Business Case White Paper Series

How Economics and Market Forces Can Support
e-Accessibility and the Convention on the Rights of
Persons with Disabilities

Benefits and Costs
of e-Accessibility

G3ict

**Global Initiative for Inclusive Information
and Communication Technologies**

**A Flagship Advocacy Initiative
of the United Nations Global Alliance
for ICT and Development**

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Costs of e-Accessibility

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About G3ict

G3ict is an Advocacy Initiative of the United Nations Global Alliance for ICT and Development, launched in December 2006 in cooperation with the Secretariat for the Convention on the Rights of Persons with Disabilities at UN DESA. Its mission is to facilitate and support the implementation of the dispositions of the Convention on the Rights of Persons with Disabilities promoting e-accessibility and assistive technologies. G3ict participants include organizations representing persons with disabilities, industry, the public sector, and academia. G3ict relies on an international network of ICT accessibility experts to develop practical tools, evaluation methods and benchmarks for States Parties and Disabled Persons Organizations to implement policies in support of assistive technologies and e-accessibility. Since its inception, G3ict has organized or contributed to 85 awareness-raising and capacity-building programs for policymakers in cooperation with international organizations such as the ITU, UNESCO, UNITAR and the World Bank. With ITU, G3ict co-produces the "e-Accessibility Policy Toolkit for Persons with Disabilities" (www.e-accessibilitytoolkit.org), which is widely used around the world by policymakers involved in the implementation of the Convention on the Rights of Persons with Disabilities.

G3ict is funded by contributions from leading corporations committed to e-accessibility: **IBM, AT&T, Microsoft, LucyTech, Adobe, Time Warner Cable, Deque Systems, RIM, Sprint, Vodafone Foundation, Code Factory, SSB Bart Group, and Motorola Mobility.**

For additional information on G3ict, visit www.g3ict.org

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Editors

Dominique Burger, UPMC-INSERM, Chair of BrailleNet
Brice Tabeling, Association BrailleNet
Matthieu Manant, University of Paris X, France
Marc-Daniel Seiffert, University of Reims, France

Contributors

Antonella Desneux, Head of Social Innovation and Social Responsibility at SFR (France); **Bonnie Kearney,** Director of Accessibility Marketing at Microsoft (USA); **James Odeck,** Norwegian University of Science and Technology (Norway); **Caroline Ragot,** Code Factory (Spain); **Dónal Rice,** Senior ICT Design Advisor for the Centre for Excellence in Universal Design at the National Disability Authority of Ireland (Ireland); **Ronald Schild,** Managing Director at Börsenverein, the German Publishers and Booksellers Association (Germany); **Cynthia Waddell**, Executive Director, International Center for Disability Resources on the Internet (ICDRI).

Reviewers

Axel Leblois, Founder and Executive Director, G3ict
David Ross, G3ict Editor
Francesca Cesa Bianchi, Director, External Relations, G3ict
Design by Manuel Ortiz - www.modesignstudio.com

Special Mentions

Foreword

On March 28, 2011, more than 200 professionals, association members and scholars from around the world gathered in Paris, at the invitation of BrailleNet, to discuss e-accessibility costs and benefits. At first, the subject seemed relatively straightforward: E-accessibility is now recognized as an important and relevant aspect of our highly digitized world; accessibility legislation has been adopted in numerous countries, while many successful businesses and thousands of professionals have emerged in the field. Participants, however, agreed that, despite technological and political achievements, we still need to understand the economic aspects of e-accessibility to make it a reality.

Speakers were invited to discuss the economic aspects of e-accessibility. They shared experiences and proposed new concepts, all the while acknowledging that e-accessibility is a fast-evolving field in a complex world.

This white paper seeks to document the innovative elements of these discussions. Rather than simply presenting a set of conference proceedings, it aims to capture the ebullient atmosphere of the event and to honor the creative and sometimes challenging conclusions that came out of it. It is meant to reformulate the e-accessibility economic paradigm around concepts that take into account the complex nature of the ICT field and the even more complex state of our global society. It is the hope of the editors that this white paper will be a first step toward defining new analytical approaches to improve our understanding of how to best promote sustainable e-accessibility models. It does not claim to be exhaustive or complete.

Information presented during the conference is supported by additional data from a variety of sources (MeAc, UNESCO, WHO, etc.). Two economists were invited to contribute to this work and to build on our discussions.

The key conclusions of this white paper are the following:
- E-accessibility costs are highly dependent on the structure of the market and of supporting e-accessibility business ecosystems.
- Cost-benefit analysis can be applied to e-accessibility to demonstrate its socioeconomic benefits as well as to document the costs incurred by the lack of e-accessibility.
- Litigation influences the e-accessibility economy and can have a bearing on the costs involved.
- Standards can help incorporate e-accessibility widely in business and industrial practices so that products are accessible to everyone.
- Standards create a level playing field so that accessible products and services can compete effectively.

Global Relevance for the Proper Implementation of the Convention on the Rights of Persons with Disabilities (CRPD)

General view of the 5th European e-Accessibility Forum - 2011

One hundred and fifty three countries, including the European Union, have signed the CRPD and 110 have ratified it since its opening for signature on March 30, 2007. Article 9 of the CRPD elevates the obligation for States Parties to ensure e-accessibility on par with the obligation to ensure the accessibility of the built environment and transportation. The CRPD in its preamble recognizes "the importance of accessibility to the physical, social, economic and cultural environment, to health and education and to information and communication, in enabling persons with disabilities to fully enjoy all human rights and fundamental freedoms." Article 9 of the CRPD includes specific directions for States Parties to promote accessibility standards, universal design, and, more specifically, to "Promote the design, development, production and distribution of accessible information and communications technologies and systems at an early stage, so that these technologies and systems become accessible at minimum cost" (Art. 9.2.h). Thus, understanding the economics of e-accessibility appears to be a prerequisite to properly implementing the dispositions of the CRPD on ICT accessibility.

Dominique Burger
UPMC-Inserm, Chair of BrailleNet

Axel Leblois
Executive Director, G3ict

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I. Defining the
e-Accessibility Economy

The question of e-accessibility's costs and benefits implies the existence of a market. Within this market, *"e-accessible products"* are exchanged between buyers (persons with disabilities) and sellers (companies producing these goods). To understand what is at stake in the e-accessibility economy, it is thus necessary to answer the following questions:

- How can the population of persons with disabilities be defined?
- What is an e-accessible good?
- How can the market be quantified?
- How does the offer match the demand?

Defining Disability

According to the World Health Organization (WHO), *"Disability is an umbrella term for impairments, activity limitations, and participation restrictions."* [1] Impairment is a problem in body function or structure, an activity limitation is a difficulty encountered by an individual in executing a task or action, and a participation restriction is a problem experienced by an individual in involvement in life situations. Disability is thus a complex phenomenon, reflecting an interaction between features of a person's body and features of the society in which he or she lives.

