ICT accessibility standardization and its use in policy measures

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Executive Summary

This paper consists of two parts.
In the first part, the use of standardization to promote ICT accessibility is explained. Companies may find challenges to implement accessibility functions in mainstream ICT products. Standardization helps these companies by providing information about necessary accessibility features in mainstream products, interfaces between mainstream products and assistive technologies and so on.
ICT accessibility standards are used voluntarily in development of mainstream products. Also they can be used as a mandatory requirement for public procurement. Pubic procurement facilitates implementation of accessibility functions in mainstream ICT products because of its bargaining power.
In the second part, this paper first explains difficulties in accessibility related conformity assessment. Qualitative nature of requirements in accessibility standards makes determining product conformance difficult.
Secondly, this paper provides alternative approaches of conformity assessment that may overcome the difficulties. Proposed alternative approaches are self declaration, self declaration with challenge or post-market surveillance, best practitioner method, top runner approach, third-party testing system, accessibility management system standard and top management's declaration of accessibility policy.
Each of the alternative approaches has both pros and the cons. Since alternatives are not mutually exclusive, mixed use of alternatives may reduce social costs and improve the creditability of conformity assessment simultaneously.
It is recommended to start considerations as soon as possible to meet the necessity of developing an effective conformity assessment approach for public procurement of accessible ICT products and services.

Note 1

This paper is prepared to contribute the work in Europe to implement accessibility requirements into public procurement through a study on accessibility standardization and conformity assessment.

Note 2

This paper represents personal view of the author.

Acknowledgement

This paper is developed based on informal discussions with experts at DATSCG, TEITAC and other occasions. The author expresses his appreciation to the contributing experts by listing their names; Mary Frances Laughton of Industry Canada, Inmaculada Placencia-Porrero of European Commission, Terry Weaver of General Service Administration, Alex Li of SAP, Ken Salaets of Information Technology Industry Council and Laura Ruby and James Thurston of Microsoft.

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PART I

1. Difficulty in implementing accessibility functions in mainstream products

The information society is developing. Chances of interacting with information and communications technology (ICT) products and services are increasing day by day. We cannot succeed in society without accessing ICT products and services. We must urgently solve the issues of accessibility by people with disabilities so that they can also succeed and contribute to society.

In the countries where the population is aging, it is also necessary to include older persons in the information society. Older persons can be regarded as people with age-related impairments because various human abilities deteriorate over time.

Difficulty in gathering needs

Companies generally agree with the general desire to implement accessibility functions in mainstream products. But they face challenges during product design.

The most difficult of these may be to fully understand the needs of people with disabilities.

Let us review the case of Japan using Fig. 1 that demonstrates a part of disability categorization table used in Japan. The government publishes a report on persons with disabilities annually. The latest version[1] reports that there are 3.5 million persons with physical disabilities, 0.5 million persons with intellectual disabilities and 2.6 million persons with mental disorders in Japan. The total corresponds to about 5% of the total population. Among persons with physical disabilities living at home, 306 thousand, 381 thousand, 1,797 thousand and 883 thousand are persons with visual, hearing and/or speech, mobility and internal organ disabilities[2], respectively. The category of visual disabilities consists of blind and various degrees and characteristics of low vision.

In this way, people with disabilities fall into different categories and the number of people in each category becomes smaller.

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1 Cabinet Office, "Annual Report on Government Measures for Persons with Disabilities (Summary) 2005,"
http://www8.cao.go.jp/shougai/english/annualreport/2005/h17_report.pdf

2 Persons with internal organ disabilities include persons with disabilities in heart function (e.g. people using pace maker,) kidney function (e.g. people using hemodialysis treatment,) breathing function and other.

