ‘minor’ to ‘major’ changes. Minor changes might be to suggest relocation for the SSTs to a more physically accessible area or the incorporation of a shelf or a grab rail for users who have difficulties with the things they are holding or who may be unsteady on their feet. Examples of more major changes included incorporating audio instructions for users with vision impairment or for those people who prefer to have reinforcement with another modality. In this way, students are led to question ‘standard’ components such as touch screens and to appreciate that the Universal Design principle of ‘Flexibility in Use’ (The Center for Universal Design, 1997) may be used here to guide designs which offer users more than one way to interact, e.g. touch and sound.

More deeply seated ‘systemic’ proposals question whether the self-service cannot be offered in another way, for instance by minimizing contact of the user with a SST, as in using contactless cards or devices, and transactions that require a single swiping motion rather than complicated input interacting with an interface of buttons, screens, slots and even twisting large knobs (see Figure 4). They are required to consider whether their designs are workable only with simple transactions, like deducting the price of a ticket from an electronic card (as in the London Transport’s Oyster Card system) and whether they are plausible for more complicated scenarios, where the customer needs to ‘negotiate’ with the SST, such as getting information about pricing or wayfinding.
The students often come up with many innovative ideas. One of these, using air flows generated by the machinery to be directed to slots that are to be used next in the interaction process, has been taken up by industry. This was inspired after viewing a video of a blind user\(^5\), trying to plug in his headphones to an ATM to avail himself of spoken instructions, and struggling to find the socket. The airflow was conceived as a haptic clue for users without vision, but also as a useful feature for all users unsure of which slot in the range of slots on an ATM (card reader slot, receipt dispenser slot, cash delivery slot, barcode reader slot, etc.) is the next to become active in the process.

**Ergonomics and Human Factors**

As part of the exercises carried out in this class, anthropometric data sets and other ergonomic and human factors recommendations regarding working conditions in terms of lighting, noise and temperature levels are applied to SSTs. Students evaluated height and reach parameters; they studied the locations of specific SSTs and made recommendations for improvement. Suggestions included facilitating better line of sight to machine: avoiding locations where conditions may impair users such as those that are noisy, cold, in bright sunlight, etc. Other exercises asked students to devise laboratory controlled testing situations for use with test users to collect data on observed interaction.

---

\(^5\) Tommy Edison (2011 uploaded) How Blind People use the ATM, Tommy Edison Experience [http://www.youtube.com/watch?v=Jzah0A6iC5o](http://www.youtube.com/watch?v=Jzah0A6iC5o)
**Information Design**

Information Design deals with making data and information understandable by humans. Several more formal definitions are available. According to the International Institute for Information Design (IIID)\(^6\), it is “research and practice in optimizing information and information systems for knowledge transfer in everyday life, business, education and science,” and Jacobson (2000, p5) notes that the key feature of information design is that it is to do with meaning, rather than with materials. It is essentially to do with sense-making, and with how to present data and information in ways that people can easily understand and use.

Some of the exercises in this class took the students back to SSTs and in particular the design of instructions on how to use the SST. Evidence showed that instructions supplied by the manufacturer were often supplemented by the deployer of the SSTs, in the form of extra instructions taped to the machine or some nearby surface. In addition, the information that people have to interact with while they are actually using the machine, that is displayed on screens, on button labels, etc., is often at odds with what they expect and leaves them confused and frustrated. Sample screen shots were analysed and redesigns made. However, students were encouraged not to just remain at the level of redesign of instructional text, but to question the whole process, looking from redesigning problematic screens to looking for simpler and more intuitive ways to present instructional information to users.

Tangential to the direct work on SSTs, was the brief for one of the small projects. The problem to be tackled was that noted by researchers (Choi et al, 2006; Law et al., 2007) that guidelines for designers of Design for All (or Universal Design) were often not well designed. Students made infographics that took a set of Design for All recommendations for designing accessible SSTs that was 76 pages long and turned into interesting and engaging “one pagers”. These infographics have been evaluated highly by judges from outside the department comprising designers as well as interested parties from the SST industry. The important point was that students made strategic choices about what information should be included on the infographic, and how other information could be left to ‘sink’ into the background. An example is below: see Figure 5.

---

Figure 5: Guidelines at a glance. Infographic for the accessible design of SSTs (work of student Katerina Karagianni)

**Systems Thinking**

Finally, students have been exposed to Systems Thinking very early on in our design school. They meet it in the first semester of their first year, and then again in the second semester of the second year, where they learn about it in detail. By the time students reach the Ergonomics and Human Factors, Design for All and Information Design courses that are run in the respectively in the second semester of the third year, the first and second semester of the fourth year, they are normally well versed in theory, knowledgeable about examples they have been taught, but with a modicum of exposure to real-life problems.

We begin by positing that a perfectly designed accessible SST may still deliver an inaccessible service. A systems thinking approach to the whole problem space of self service is one which can highlight the interactions within the systems concerned, identify the relevant subsystems and create ‘root definitions’ to help to guide interventions that will
be more effective and far ranging than simply dealing with one type of service delivery mechanism. A more complete description of systems thinking applied to this area is available in (Darzentas & Darzentas, 2013).