Article 1 of the CRPD takes this complex interaction into account in its definition of disability: *"Persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which, in interaction with various barriers, may hinder their full and effective participation in society on an equal basis with others."*

This definition results from a representation that emerged during the 1970s, when the disability advocacy movement, together with researchers from the social and health sciences, started to consider the role of social and physical environment in explaining disability, and to view people as "being disabled by society rather than by their bodies." [2] This transition from an individual, medical perspective to a structural, social perspective has had important consequences on public policy concerning persons with disabilities. Many countries have since adapted their laws and terminologies to reflect this paradigm change.

In the United States, during the 1980s, the work of political activists led to its first legal appearance in 1990 through the Americans with Disabilities Act (ADA), which stresses the imperative of social insertion: *"In [ADA's] framework, disability does not lie within the person but in the interface between individuals' characteristics (such as their functional status or personal or social qualities) and the nature of the environments in which they operate."*

Similar trends appeared in other countries. For example, in 1987, France enacted an employment quota concerning persons with disabilities that private companies should respect. A definition was later inserted in the law on disability of 2005 rejecting the strictly medical approach and recognizing the role of the environment as a component of disability [3] and anticipating the language adopted by the CRPD.

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1. World Report on Disability, WHO-World Bank, 2011, 4: http://whqlibdoc.who.int/publications/2011/9789240685215_eng.pdf
2. Idem
3. Rapport du Gouvernement au Parlement relatif au bilan et aux orientations de la politique du handicap, Secrétariat d'Etat chargé de la Solidarité, 12 mai 2009. A l'article L. 114, la loi stipule: « constitue un handicap, au sens de la présente loi, toute limitation d'activité ou restriction de participation à la vie en société subie dans son environnement par une personne en raison d'une altération substantielle, durable ou définitive d'une ou plusieurs fonctions physiques, sensorielles, mentales, cognitives ou psychiques, d'un polyhandicap ou d'un trouble de santé invalidant ». http://lesrapports.ladocumentationfrancaise.fr/BRP/094000070/0000.pdf

This new social definition dramatically influences the economic understanding of e-accessibility:

- Since the lack of accessibility of the environment is a component of disability, companies, governments and communities can be sued and fined for providing inaccessible e-products or services, exposing them to serious economic consequences.
- The economic assessment of e-accessibility should take into consideration its costs and benefits for the society as a whole.

Defining e-Accessible Goods

Consistently with its definition of disability, the WHO states that *"accessibility describes the degree to which an environment, service, or product allows access by as many people as possible, in particular people with disabilities."*

For instance, a bus, a building, a mobile phone and a website are accessible if persons with disabilities can use them like anyone else would. This includes the fact that, in some cases, persons with disabilities use specific equipment or devices, often referred to as assistive technologies (AT) in the ICT environment. For example, just as an accessible bus has to be accessible to a person in a wheelchair, a mobile phone has to be compatible with a hearing aid used by a deaf person. Similarly, a website has to be accessible to a person reading textual information with a refreshable Braille display.

Thus, though e-accessibility is strongly related to Assistive Technologies, it is important to emphasize that the e-accessibility market is distinct from the AT market. While AT are products specifically designed to address a particular impairment, accessible goods have to be understood as mainstream products or services that are designed in such a way to address the needs of persons with disabilities as their potential users, possibly with the addition of a specific AT. It is also worth noting that the ICT market includes content, software programs and devices that are interdependent and whose combination is necessary to provide services. This is true when considering e-accessibility, as well. An accessible smart phone might be useless if you can't access the web service you need.

In short, e-accessible goods are mainstream goods designed in such a way that persons with disabilities can use them.

Article 2 of the CRPD includes wording to this effect: *"Universal design means the design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. Universal design shall not exclude assistive devices for particular groups of persons with disabilities where this is needed."*

Disability Figures

One important parameter to be taken into account to understand the e-accessibility market is demography. All economic studies converge on the fact that data on the disabled population is scarce, poor and incomplete; however, there is general agreement that the growing need for inclusive solutions creates a large potential market worldwide.

WHO estimates that *"about 15 percent of the world's population lives with some form of disability, of whom 2-4 percent experience significant difficulties in functioning."* The global disability prevalence is higher than previous WHO estimates, which date from the 1970s and suggested a figure of around 10 percent. This global estimate for disability is on the rise due to population aging and the rapid spread of chronic diseases, as well as improvements in the methodologies used to measure disability. [4]

A study commissioned by the European Commission similarly establishes that the lack of e-accessibility could *"digitally exclude as many as 110 million Europeans between persons with disabilities and older persons"* and stated, *"This larger definition of the target is justified by the fact that the potential beneficiaries of e-accessibility in general, and of Web accessibility in particular, are not only the strictly defined people with disabilities, but can also include the aging population."* [5]

Thus major industry organizations like the European ICT Association (EICTA) stated, as early as 2005: *"Provision of accessible products and services is important to everyone, [as] it enables an estimated 500 million disabled persons around the world to access technology and the services it increasingly delivers; it enables the disabled to enter the workforce (approximately 14 percent of Europeans have a disability and half of those are not working); a recent study in the United States found out that 60 percent of working-age adults can benefit from the use of accessible technologies because they experience mild impairments or difficulties when using current technologies."* [6]

In 2006, EICTA, analyzing the results of a WHO analysis of global health situations and trends from 1955 to 2025, reasserted:

> *"Shifting demographics dictates the need for further improvements in accessible design. The number of people … over 65 will rise from 390 million now to 800 million by 2025 - reaching 10 percent of the total population. As the overall number of elderly people increases, there is a corresponding rise in the number of persons with disabilities."* [7]

Such statements are not exceptional. On many occasions, industry or finance organizations have clearly expressed their belief that the needs by an increasing number of senior citizens around the world for accessible e-services are about to open new market opportunities.

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4. World Report on Disability, WHO-World Bank, 2011
5. Study Smart 2009-0072 on "Economic Assessment for Improving e-Accessibility Services and Products"
6. EICTA Report – See reference at the end of this document
7. EICTA Report – See reference at the end of this document

5th European e-Accessibility Forum - 2011

Bonnie Kearney, Director of Accessibility Marketing at Microsoft: "In the United States, 1 in 4 people experiences trouble with their vision and 1 in 5 people experiences trouble with their hearing. 74.2 million computer users have impairments. Considering, in addition, that 1.4 billion people will be over 55-year-old in 2020, a strong marketing argument exists to make firms invest in e-accessibility."

But, Does a Market Really Exist?