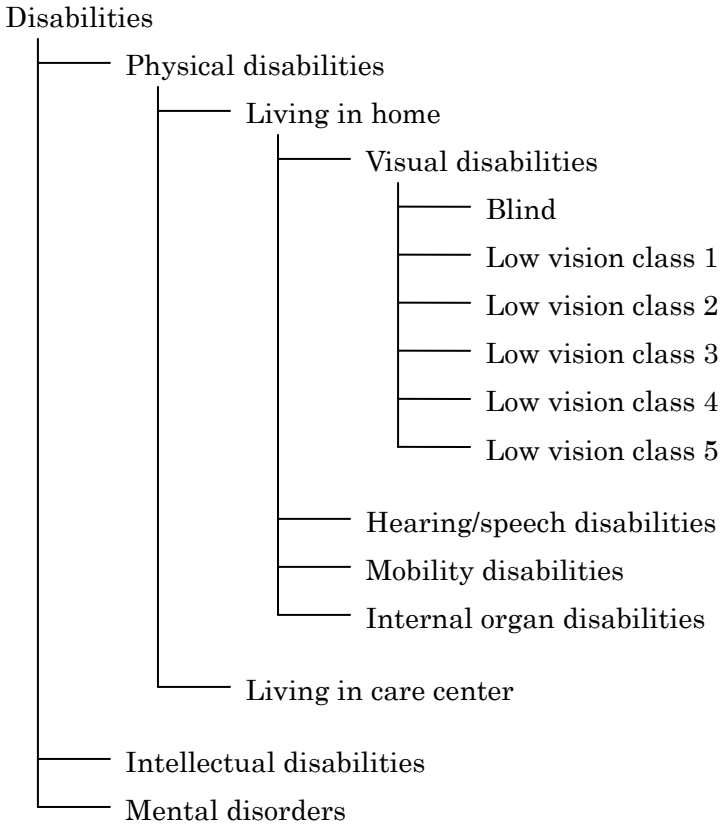

Fig. 1 A Part of Disability Categorization Table used in Japan

Source: Law for the Welfare of Physically Disabled Persons

People in different categories have different needs. However, because of the small number of people in each category, it may be difficult for a company, even if the company puts forth its best effort, to gather needs directly from people in various categories and then to meet all needs.

Some people have multiple disabilities. Needs of people with multiple disabilities are not a simple addition of the needs of people with various single disability. In addition older persons have multiple minor disabilities. Their needs are also different from the needs of people with a single disability.

Thus it is difficult for the company to design products taking into account the widest range of needs of people with disabilities.

The ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission) jointly form a committee called the Joint Technical Committee (JTC1).The JTC1 established the Special Working Group on Accessibility (SWG-A) in 2004 considering a necessity to address ICT accessibility in global

standardization activities. The SWG-A gathered the needs of people with disabilities and recently published the User Needs Summary[3]. The Summary, the first deliverable of SWG-A, gathers accessibility needs of ICT users and can be used to analyze whether or not an ICT accessibility standard fully takes into account the needs of people with disabilities.

The Summary also can be used by a company to understand the needs of people with disabilities and to analyze whether its mainstream products take into account these needs. The Summary can help address the first difficulty a company faces when it wants to design products in which accessibility functions are implemented.

Necessity of economic justification

However, there exists the second difficulty when companies work to implement accessibility functions into mainstream products. Companies must decide which needs will be addressed and which will not. Usually that decision is made based on the following logic.

A company evaluates individual needs relative to the market size and the resource necessary to fulfill the need. If the market size is greater than the resource, the company decides to fulfill the need. Otherwise the company may not implement an accessibility function corresponding to a particular need. In short, some economic justification is necessary.

Companies are profit-seeking entities and profit-seeking is the origin of the healthy market economy. We, therefore, must accept this behavior of companies.

Of course, in many cases companies recognize their broader social responsibility and also take into account some needs that are not economically justifiable. However, it is impossible for companies to respond to all accessibility needs in the name of social responsibility.

The needs that are not fully met by mainstream products often are supported by assistive technologies. It is common that governments subsidize the development and procurement of assistive technologies[4] from a social welfare policy perspective: Governments compensate for a failure in the market. But this is the very reason it is rare to find assistive technologies that are used worldwide. In other words, the assistive technology market is much more segmented than the global ICT market as a whole.

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[3] JTC1 SWG-A, "User Needs Summary Version 1.0," http://www.jtc1access.org/documents/swga_212.zip

[4] In Japan, purchase of "welfare equipment" is supported by the government. The list of "welfare equipment" can be found in the website of Association for Technical Aids in Japanese. http://www.techno-aids.or.jp/

Interfacing between assistive technologies and mainstream products is also difficult because of the lack of standard interfaces. This makes assistive technologies more expensive and incompatible with many products.
We need a new strategy that facilitates implementation of accessibility functions in mainstream products. Otherwise, we continue to depend on assistive technologies that are economically inefficient.