**Erasmus Intensive Programme on sustainable and service design**

One of the ways we have been able to gauge whether this approach to fostering interdisciplinarity is being cultivated by our students is in an intensive programme that runs for two weeks with students from three or four other universities. The complete programme is described in (Bofylatos et al., 2013)

For our students, this is their first exposure to classes on service design (Maglio et al, 2006, Spohrer et al, 2007) and to sustainable design. The point of the programme is to encourage undertake interdisciplinary work and combine these emerging fields and apply them to real world projects that involve issues of service and sustainability.

One of the interesting themes to appear was the need of facilitating the customer-service provider collaboration. This is in line with academic and commercial literature on service design (Vargo et al. 2008). These show that there is emerging practice in self-service design of co-designing the experience. In this view, users are viewed as collaborators who undertake willingly to enter into transactions with the service via whatever delivery method. This means fostering an atmosphere of cooperation where users are not passive consumers of services, but active participants in acquiring the goods or services they require. Thus the problem is not just one of good or accessible design, but also requires helping customers engage in the collaboration.

**Discussion**

As is well understood in pedagogical theory and praxis, understanding is significantly supported when illustrated with good examples. The example of self service is sufficiently rich and familiar, while being the subject of intense activity that is both practical and academic, to offer a good grounding for, on the one hand, theories, approaches and methodologies and on the other, for practice based activities and project work.

At the same time, within this context of self service, stretching the design ‘brief’ of self-service design to include the needs of elderly and disabled users, or even the needs of users in handicapping contexts, such as noisy backgrounds, or difficulties with ambient lighting, has shown benefits. We have found this assists students in thinking about solutions that go further and cover needs that people may not even realise they have. It leads students to go beyond the self-service terminal itself, and to examine the service offered so as to be more innovative and creative in their approaches to dealing with the problem space.

Our experiences have led us to believe that our students can be usefully trained in this way to break out of disciplinary boundaries and attempt more holistic solutions. These may prove in the long term more efficient than a concentrating on one aspect of the overall problem. Of course, as good interdisciplinary collaborators they should be capable of offering assistance with those individual aspects, but this should be with the understanding that ‘fixing’ these only offers partial solutions to the overall problem space. In terms of SSTs, such an outlook could help designers to guard against costly machine refits that may not be worth the effort and guides designers to look for other types of solutions. Ideally, such designers will be able to help to achieve both the goals of Design for All and consumers as well as those of the business, by aligning those goals so as to be mutually understandable, and as far as possible mutually beneficial, rather than conflicting.
It goes without saying that working with other disciplines in real life project is also a necessary part of this process. Hence our students are required to undertake internships in the final years of their degree courses, when they have finished the majority of courses. However, we believe that working throughout their courses with some common exemplars may prove very useful. We offer our experiences in the spirit of looking for ways to foster the necessary abilities to work in interdisciplinary settings that will be required of design graduates working on inclusive designs in the future.

Acknowledgements

The research reported on in this paper has been carried out as part of the eAccess+ network (www.eaccessplus.eu) funded by the European Union.

My thanks to the students who contributed samples of their work and research.

References


Jenny S. Darzentas

Dr Jenny S. Darzentas (BA, London, UK, PhD, City University, UK) works in the Department of Product and Systems Design Engineering (www.syros.aegean.gr of the University of the Aegean (www.syros.aegean.gr and lectures on Design for All; Information Design; Interaction Design Communication Theory, Organisational Theory, Behaviour and Service Design.
Her publications cover topics in Design and HCI (Human Computer Interaction), such as user needs for information; accessibility practices and policies; and educational requirements for Design for All. In addition, she has worked on many national and European funded projects, on library and archival programmes; online learning; on issues of accessibility; on personal profiles/device profiles aiming at seamless interactions, and has published on these subjects.

Her current research interests focus on the questions about self service and accessibility, and the contributions of frameworks and methodologies from Systems Thinking to Service Design and its accessibility and to Information Design. A fuller Curriculum Vitae is available at http://www.syros.aegean.gr/users/jennyd/cv_en.pdf

---

**John Darzentas:**

Professor John Darzentas (BSc Athens, MSc Sussex, UK, PhD, London, UK) is Head of the Department of Product and Systems Design Engineering (www.syros.aegean.gr) of the University of the Aegean (www.aegean.gr).

He has held academic faculty positions in universities in the UK and in Greece, and departmental headships, including Docent at the Abo Akademi, Turku, Finland, visiting Professor in the Department of Economics, University of Athens, and others.

His research interests are wide ranging and include Systems Thinking and Systems Design; Service Design; Information Systems Design; Intelligent Systems and Decision Support Systems; Human Computer Interaction; Design for All; Learning Systems and Technologies, and issues of Multi-Inter-Trans-Disciplinarity.

He is on the editorial board of a number of journals and has authored many papers published in books, journals and conference proceedings. He has served as Scientific Lead in many research programmes, funded both at national and European level. He is invited expert / member of IFIP TC13 (International Federation of Information Processing Technical Committee 13) on HCI.

A fuller Curriculum Vitae is available at http://www.syros.aegean.gr/users/idarz/cv_en.pdf