Despite the impressive figures and strong declarations, on the customer side, i.e., for persons with disabilities, the picture is still extremely disappointing:

- Most of the Web services are not compliant with accessibility standards, many of them cannot be used, even though some are essential in our information society. [8]
- Text relay services are only available in half of the EU Member States, though they are essential for deaf and speech-impaired persons. [9]
- Most mobile phones are not accessible (see chapter III).
- Only a negligible proportion of books published in an electronic format are available in accessible XML DAISY (see chapter VII).
- In 2002, the Senior Watch study found that 48 percent of Europeans age 50 or older considered that manufacturers are not adequately addressing them in the design of their products. Between 10 and 12 million were nevertheless potential customers of new mobile phones, computer and Internet services. [10]
- In general, the level of e-accessibility is clearly lagging behind the target set out in the Riga Declaration [11] in 2006 and at its current pace the target of the Digital Agenda for 2015 will not be reached. [12]

Several reasons can be found for such a discrepancy between demography, public statements and the availability of accessible products and services:

- The lack of precise data on disability does not help risk-taking by the private sector in a market that has been largely ignored for decades. In particular, the purchasing power of persons with disabilities is a real business question.
- The diversity of disabilities creates a complex landscape for business. In fact, understanding "people with disabilities" as a unique target would be misleading. As any group of individuals, persons with disabilities have diverse personal factors, with differences in gender, age, socioeconomics, status, sexuality, ethnicity, or cultural heritage. Each will have different preferences and solutions according to his or her own way of life.
- The lack of technical expertise required to develop solutions that meet the needs of persons with disabilities.
- Little awareness and lack of measurement capabilities among companies and public organizations to conduct cost-benefit analysis of e-accessibility. [13]
- A perception within industry that e-accessibility may create barriers to creativity and innovation and slow down development processes, thus affecting market reactivity and competitiveness.
- Companies often consider that it is up to governments to nurture the market by taking steps that can create conditions for sustainable market developments. This does happen, of course, but takes time: a classic chicken and egg problem!

Still, there are many examples where industry has produced powerful accessible products, providing persons with disabilities with an equal access to ICT services. In the following chapters, we will examine and discuss how industry and business strategies can achieve such results.

Learning Points

- A new paradigm emerged during the 1970s, namely that people are disabled by society rather than by their bodies. The social environment, companies, governments and communities are considered responsible for the disability.

- The fact that "about 15 percent of the world's population lives with some form of disability" and the shifting demographics dictate the need for serious improvements in accessible design.

- The knowledge of the disability market is insufficient. Economic investigation should be carried out in order to support corporate strategies toward e-accessibility and Universal Design.

8. MeAC European survey conducted in 2006-2011 showed that only a very small proportion of key government websites in the Member States meet the accepted minimum international standards on accessibility (12,5 percent passed automated testing and only 5,3 percent passed both automatic and manual examination)
9. Result of the MeAC European survey
10. http://www.seniorwatch.de/
11. See: http://ec.europa.eu/information_society/events/ict_riga_2006/doc/declaration_riga.pdf
12. See reference at the end of this document
13. See reference at the end of this document

II. Designing for All:
An Industrial Challenge

Reducing costs while improving customer satisfaction is always an effective and economical strategy, an objective that "Design for All" or "Universal Design" can help achieve. Considering e-accessibility as part of a Design for All strategy requires specific expertise and knowledge related to disabilities, which may bring together several players. In this chapter we contrast two models, illustrated by examples taken from the mobile phone industry, and analyze the costs and benefits involved in each.

Outsourcing e-Accessibility:
Screen Readers as Mobile Phone Add-Ons

Most cell phone manufacturers have adopted an accessibility strategy where they do not take e-accessibility requirements into account when designing their products, but rather cooperate with a third-party company that specializes in providing e-accessibility solutions for mainstream mobile phones. One of these third-party companies, Code Factory, has developed a screen reader software called Mobile Speak and a screen magnifier called Mobile Magnifier.

Mobile Speak and Mobile Magnifier have been adopted by such major companies as Nokia, RIM, and Motorola. The additional cost of the accessibility solution is supported by consumers, in other words by disabled users, or by organizations paying for them through sponsoring or funding (such as SFR in France). It is worth noting that such solutions are highly dependent on the upgrade of mobile phones themselves. For example, Nokia recently decided to drop the Symbian OS and to migrate toward Windows Mobile, a decision that made the current version of Mobile Speak obsolete on all future Nokia Mobile phones.

"Universal design means the design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. Universal design shall not exclude assistive devices for particular groups of persons with disabilities where this is needed."

Article 2 – Definitions
Convention on the Rights of Persons with Disabilities[14]

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14. See reference at the end of this document

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Caroline Ragot,
Managing Director, Code Factory:
"Implementing accessibility natively would certainly be the most economical solution, but it is rarely the case for several reasons: First, a lack of expertise on the part of the manufacturers can hinder such initiatives. Constraining technical requirements can also limit their creativity. Longer development process can also constitute a hurdle. But manufacturers' involvement in accessibility implementation after the manufacturing process (or even after the product has been launched) is not without cost: It implies long and heavy processes due to the size of the firms.

This has encouraged third-party firms to develop "niche" solutions, such as screen readers or magnifiers. This requires a high level of expertise and specific developments whose costs at Code Factory is roughly €1 million a year, which justifies the price of the Mobile Speak license set at 225€, which addresses the need of around 40, 000 blind users worldwide."

Mobile Speak

The Mobile Speak screen reader is a software application installed on a mobile phone that allows the user to operate the device even if he or she cannot read the screen visually. Information displayed on the screen is rendered in synthesized speech output generated using text-to-speech (TTS) technology and routed through the device's speaker or a headset. Screen contents can also be presented in Braille if the mobile phone or PDA is connected to a Braille device with a refreshable Braille display. Speech and Braille output can be used either simultaneously, or independently, to perform many tasks on the phone.

Mobile Magnifier is a full-screen magnification application for mobile phones that enlarges and improves readability of screen content, detects areas of interest to make them more visible, and offers hotkeys to change settings on the fly.

Incorporating e-Accessibility in the Design Process

Part of Apple's marketing strategy is to include assistive technology in its products as standard features at no extra cost. Consequently, Apple has integrated its VoiceOver Screen Reader into its mainstream iPhone/iPad, making it possible for persons with physical disabilities to place and receive calls, surf the web, text and email correspondents, and access many services via software applications – popularly known as "apps" – on a variety of practical types of information or transactions. In addition, Apple promotes a highly controlled business environment and imposes a technical framework for making applications accessible around their products. Visually impaired users can, for example, order and read books from mainstream digital vendors, using a mainstream iPhone/iPad.

As a result, the e-accessibility market is absorbed into a wider market. Braille or text-to-speech AT manufacturers also benefit from the economic and technological ecosystem of Apple environments, which add value to their solutions by opening them to new applications, provided they follow Apple guidelines, so that AT users potentially have access to applications and innovative solutions developed for the Apple environment. Concerning the costs of developing and implementing VoiceOver, a first observation is that VoiceOver for iPhone/iPad was born out of accessibility technologies that were implemented in Apple's Mac before the launch of the iPhone. The iPhone/iPad accessibility solutions form part of Apple's larger technological environment. From this point of view, accessibility costs are reduced significantly, particularly in relation to a solution developed independently.

It can also be inferred that Apple's accessibility policy contributes to the overall momentum of its environment, as it relies on innovative human interaction solutions that facilitate the reach of a wider audience. Apple encourages companies involved in developing software for use in their environment to help promote accessibility solutions, thus providing a wider confidence in the sustainability of e-accessibility solutions. It is a virtuous circle.