2. Choice of needs during standard development process

Around the world, the development of ICT accessibility standards is a priority topic. This development is performed, in most cases, through cooperation among the government, industry and user community. In Japan, for example, a set of national standards has been developed and approved under the supervision of the Ministry of Economy, Trade and Industry in the last two years[5]. In the U.S., a committee called Telecommunications and Electronic and Information Technology Advisory Committee (TEITAC) was organized in 2006 by the U.S. Access Board in which users and providers participate.
These standards, either compulsory or voluntary, can be used as a tool to facilitate ICT accessibility. Regardless of the form of use of these standards, during ICT accessibility standard development, the drafting committee carefully examines needs.
A first step in this review of needs is to determine categories of needs and also of disabilities. For example, if the standard is to define an interface between hearing aids and telephone sets[6], needs that directly relate to the coupling of hearing aids and telephone sets are chosen. If the standard related to web content, needs that relate to the mobility of wheelchair users do not need to be taken into account.
The second aspect of examing needs as part of the standards development process is technical feasibility. Standards are effective only when they are used in the market. Needs that are not technically achievable are usually not covered by standards. Drafting committees attempt to be very precise in writing clauses. If a standard requests “be operable without vision” and “be operable without hearing” simultaneously, the technology hurdle to achieve both requirements is high. If the standard requests the product conform to at least one of the above requirements, the hurdle is lower. But if a

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[5] JIS X8341 Series, “Guidelines for older persons and persons with disabilities -- information communication equipment, software and services --,“ Part 1:”Common Guidelines,” Part 2 “Information Processing Equipment,” Part 3 “Web Contents,” Part 4 “Telecommunications Equipment” and Part 5 “Office Equipment”
[6] For example, ITU-T, “Coupling Hearing Aids to Telephone sets,” Recommendation P.370 (1996)

product conforms to only "be operable without vision," people with hearing disability cannot or may not operate the product.

When drafting committees consist of users and providers, users tend to insist on higher hurdles, while providers try to lower technology hurdles. In order to find solutions or compromises, it can be useful to include a neutral party in the drafting committee[7]. A neutral party in some cases can be found in academia.

Many standardization organizations claim that they are "industry driven" but it is important to invite "third parties" to the drafting committee for accessibility standard development[8].

Drafting committees usually avoid hurdles that are too high to jump over by the current technology. A hurdle that is too high will reduce manufacturers' incentive to design products that conforms to the standards. A standard everyone ignores is not an influential one. However, it is recommended not to lower the hurdle too much, because even though every manufacturer easily can ship products conforming to that ICT accessibility standard, users may still face difficulty in using the resulting products that are deemed "accessible."

Importantly, there is also a positive trend to make standards that are technology neutral, concentrating on functional requirements, so that manufacturers are free to decide their technological solutions and compete to design the best and most accessible products.

It must be understood that standards usually do not cover all needs. It can be a political process among drafting committee members to select needs that must be met in standard development process. One exception is ISO 9241-20 that is under development to recommend accessibility requirements of all ICT products and services[9]. ISO 9241-20 is a comprehensive but high level standard.

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[7] Article 13-2 of the Industrial Standardization Law of Japan reads: "*Relevant ministers must enact any drafts proposed by JISC as industrial standards, in case of responding to opinions of all substantial interest parties, applying to anyone under the same conditions without discrimination, and being recognized by relevant ministers as appropriate." The Article is the foundation of inviting the three parties to drafting committees in Japan*.

[8] World Wide Web Consortium (W3C) and Ecma International are examples of standardization organizations that explicitly mention it is industry driven. Other organizations like to use a term "market driven," however, in most cases leadership of organization is held by industry.

[9] The title of ISO 9241-20 is "Ergonomics of human-system interaction -- Part 20; Accessibility guidelines for information/communication technology (ICT) equipment and services."

3. Voluntary standardization: A tool to facilitate ICT accessibility

In this chapter, we review the situation where standards are used voluntarily in the market.

Influence of voluntary standards

Publication of standards is important for both users and manufacturers.

Manufacturers welcome the publication of ICT accessibility standards. It is easier for manufacturers to prioritize needs by referring to standards than by selecting needs internally as mentioned in the previous chapter.