Learning Points
- Universal Design requires highly specialized knowledge and know-how.
- Developing e-accessible solutions is easier for the manufacturer of the operating system than for a third-party company.
- When taken on board early enough in the design process, e-accessibility is not a hurdle to a successful business and can widen its market.

VoiceOver

The same VoiceOver screen reader made popular on the Mac is a standard feature on iPhone 4 and iPhone 3GS. It's a gesture-based screen reader, enabling a person to use an iPhone even if he or she cannot see the screen, just physically interacting with items on screen. With VoiceOver, you touch the screen to hear a description of the item under your finger, then gesture with a double-tap, drag, or flick to control the phone. The speaking rate is adjustable and distinctive sound effects are used to alert you when an application opens, when the screen is updated, when a message dialog appears, and more.

A refreshable Braille display that uses Bluetooth wireless technology can be used to read VoiceOver output in braille. In addition, Braille displays with input keys and other controls can be used to control iPhone when VoiceOver is turned on. iPhone 4 and iPhone 3GS work with many of the most popular wireless Braille displays. [15]

"States Parties shall also take appropriate measures to: ...Promote the design, development, production and distribution of accessible information and communications technologies and systems at an early stage, so that these technologies and systems become accessible at minimum cost."

Article 9-2(h) – Accessibility
Convention on the Rights of Persons with Disabilities

[15] http://www.apple.com/accessibility/iphone/vision.html

III. Methods for Measuring the Economic Impact of e-Accessibility

Measuring the economic impact of e-accessibility is essential to involving decision-makers who, in general, consider e-accessibility implementation as a sure cost for an uncertain benefit.

Since the e-accessibility of a product or a service is an integral part of its features, it is difficult to measure its costs and even more difficult to assess its benefits. Studies by experts of the actual return on investment of e-accessibility show significant differences. The result is a lack of common metrics by which to assess the economic impact of e-accessibility. In this chapter, we present two types of methodologies developed in support of decision-making.

Microeconomic Approach: The Stated Preference Method (SPM)

The Stated Preference Method (SPM) is based on asking people how much they would agree to pay for implementing specific features in a service or, alternatively, how much they would ask for as compensation for its absence. This method does not consider demographic data. It provides companies with an approach to compare benefits with investment costs, therefore assessing the economic balance of the specific features of a product or service. SPM was used in Norway to appraise Universal Design (UD) in public transportation. Although it does not seem to be applied by manufacturers to assess the economic impact of the e-accessibility features of products or services, there are reasons to think that it could be suitable for such a task (see box, James Odeck).

James Odeck, Professor at The Norwegian University of Science and Technology, presented an evaluation framework, recently developed in Norway, which demonstrates that UD projects are greatly profitable from a socioeconomic viewpoint. Indeed, even if UD addresses primarily users with disability, it is actually beneficial for everyone. At the very heart of the Norwegian framework lies a new perspective on UD: UD is necessary for some users but benefits all. Therefore, to evaluate economically UD benefits, one must take into account which advantages are gained by everyone.

For example, a low-floored bus benefits wheelchair users as well as those with baby strollers. Also, because wheelchair and stroller users can board more quickly, all riders can, too. Then, all others passengers on board also save travel time, and bus operators may increase their efficiency.

To assess UD benefits, it is important to detail every benefit coming from its implementation. These benefits can be evaluated with a Stated Preference Method; in other words, through polls asking users how much they value each UD improvement. It appears then that benefits largely exceed UD costs.

This analysis can be made for e-accessibility, considering that e-accessibility investments benefit everyone. By analogy, it reveals also that projects aimed at promoting an equal access to ICT are likely socioeconomically beneficial.

Universal Design	Benefits	Costs
Low-floor bus	• Eases boarding/alighting the bus (comfort factor) for all passengers • All passengers save time boarding/alighting • All passengers in the bus save time because boarding/alighting the bus is quicker • Bus company obtains an efficiency effect due to time saving (not included in the analysis) • Reduction of subsidies from the government due increased patronage (not included in the analysis)	• Investment and maintenance of low-floor bus
Implementation of high curbstone at a bus stop	• Eases boarding/alighting the bus (comfort factor) • All passengers save time boarding/alighting • Bus company obtains an efficiency effect due to time saving	• Investment and maintenance of curbstones
Enhanced lighting at bus stops	• Improved total overview • Improved readability of information • Increased sense of security and increased level of identification of approaching buses	• Investment in lighting and maintenance

5th European e-Accessibility Forum - 2011

Dónal Rice, Ph.D. student, Centre for Disability Law and Policy, National University of Ireland, Galway and editor of the ITU-G3ict Policy Toolkit for Persons with Disabilities

"Inclusive education aims at reducing obstacles related to education of disabled populations (but not only). ICTs are an important way to promote inclusive education through compensation, didactical methods, alternative communication means and strategies for improvement."

The development of inclusive education is based on several international recommendations. The CRPD is the primary piece of international law guiding the educational components of national disability policies around the world.

Without even considering the technological and pedagogical benefits resulting from ICT use in inclusive education, it is still possible to evaluate the economic costs of their absence. As with many other areas of ICT accessibility, the cost modeling should not solely be based around the cost of providing individual supports, but should look at the wider societal benefits.
To this end, cost-benefit analysis for providing ICTs to enable persons with disabilities to access education and thereby become productive members of the workforce should factor in the wider societal and economic benefits. UNESCO, for example, recommends that any cost modeling of inclusive education should take into account the high social and economic costs that will be incurred by a country if these children are not educated.

Specifically, the UNESCO IITE Policy Brief "ICT for Inclusion: Reaching More Students More Effectively" states: "To not invest in education as a preparation for an active and productive adult life can be very costly and profoundly irrational in economic terms."

Several studies have shown the enormous decrease in Gross Domestic Product (GDP) by not including persons with disabilities. For instance, a study in Canada concluded that the world production loss amounts to 7.7 percent of GDP if persons with disabilities are kept outside of the labor market. This lead to the conclusion that large amounts of money should be invested in facilitating an education that can lead to work.

The UNESCO IITE Policy Brief "ICT for Inclusion: Reaching More Students More Effectively" proposes a number of areas for policy interventions: infrastructure, support for practice, needs assessment for persons with disabilities, training for students and teachers, cooperation and research on best practices and evaluation on the benefits and uses of assistive technologies."

Should the Stated Preference Method be applied to appraise e-accessibility, the accessibility features submitted to users could be easily identified among existing accessibility standards. For instance the W3C WCAG (Web Content Accessibility Guidelines) recommendations for Web accessibility[16] point out some benefits resulting from Web accessibility implementation, including:

- Better reading experience (e.g., sufficient contrast between foreground and background colors; text and other elements that blink; flash or animations that don't distract users or cause seizures)
- Clear design (e.g., clear and consistent design, navigation, and links; an ability to increase the clickable area of targets; supplemental illustrations)
- Better navigation experience (e.g., being able to use the keyboard, rather than having to use the mouse, for all website interaction (device independence); providing users enough time to read and use content)
- Good structure for the content.
- Screen reader compatible with text-to-speech applications
- Content adaptability (e.g., an ability to increase the clickable area of targets; text that can be increased in size so that it can be read directly by persons with mild visual impairment without requiring assistive technology such as a screen magnifier; along with easy to read fonts and increased line spacing).

Any user can be asked to price such advantages. Such studies would probably reveal that, as James Odeck concluded, "projects aimed at promoting an equal access to ICT are beneficial socioeconomically."

Macroeconomic Approach

This approach considers the possible impact of e-accessibility on global economic indicators. For example, how does the exclusion of persons with disabilities from economic activities impact the Gross Domestic Product (GDP)? A Canadian study estimated that the production loss – if persons with disabilities are kept outside of the labor market – would amount to 7.7 percent of GDP (see box, Dónal Rice)

UNESCO conducted such studies focusing on inclusive education. E-accessibility helps implement inclusive education: It allows students to access course material, through ICTs, irrespective of their disabilities. In fact, the lack of e-accessibility compromises inclusive education and prevents many people from accessing knowledge and training.

Learning Points

- Measuring e-accessibility costs and benefits is essential to involving and getting the support of decision-makers.
- 7. 7 percent of the GDP worldwide could be affected by a lack of e-accessibility.
- Cost Benefit Analysis demonstrates the socioeconomic benefits of Universal Design can be applied to assess e-accessibility.
- Considering e-accessibility as part of Universal Design changes the cost-benefit understanding, because e-accessibility can reduce costs and maximize benefits. Citizens and industry have both called for government and public institutions to reinforce the adoption of e-accessibility.
- The spectrum of measures that public bodies can take is wide and includes awareness campaigns, education programs, legislation, financial support of good practices, legal action, and R&D.

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[16]. http://www.w3.org/WAI/

IV. e-Accessibility Policies: Results and Future Trends

In this chapter, we examine how efficient such policies can be, on the basis of a study conducted in Europe, and the enactment of an e-accessibility law in the United States and its impact on business.

Efficiency of Public Policies on e-Accessibility

The impact of public policies has been studied in a report called "Measuring Progress of e-accessibility in Europe" (MeAC), as a follow-up to the European Commission's Communication of 2005 on e-accessibility.

The methodology adopted in this study was based on comparing two main types of indicators: policy indicators and e-accessibility status indicators. Taken together, those indicators enable an assessment of the status of e-accessibility in Europe. On the policy side, the main focus was on legislative/regulatory measures. The assessment was made across the EU Member States and also in selected comparison countries, namely, the United States, Canada and Australia. The aspects of e-accessibility to be measured were selected to give a broad representation across ICT domains and disability groups. The results identified a clear and positive correlation between effective e-accessibility and policy measures (Figure 1).

U.S. Law on e-Accessibility

Among the policy measures supporting e-accessibility, an important one is legislation. The implementation of specific legislation on e-accessibility in the United States provides an example of legislation that could have deep economic impact via litigations if a lack of accessibility is detected. The costs may be quite high, through judiciary charges, financial settlement agreements, technical barrier elimination, or, in some cases, financial remedies.
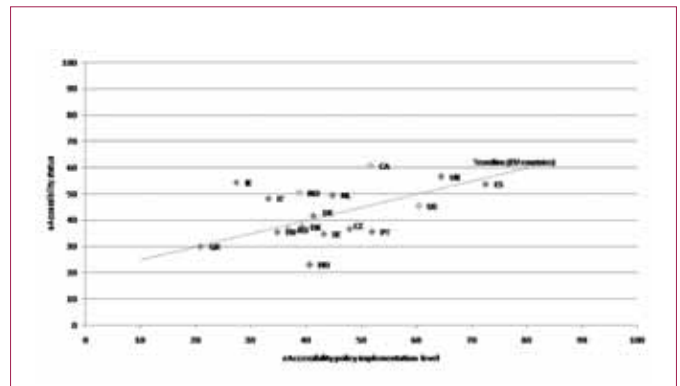

Figure 1: Relationship between the e-accessibility level and the degree of e-accessibility policy implementation - Source: MeAC2 (2011). The indicators used to build the synthetic indexes emerge from components that have been calculated from the answers provided to technology and policy questionnaires. These components have been transformed into a scale ranging from 0 to 100 to allow comparison between countries.

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Cynthia Waddell, Executive Director and Law, Policy and Technology Consultant, International Center for Disability Resources on the Internet (ICDRI), presented the case of the U.S. legislation. She began by reminding the audience of the U.S. legal framework:

1. Section 504 of the 1973 Rehabilitation Act was the first disability civil rights law enacted in the United States. It prohibits discrimination against persons with disabilities in programs that receive federal financial assistance. In 1977, a sit-in, along with demonstrations in San Francisco and Washington, D.C., changed the course of civil rights history, and resulted in the signing of the 1977 Health, Education, and Welfare (HEW) regulations implementing Section 504.

2. The Americans with Disabilities Act (ADA) of 1990 was the first civil rights law extending non-discrimination provisions to the private sector. It is a civil rights law that prohibits discrimination solely on the basis of disability in employment, public services and accommodations from the private sector.

3. Section 508 of the Rehabilitation Act of 1973 was strengthened with the passage of the Workforce Investment Act of 1998. It prohibits the federal government from procuring information and communications technology that is not accessible.

4. The 21st Century Video and Communications Accessibility Act was enacted in October 2010 and established new safeguards for disability access to ensure that persons with disabilities are not left behind as the United States migrates to the next generation of Internet-based and digital communication technologies.

Further, Cynthia Waddell presented several litigation cases related to e-accessibility that have shaped jurisprudence and illustrate the possible cost of e-accessibility failures, such as the case against universities deploying the Kindle. On June 25, 2009, the National Federation of the Blind (NFB) and the American Council of the Blind (ACB) jointly sued Arizona State University on behalf of students with visual impairments to prevent the university from deploying the Kindle DX electronic reading device as a means of distributing electronic textbooks to all students. Although the Kindle DX has text-to-speech features, it was inaccessible to individuals who are blind. Plaintiffs alleged that the university's use of Kindle DX for textbooks violated Section 504 of the Rehabilitation Act and Title II of the ADA.

Additional complaints were filed against five other institutions of higher education for deploying the Kindle DX as part of a pilot project to assess the role of electronic textbooks and reading devices in the classroom. The complaints alleged violations of the ADA and Section 504 of the Rehabilitation Act.

The subsequent settlements agreed to by higher education institutions with the U.S. Department of Justice established several rules, including that colleges will not purchase, promote, recommend or require a Kindle DX or any other dedicated electronic book reader for use by students unless the device is fully accessible or a reasonable accommodation or remediation can be provided. The settlement specifically called out the inaccessibility of the Barnes and Noble Nook and numerous models of the Sony eReader. The Justice Department also defined that an eReader is fully accessible only if all uses of the device that are available to individuals without disabilities are available to individuals with visual impairments and in a manner equally as effective.

And, indeed, it called for a response from the eReaders market. On April 3, 2010, Apple launched the iPad with extensive Accessibility Features and oin July 29, 2010, Amazon released the Kindle 3 with talking menus. This is an example of how legislative action and litigation cases have a deep impact on the market.