Perhaps even more important is that the standards can be used to "educate" designers. ICT products and services are in most cases designed by young designers who may be far from people with disabilities and older persons. ICT accessibility standards can be valuable educational material for these young designers.

Users can acquire in the marketplace mainstream products that implement some accessibility functions. Users also can understand that all needs can not be satisfied by the mainstream products alone. Users can make their own decision whether to "buy mainstream products," "rely on assistive technologies" or "some combination of both"

Users often find difficulties in getting information about product accessibility functions. Because products are often sold on the market without attaching a document that describes their accessibility functions, it becomes difficult for users to know the accessibility functionality of products on the market. Information about accessibility functions must be disclosed effectively to users in the form of documentation or via the Internet.

Mainstream products that feature accessibility functions have been increasing since the publication of ICT accessibility standards in Japan. One example is a mobile phone called "Raku Raku PHONE" provided by Fujitsu[10]. It features, as demonstrated in Fig. 2, a variety of accessibility functions; a larger button size, one-touch buttons for dedicated receiving parties, and the ability to alter the text color and the background and size of the text, etc. In addition a voice synthesizer is installed, through which people can listen to e-mails received by the phone. More than eight million Raku Raku PHONEs have been sold. This mobile phone is not an exception. We can find copiers, telephone sets and laptop computers that implement accessibility functions.

[10] T. Irie, K. Matsunaga and Y. Nagano, "Universal Design Activities for Mobile Phone: Raku Raku PHONE, " FUJITSU Sci. Tech. J., vol.41, p.79 (2005)

Fig. 2　Accessibility functions in Raku Raku PHONE

Source: T. Irie et.al., [10]

Why does Fujitsu manufacture the Raku Raku PHONE? One reason is the maturity of the market. The number of mobile subscribers exceeds 90 million in Japan now. This figure corresponds to 73% of the population. People who seldom use mobile phones are babies, young children and older persons. Fujitsu and other manufacturers are, therefore, eager to sell their mobiles featuring a larger button size, one-touch buttons for dedicated receiving parties, etc. In short, older persons are one of the last untapped markets for mobile manufacturers. We also can find mobiles that are designed for children in the market.

Providing accessibility functions in mainstream products results in an important externality. We can expect a dramatic decrease of unit production cost of ICT hardware. ICT hardware uses a huge number of semiconductor chips the cost of which decreases by accumulating production. Because of the reduction of unit cost, we can find for example a variety of "speaking" ICT products that now install voice synthesizer chips.

People without disabilities also benefit from accessibility functions. Users often find "speaking" ICT products are easier to use than ordinary products.
Assistive technology developers can also use the voice synthesizer function in their product without caring about the cost. In this way, mainstream products and assistive technologies can build a collaborative relation.
In the case of software, if a software module can be used in a variety of ICT products, it also reduces the unit cost of ICT products.
The market welcomes accessible products. The success of an accessible product drives other companies to respond and can result in further deployment of accessible products. In the best case, this chain reaction creates a trend of deeper and more serious consideration of accessibility functions in the mainstream products.
This is the final effect of the voluntary use of ICT accessibility standards.

Business chance for assistive technologies

The development of voluntary standards is a business opportunity and challenge for assistive technology developers.
The transfer of knowledge from assistive technology developers to mainstream product designers is inevitable to implement accessibility functions into mainstream products. Assistive technology developers receive rewards for the knowledge transfer in the form of patent and know-how licensing.
Designing assistive technologies becomes easier in this case because standards define explicitly the interfaces between assistive technologies and mainstream products. In addition, assistive technology developers can use cheaper hardware and/or software components already installed in mainstream products. These development and production cost reductions positively impact the assistive technology market and facilitate the broader dissemination of assistive technologies.
Clearly, there will remain a need for the assistive technology market. While some assistive technology products will be disappearing from the market as they are implemented into mainstream products, a market will continue to exist for dedicated assistive technologies that meet consumer needs.

4. Use of standards as a mandatory requirement for public procurement

Governments are starting to use ICT accessibility standards in their policy measures. Since policy measures accompany enforcement power, the influence is different from the voluntary use of standards described in the previous chapter.

The case of Japan

In 1995, the government announced guidelines for the criteria to be used in the general evaluation of contracts and tenders for the supply of computers and services to the government as an agreement among agencies and bureaus. A statement in the announcement reads: "*Items to be evaluated shall be established in conformity with international and national standards*." Therefore, products and services supplied to the government must have been designed with consideration for ICT accessibility determined in the series of existing standards. One example is the Ministry of Economy, Trade and Industry's public procurement announcement of its information system. The announcement requests that tenders explain how the national accessibility standards are met.

In Japan, there is a public procurement system for accessible websites in the central government. Two laws, the Basic Law on the Formation of an Advanced Information and Telecommunications Network Society enacted in 2000 and the Persons with Disabilities Fundamental Law amended in 2004 mention the necessity of accessibility in governmental websites[11]. Under the two basic laws, the government has developed Basic Plans and annual implementation plans in which target dates are determined. One example is that e-Government system which is under-development will increase information provisioning in accessible format in the fiscal 2006.

The Persons with Disabilities Fundamental Law also requests local governments to develop local basic plans. Many local basic plans include a schedule to develop accessible websites.

Website development for these central and local governments is usually contracted to system integrators. In order to get contracts, system integrators develop and publish, free of charge, web accessibility checking tools. In addition, system integrators develop helper tools, e.g. voice synthesizer software and/or software to change color to negative polarity color scheme, installed in governmental websites. An example is shown in Fig. 3 where the top page of the Ministry of Health, Labor and Welfare website is displayed in negative polarity color scheme. System integrators are now eager to sell Content

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[11] The Article 10 of Persons with Disabilities Fundamental Law has the title of "Realization of information barrier free." The Article requests the following:
States and local authorities shall undertake necessary measures to spread electronic computers and their related devices and other information and communications equipment which are easy to use for people with disabilities, to promote convenience for people with disabilities in their use of telecommunications and broadcasting services, and to equip facilities which provide information for people with disabilities, in order that they can make use of information in an efficient manner and express their own will.

Management System.

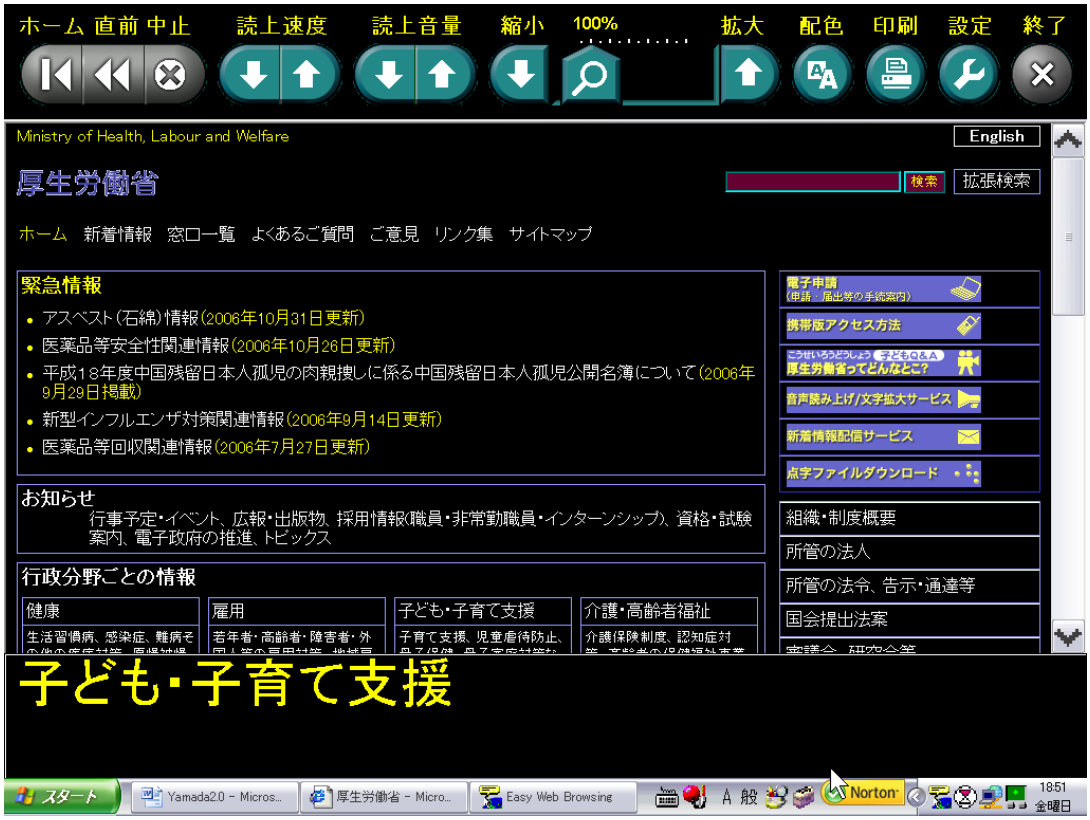

Fig. 3 The Top Page of the Ministry of Health, Labor and Welfare website in negative polarity color scheme