Lawsuit Costs in Target Corporation Litigation Case

Target Corporation (Target) offers discount consumer products, fresh food and general groceries in the United States. Their website registers close to 1 million unique visitors daily.

In 2005, the National Federation of the Blind (NFB), notified Target that its website, Target.com, was not accessible to blind and visually impaired users. Key issues cited were: a lack of alternative (alt) text on the site, online purchases could not be completed without the use of a mouse, image maps to show store locations were inaccessible,and many headings important to navigating the site were missing.

As Target would not commit to any action to remedy this, NFB filed a lawsuit alleging that Target.com's lack of accessibility violated two California acts and the Americans with Disabilities Act, all concerning civil rights and anti-discrimination issues. Finally, in 2008, Target settled the class action lawsuit with the NFB and agreed to pay class damages in the amount of $6 million, as well as attorney fees and court costs.[17]

"States Parties shall take all appropriate measures to ensure that persons with disabilities can exercise the right to freedom of expression and opinion, including the freedom to seek, receive and impart information and ideas on an equal basis with others and through all forms of communication of their choice."

Article 21 – Freedom of expression and opinion, and access to information
Convention on the Rights of Persons with Disabilities

Learning Points
- Measuring e-accessibility costs and benefits is essential to involving and getting the support of decision-makers.
- 7. 7 percent of the GDP worldwide could be affected by a lack of e-accessibility.
- Cost Benefit Analysis demonstrates that the socioeconomic benefits of Universal Design can be applied to assess e-accessibility.
- Considering e-accessibility as part of Universal Design changes the cost-benefit understanding, because e-accessibility can reduce costs and maximize benefits.

17. ref.

V. Standards: A Foundation for e-Accessibility

Standards: Market Dynamics and Ethical Principles

Standards aim to harmonize a field of activities and practices around a common norm. They play an important economic role by unifying and making a market more fluid, creating a level playing field in which products and services are in competition. They can create economies of scale and reduce development costs. For example, according to the MPEG Licensing Authority, the MPEG-2 digital coding standard generated an estimated market of 2.5 trillion USD in 2008.[18] This potentially applies to any activity sector, including e-accessibility.

Additionally, standards can insert ethical principles at the very heart of business and industrial practices, as with e-accessibility standards. Thus, the benefits of e-accessibility standards are threefold:

- They facilitate the interoperability between mainstream and assistive technologies and the acceptance and recognition of assistive technologies by industry.
- They encourage the emergence and growth of business ecosystems involving companies specialized in e-accessibility.
- They improve the usability and broaden the audience of mainstream products.

The European survey conducted by MeAC showed that web designers consider that e-accessibility standards, such as W3C/WAI WCAG, are a major facilitator of web accessibility. (Figure 2)

This opinion is shared by the ICT industry organization EICTA, which declared, "We support the development of a coherent global market for accessible products and services. We believe that one of the requirements for a coherent market is the development and adoption of international (rather than national or regional) standards; where this is not feasible, we support the global harmonization of regional standards." [19]
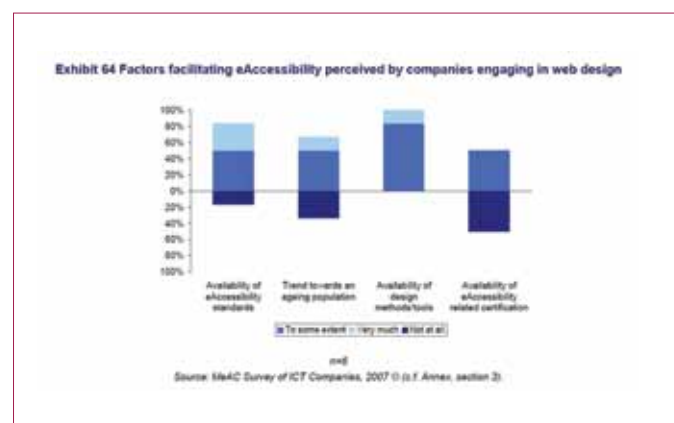

Figure 2: The main factors facilitating e-accessibility in the view of web designers are: the e-accessibility standards, proper design methods and tools, the trend toward an aging population. Certification is ranked fourth. (Source: MeAC)

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18. Source: W3C/WAI website http://www.w3.org/WAI/bcase/target-case-study
19. ISO brochure Today state of art solutions for CEO, 2010 - http://ildigital.olivesoftware.com/Olive/ODE/ISO-Brochure/?href=ISOB/2010/05/01

The Main Standards Supporting e-Accessibility

W3C Accessibility Recommendations

Since its creation, the World Wide Web Consortium (W3C) has devoted a great deal of effort to ensuring that the Web is accessible for everyone, including persons with disabilities. The Web Accessibility Initiative (WAI) was launched in 1997 with endorsement from the Clinton Administration and W3C members. WAI is the leading organization for standardization activities relating to Web accessibility. WAI coordinates the elaboration of guidelines, technical reports, educational materials and other documents that relate to web content, web browsers and media players, authoring tools, and evaluation tools.

The W3C/WAI standards have been adopted by numerous countries worldwide and in Europe, with support from the EU Commission. Since persons with disabilities often require non-standard devices and browsers, making websites compliant to W3C/WAI recommendations also benefits a wide range of applications and devices, including mobile devices and smart phones. W3C accessibility recommendations relate to web content, authoring tools, user agents and mobile web best practices.

DAISY Standard (Digital Accessible Information System)

The DAISY standard is an XML standard for accessible electronic books that has been designed in such a way that they can be read by persons with print disabilities, including the blind and the visually impaired but also by persons with dyslexia or motor impairments. A DAISY book is composed of a set of digital files that may include:

- Digital audio files containing a human narration of part or all of the source text
- A marked-up file containing some or all of the text
- A synchronization file to relate markings in the text file with time points in the audio file
- A navigation control file which enables the user to move smoothly between files while synchronization between text and audio is maintained

Books can be read on refreshable Braille displays or listened to on audio devices. Books can be searched, bookmarked and navigated through structure elements such as titles, footnotes, etc. The DAISY 2.0 Specification was first released in 1998. DAISY 3 became an ANSI/NISO Standard in March 2002 (ANSI/NISO Z39.86). It was revised in 2005.

In October 2011, the EPUB standard in its EPUB 3.0 revision integrated most accessibility specifications of the DAISY standard.[20]

Braille, the First Accessibility Standard

The Braille system was invented in the 19th century for coding texts in such a way that the blind could read and write. Indeed, when Louis Braille's system was adopted by the International Congress for the Amelioration of the Condition of Blind People in 1878, it became de facto the first worldwide e-accessibility standard. Over the decades, the social benefit of Braille for the blind has been tremendous. The strength of this standard is such that recently Braille code could easily be integrated into other standards such as ASCII (American Standard Code for Information Interchange) and UTF-8 (UCS Transformation format – 8 bit).

EPUB 3.0: The Emergence of Universal Standards Including e-Accessibility Requirements

EPUB is a digital publication interchange and delivery format based on XML and web standards. It has become a global standard in the digital publishing industry, enabling content to be portable across devices and reading systems. This format is supported by a large number of e-readers.[21] Consequently, an increasing number of publishers are using this format to distribute their books electronically. EPUB was developed by the International Digital Publishing Forum (IDPF), a global trade and standards organization.[22]

In 2009, IDPF accepted the offer made by the DAISY Consortium to act as maintenance agency of the IDPF Standards. Later the same year Georges Kerscher, the Consortium's Secretary-General, was elected IDPF president. These were important steps towards the convergence of EPUB and DAISY text-only formats into one unique standard. Some EPUB key features include enriched semantic structure, support for synthesized speech pronunciation, enhanced Global Language support, Math ML support and structure-based navigation through a book. Support for synchronized audio and text is enabled through "Media Overlays," providing the reading experience of existing DAISY Digital Talking Books.

[20.] ref.
[21.] http://idpf.org/epub/30/spec/epub30-overview-20111011.html
[22.] The following e-readers recognize the EPUB format: Barnes & Noble Nook, Bookeen Cybook, Apple iPad and iPhone, Sony Reader, GNU/Linux tablets and PDAs such as Nokia 770, n800, n810, and n900, and Android devices.

"EPUB 3 is by far the most significant advance in over 10 years of history of the IDPF. In just one year, IDPF member organizations and invited experts, from around the world, have significantly enhanced all aspects of this standard. I'm particularly delighted that EPUB 3 marks the mainstreaming of accessibility capabilities within the universal commercial digital publication format standard –now every e-book can be a fully accessible e-book." [23]

George Kerscher
President, IDPF, and Secretary-General, DAISY Consortium

"States Parties shall also take appropriate measures to: (a) Develop, promulgate and monitor the implementation of minimum standards and guidelines for the accessibility of facilities and services open or provided to the public."

Article 9-2 (a) – Accessibility
Convention on the Rights of Persons with Disabilities

[23.] See IDPF website: http:/idpf.org/news/epub-3-proposed-specification-released
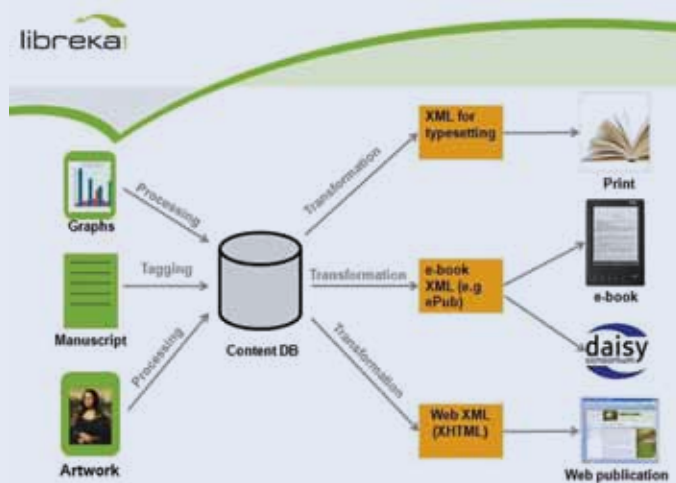
5th European e-Accessibility Forum - 2011

Ronald Schild, Managing Director at Börsenverein, the German Publishers and Booksellers Association, and Managing Director of libreka!, emphasized the potential of EPUB 3 for producing universally designed e-books.

Considering the current e-books boom in a context where structured content and XML standards are fast becoming an important focus of publishers, if you add the growing success of e-books which are revolutionizing the book industry, the merge of EPUB and DAISY will revolutionize book access for persons with print disabilities.

The publishing industry is undergoing revolutionary changes, probably the most important … in the last 500 years. These changes are not merely reflected in the adoption of digital rather than analog reading; the whole value chain of book production is affected. This can create win-win situations for both print-disabled persons and publishers by increasing accessibility of content and thereby increasing publishers' reach.

The new paradigm is focused on granular content that is managed independently of various output formats, such as printed books, e-books or audio books.These developments dramatically change the business ecosystem for the visually impaired reader and, more generally, the print-disabled one. Traditionally, written content had often to be reproduced from scratch to satisfy the requirements of various levels of accessibility. Associated with a high level of cost and resources, accessibility has often been out of scope and focus for many publishers. The limited number of books in Braille or large print is a clear indication of this lack of attention.

Technology is thoroughly reshaping this environment. Publishers are turning to new data management structures based on XML in order to manage granular content. EPUB is being widely adopted by the publishing industry. The latest revision, EPUB 3.0, incorporates DAISY. We assume that already in the medium term, most new books could be published in EPUB or subsequent formats and therefore be accessible to print-disabled persons.

It is estimated that more than 1.3 million books will soon become accessible through this EPUB3 / DAISY merger. Moreover, publishing chain production will be radically simplified and made more economical. Indeed, digitization in the traditional publishing chain of production included a costly and slow retrofitting. The path from the manuscript to the e-book necessitates retrofitting the PDF in order to include e-book-specific and necessary features.

On the contrary, new publishing chains put the digitized content at the core, allowing a radical simplification of the publishing process. Above all, it makes the accessible DAISY / EPUB 3 book as available as the printed publication, as illustrated in figure 3.

Figure 3: Accessible content can be one option among others in modern accessible publishing chains (Source: Ronald Schild)

VI. The DAISY Business Case

Thousands of published books in many languages are already available in DAISY formats worldwide. These books cover literature, sciences, and K-12 and university instructional material. Thousands of people regularly buy or borrow DAISY books that they can read on a wide variety of reading devices. In the e-accessibility world, DAISY is an important success story, showing how a grassroots movement of users and experts successfully created a global standard. We examine how those dynamics developed in this chapter.

A Brief History of DAISY

The DAISY concept stems from research started in 1988 at the Swedish Library of Talking Books and Braille, a government library serving both public libraries and print impaired university students. The objective was to explore the potential of digitization to expand the access to talking books and speed up their reading by users. Talking books were then still distributed on cassettes and their reading was therefore cumbersome and time-consuming.

The DAISY Consortium was founded in Stockholm in May 1996 by seven initial members: the Japanese Association of Libraries for the Blind, the Spanish National Organization of the Blind (O.N.C.E.), the Royal National Institution for the Blind (RNIB, UK), the Swiss Library for the Blind and Visually Impaired (SBS), the Dutch Library for Visually and Print Handicapped Students and Professionals (SVB, now Dedicon), the Swedish Library of Talking Books and Braille (TPB) and the Swedish Association of the Visually Impaired (SRF). Many organizations around the world have since joined the consortium and committed to developing equitable access to information for persons who have a print disability. The consortium has released several versions of the DAISY standard and developed active working groups for solving numerous technical issues.