Source: http://www.mhlw.go.jp/

One interesting point is that the laws do not impose punishment. The "graying" of Japanese society discussed in the previous chapter has triggered many of these movements.

The case of U.S.

Section 508 of the Rehabilitation Act requests U.S. Federal Government states the following:

> *When developing, procuring, maintaining, or using electronic and information technology, each Federal department or agency, including the United States Postal Service, shall ensure, unless an undue burden would be imposed on the department or agency, that the electronic and information technology allows,*

regardless of the type of medium of the technology --
(i) individuals with disabilities who are Federal employees to have access to and use of information and data that is comparable to the access to and use of the information and data by Federal employees who are not individuals with disabilities; and
(ii) individuals with disabilities who are members of the public seeking information or services from a Federal department or agency to have access to and use of information and data that is comparable to the access to and use of the information and data by such members of the public who are not individuals with disabilities.

Section 508 was amended in 1998. Technical specifications were developed and made compulsory then and the U.S. Federal Government started to procure accessible ICT products in 2001. What is different here from the case of Japan is that Section 508 includes some enforcement. If an agency procured an inaccessible ICT product when other functionally equivalent accessible products existed, a Federal employee with disabilities can make complaint or even take legal action against the agency. In the case of an ICT product made available to the public from the Federal Government, an individual can take the same legal action.
It is noteworthy, however, that the technical specifications established do not satisfy all the needs. It is identical to the case of voluntary standard development. Needs of some categories of people with disabilities are not covered. Needs that are significantly difficult are not also covered. The term "*unless an undue burden would be imposed*" is an expression of necessity of cost effectiveness in the public procurement[12].

Impacts of the use of standard as a mandatory requirement

Currently in Europe, there is a movement to apply similar policy measures to public procurement of ICT products and services.
Government procurement policies that require compliance with accessibility standards can be an incentive for manufacturers to develop and market accessible products and services. However, this development and production of accessible products likely will incur additional cost. But, if the cost is compensated by public procurement, companies can be more aggressively implement accessibility functions in their mainstream products.

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[12] "Section 508 Acquisition FAQ's Page 3" in Section 508 website, www.section508.gov/index.cfm?FuseAction=Content&ID=92

Public procurement accounts for more than 10% of Gross Domestic Product (GDP) in many countries. The huge public sector market is extremely attractive to the private sector.

While this procurement of accessible products may increase the cost to the public sector, it also reduces expenses to subsidize assistive technologies since people who needed to use assistive technologies can use accessible mainstream products instead. In addition, in the long run, accessible ICT mainstream products will enjoy a natural, and likely dramatic, cost reduction.

If an e-Government system is developed which is accessible only by limited range of people, the government needs to continue the service of conventional (not e-Government) system in parallel. We must pay tax for the operation of two parallel systems. It is, therefore, reasonable to spend additional expenses to further develop accessibility functions in e-Government system since we can expect reduction of future operating cost.

In the long run, accessibility criteria in public procurement work positively to achieve a more efficient government system.

Revision of accessibility standards and technical specifications

Since technologies are rapidly evolving in the ICT area, accessibility standards and technical specifications (hereinafter collectively called accessibility standards) that are used in public procurement must be revised periodically. Reasons for the revision are as follow.

1. New product introduction: Accessibility standards must be up to date. In the ICT industry, frequently a product that did not exist several years ago does exist now. Apple's iPod is a typical example. The introduction of the iPod to the market changed the music industry. People buy music not at music stores such as Tower Records, once a popular music retailer that has gone out of business, but via the Internet now. This change in behavior and the market affects people with disabilities. Therefore, accessibility standards of portable content player are now necessary. The same is true for ICT services. We also need accessibility standards for services such as Skype and YouTube.
2. Change in technical feasibility: Technology development lowers the hurdle to realize accessibility functions. Technologies that were not feasible several years ago may be implemented more easily now. One example is media conversion. Digitalization of information creates an environment where media conversion,

such as from speech to text and from text to speech, is easier. Accessibility standards must support these technology developments. Needs that were not covered by accessibility standards can be covered now. Revision of accessibility standards enlarges the scope of meeting needs.

3. Change in policy objectives: Accessibility standards must reflect policy objectives. If policy objectives change, accessibility standards may need to be modified. For example:
    I. Increasing ICT use in all aspects of life may require an employment policy measure to accommodate people with disabilities in the workplace.
    II. Accessibility requirements must be more seriously considered in e-Government.

Necessity of global harmonization

It is important to achieve global harmonization of standards for ICT accessibility
One reason is to reduce a technical barrier to trade. If accessibility standards differ region by region, manufacturers need to adjust their products to meet various, potentially conflicting accessibility standards. On the other hand, if the specifications are harmonized globally, manufactures benefit from the economy of scale.
The economy of scale also benefits users of ICT products who can purchase more products at lower prices.
Global harmonization encourages movement of people including people with disabilities and older persons around the globe. It is hard for people to access to a public terminal abroad, if user interface is completely different from that in their homelands. On the other hand, if global harmonization is achieved, people can move more easily, freely and frequently. Global harmonization consequently facilitates mutual understanding of people in different countries and cultures via movement of people.
It is also true that pursuing global harmonization saves scarce resources and knowledge in the standard development process. Since ICT accessibility is a relatively new area of research and business, the number of experts available is limited at the global level.
The revision of Section 508 technical specifications involves foreign participants including representatives from Australia, Canada, Europe and Japan[13]. This action is welcome and should be supported.

[13] Telecommunications and Electronic and Information Technology Advisory Committee, "Committee members", http://teitac.org/wiki/Committee_members

PART II

5. The Role of conformity assessment and its challenges

Most requirements in accessibility standards are qualitative not quantitative. This qualitative nature makes determining product conformance very difficult.
If a requirement is "the character size printed on operable controls shall be 5 mm or larger and the contrast ratio shall be 4:1or higher," it is easy to judge. However, if a requirement is "a screen display device shall support advanced functions such as character enlargement and contrast adjustment," no one can determine the appropriate size and contrast of character on screen. Because of this ambiguity regions are now struggling to establish effective accessibility conformity assessment approaches. However, especially for public procurement, it is necessary to do so.
In Europe, three regional standardization organizations are now under negotiation with the European Commission which wants to implement accessibility requirements into public procurement, including through a study on accessibility and conformity assessment. The European Committee for Standardization (CEN) will soon undertake an examination of accessibility conformity assessment under the secretariatship of Asociacion Espanola de Normalizacion y Certificacion (AENOR) of Spain.

The case of Japan

Telecommunications equipment which conforms with the national accessibility standard JIS X8341-4 "Telecommunications equipment" carries a symbol mark called "U mark" shown in Fig. 4. The capital U in the "U mark" stands for user-oriented.

Fig. 4 "U mark" attached to accessible telecommunications equipment

Source: Info-communication Access Council

The "U mark" is a system provided by Info-communication Access Council[14]. The Council developed a checklist based on JIS X8341-4. A manufacturer uses the checklist

[14] Info-communication Access Council website in Japanese, http://www.ciaj.or.jp/access/

and if it thinks a product conforms to the checklist, the manufacturer sends the list to the Council. The manufacturer attaches the mark to the product and the Council discloses the received checklist to the public.
If users find difficulty in using declared accessibility functions, they can submit a notification to the Council and the Council initiates an investigation. In this way reliability of declaration is ensured. In short, the "U mark" is a self declaration system with some post-market process to handle complaints.
As of October 20, 2006, 20 products carried the mark. One example is a fax machine from Panasonic Communications[15]. It features accessibility functions including the following: as a number button is pressed, a voice informs the user of the button's number; the user can hear the dialed number again by pressing the "repeat" button; for their easy hearing, users can choose tone characteristics of the receiver sound; and the handset features a bone conduction speaker that uses vibrations which allow users to hear their telephone conversations. The Raku Raku PHONE is another example.
Web accessibility checking tools designed by system integrators declare they conform to JIS X8341-3 "Web contents" accessibility standard. Some companies self declare that their copiers conform to JIS X8341-5 "Office equipment." Companies ship personal computers taking into account the accessibility requirements listed in JIS X8341-2 "Information Processing Equipment."
However, there is no marking system in these product areas. There is also no way to confirm whether products really conform to these national standards.
In a country like Japan, where implementation of accessibility functions is not mandatory, it may be a challenge to establish a reliable conformance assessment system.