A Trust in Standards at the Core of DAISY

At its creation, the objectives of the consortium were to:

• Establish the DAISY concept as a de facto standard for digital talking books for the print-impaired and for commercial audio books
• Develop appropriate tools and systems
• Promote the concept
• Manage the use and licensing of the DAISY standard and its features to maximize the benefit to print-impaired persons

An Early Involvement of Industry

A Japanese company, Shinano Kenshi/Plextor, developed a first prototype of a DAISY Playback for Windows as early as 1994. This company had entered into the electrical industry with small precision motors in the early 1960's. In the 1970s, it had started to manufacture Plextor high speed CD-ROM drives and professional business audio players for background music systems. This company provided the first industrial support to the consortium, followed by a growing number of companies worldwide, from the AT sector and the mainstream ICT industry as well. Among these companies were manufacturers producing DAISY players, publishers, or ICT companies like Microsoft and Adobe.

The Production of an Accessible DAISY Book Can Be Costless

In the DAISY environment the cost of an accessible book is directly related to the work needed to produce its content into DAISY XML, since that format can be read directly on DAISY-dedicated players or automatically converted into specialized formats, such as Braille, synthesized speech, accessible HTML, digital audio books, or large print.

Producing a highly structured XML DAISY file from scratch is costly, but generating a DAISY file automatically from another XML used in publishing industry can be straightforward. Given that an increasing proportion of books, printed or electronic, are produced on XML-based publishing chains, the extra cost for producing an accessible version of most books might be nominal if correctly piggybacked onto the mainstream production process. The release in 2011 of EPUB 3.0 will only increase this potential.

DAISY Creates Innovation and Business

Several companies around the world develop, produce and market software and hardware solutions for creating, distributing and reading DAISY books. Some have specialized in developing DAISY-based technologies while others have been created specifically for that purpose. An ecosystem has therefore developed and grown on the basis of DAISY. International competition has also emerged in this small but very dynamic market. Among others: Shinano Kenshi (Japan), HumanWare (Canada), Bones (Switzerland), DOLPHIN (U.K.), etc. Major software publishers like Microsoft and Adobe have integrated export functions in their products in XML DAISY formats.

DAISY developers have had to innovate to overcome technical hurdles such as synchronizing multimedia, as many persons with print disabilities access content by a combination of sight, touch and hearing. Multimedia standards developed by W3C, such as SMIL, were used for this purpose. The resulting solution developed by DAISY has been widely used and been shown to be robust enough to raise interest from the e-book industry.

DAISY Generates Social Return on Investment

Reading is a way to share knowledge and experience, improve skills and stimulate faculties, so every DAISY book that allows a reader to access content that was previously inaccessible to them offers immeasurable personal benefits. This is also the case for the large population of aging readers with vision loss. While it is difficult to measure these advantages with any precision, the social and economic benefits of an increased circulation of books through the DAISY solutions are considerable.

To date, the application of the DAISY standard has made possible the production of thousands of accessible books worldwide, in numerous languages, for the benefit of persons with print disabilities, including blindness, low vision, physical limitations and dyslexia.

In several countries, the DAISY standard supports the implementation of inclusive policies in education. In the United States, for example, the Instructional Materials Accessibility Act, which intends to improve access to instructional print materials for persons with print disabilities, was followed by the adoption of NIMAS, a national standard for the distribution of electronic files derived from DAISY and suitable for conversion into a variety of specialized accessible formats.

Even if it is impossible to estimate precisely the financial and social benefits that can be attributed to DAISY, it is easy to understand that those benefits go far beyond the costs related to the development of the standard by the consortium.

Learning Points

- ICTs can provide efficient and cost-effective ways to provide accessible material to persons who have been excluded from the "Gutenberg galaxy."
- The DAISY story illustrates that standardization can transform an entire economic sector and bring tremendous accessibility benefits to segments of users traditionally excluded from reading materials.
- Solutions developed for specific needs can generate solutions that are profitable to many other users and to the market at large.
- E-accessibility proves to be as a necessary and useful contribution to implement Design for All (or Universal Design) effectively.

VII. Challenges

In concluding this white paper, a simple statement can be made: e-Accessibility economics must be understood by recognizing that it benefits not only disabled persons, but society as a whole. Such a conclusion is based on several facts learned during the 5th European Forum on e-Accessibility and the following observations:

- Since 2007, WHO has defined disability as "a complex phenomenon, reflecting an interaction between features of a person's body and features of the society in which he or she lives." This definition considers that people are "being disabled by society rather than by their bodies" and attests to a transition from an individual, medical perspective to a structural, social perspective.
- Cynthia Waddell showed that this new paradigm is already reflected in the e-accessibility legislation of several Western countries, making litigation cases possible against corporations – and sometimes costly for them. The progressive implementation of the CRPD will accelerate this trend around the world.
- Therefore, accessibility improvements must be considered as a way to solve the deficiencies of society as a whole and should be economically understood as an investment for everyone. As James Odeck demonstrated, applying a cost-benefit analysis is relevant if and only if it integrates the benefits of accessibility improvements for everyone. Evaluating the benefits of e-accessibility for the sole population of persons with disabilities does not capture the real impact of e-accessibility.
- As Bonnie Kearney stated, "We found that the majority of our customers could benefit from accessible technology. Persons with mild to severe impairment were likely to benefit from these technologies. They represent about 57 percent of Microsoft's working-age customers. That's not just the 1 percent story here."
- Such an impact is apparent in the ICT field: Apple's integration of accessible features and assistive technologies as standard features improves the experience of its users and the overall momentum of its technology.
- Mainstream and specialized e-accessibility standards convergence, as highlighted by the DAISY / EPUB merger, shows how e-accessibility features can and should be integrated with every mainstream technology and process.

Given these observations, several current trends should be sustained and strengthened and a few challenges addressed:

- E-accessibility at the core: E-accessibility should not be considered as a far-off feature of Web and/or ICT devices. On the contrary, it must be considered as one of the main components of any technology and taken into account at the conception of any new product or service.
- Web developers must implement e-accessibility at every step of the building process. Most expert opinions estimate that the reduction of costs related to the implementation of e-accessibility should be sought continuously throughout the project.
- Such a procedure must also be implemented in training, industrial production chains, publishing processes, and engineering schools, so that e-accessibility is no longer a problem to be solved occasionally by external experts but an aspect embraced by the development community at large.
- Technical training and certification programs should be set up for developers so they can stay abreast of accessibility innovations.
- Standardization must continue to converge for all e-accessibility features in every ICT field to generate further benefits, enhance interoperability and lower costs
- E-accessibility development tools satisfying industry requirements should be further developed: content management systems, conformity assessment software, user experience simulators, etc. …
- Policymakers must find ways, through legislation, financial incentives, and public procurement, to foster investments in e-accessibility. As emphasized by contributors to this report, the lack of effective e-accessibility policies and programs is more a consequence of cultural barriers, lack of data and structural weaknesses than the result of an economic rationale.

Global benefits will emerge, for corporations as well as for civil society, especially if e-accessibility is implemented at the core of industrial and commercial models. Therefore, it is the role of States Parties to solve market failures and to spur e-accessibility investment in order to help its development and insure future global benefits. Those conclusions obviously support a full implementation of the dispositions of the Convention on the Rights of Persons with Disabilities and of its Article 9 in particular.

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909 W. Peachtree Street, NW
Atlanta, GA 30309 – U.S.A.