The case of U.S.

After the enactment of the Section 508 technical specifications, the Information Technology Industry Council (ITI) collaborated with the General Service Administration (GSA) to develop a system to communicate conformance information called the Voluntary Product Accessibility Template (VPAT). The VPAT assists Federal procurement officials in making preliminary assessments regarding the accessibility features in commercial ICT products and services.
The VPAT is a checklist that shows how a product conforms to the relevant Section 508 standards. Companies produce a VPAT for each individual product, post them on their

[15] See in detail in the following URL:
http://panasonic.co.jp/pcc/cs/en/telecom/otakkusu/FKN551_English_Quick_Guide.pdf

company websites[16], and link them to the GSA's "Buy Accessible Wizard" website[17]. Procurement officials use the "Buy Accessible Wizard" to identify products that meet their requirements.

Whether the resulting checklist is correct or not can be ambiguous. Not because of a lack of commitment by the companies, but because Section 508 technical specifications are written qualitatively. The extent to which any product conforms to the qualitative technical specifications is therefore somewhat subjectively.

Challenges with conformity assessment

We reviewed two cases of Japan and U.S. Both use self declaration scheme and demonstrate the identical limiting feature: No one knows of the declaration is correct or not.

This difficulty is not a responsibility of industry. Companies devote their best efforts to check the compliance. But because accessibility standards are in most cases written qualitatively, it is impossible to determine compliance in objective manner.

How do we overcome the difficulty? One possibility is to gather quantitative data and use them in accessibility standards. The ISO already started such effort. One committee under the ISO is now developing a document[18] titled "Ergonomic data and ergonomic guidelines for the application of ISO/IEC Guide 71 to products and services to address the needs of older persons and persons with disabilities." The document summarizes reference data of various human abilities including vision and hearing.

We will discuss the other possibilities in the next chapter.

6. Alternative approaches to conformity assessment

Let us now examine alternative approaches to conformity assessment one by one.

Self declaration

Self declaration remains as an important approach to conformity assessment even though we pointed out a couple of challenges in the previous chapter.

Self declaration is used widely around the world and in various scenarios. In Japan the conformity assessment of telecommunication terminals is performed by self declaration

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[16] Some companies do not post their VPATs on their websites. In the case users need to get VPAT information by asking by e-mail, but this arrangement reduces the visibility of VPATs.

[17] General Service Administration, "Welcome to the Buy Accessible Wizard!," http://app.buyaccessible.gov/baw/

[18] ISO TC 159/WG 2 "Ergonomics for people with special requirements" is developing the document. The number is ISO TR22411.

based on an Ordinance published by the Ministry of Internal Affairs and Communications[19]. Self declaration was also introduced to telephone terminals in the U.S.

For product safety and electromagnetic compatibility, self declaration is used by many countries around the world. A page in the website of European Commission explains European situation: *There are currently three conformity assessment procedures for such equipment. The first is self-declaration by the manufacturer where he/she applies the relevant European harmonized standards*[20].

Self declaration with challenge or post-market surveillance

In the very competitive global ICT marketplace, companies closely watch and monitor each other, even testing each other's products, to determine how and whether they meet market requirements. The "post-market surveillance" is a powerful and informal way to support the self declaration approach to conformity assessment. An example of the mechanism is as follows.

The first company tests accessibility of its product by itself and discloses the test results to the public procurement agency, e.g., by creating a VPAT. The second company monitors the first company's self declaration and challenges to them when it feels they are not correct. If challenged, the first company may be asked by the government agency to provide its test results or some other form of validation. And if it fails to prove conformance, the first company is required to correct the situation or may be prevented from bidding or selling the product to the government[21]. This dynamic happens now with Section 508 and VPATs in the United States.

Japanese "U mark" system described before is a similar approach where, not competing companies, but users submit a notification to the Council when a product attached "U mark" does not work properly.

There is a possibility of stacking up challenges if companies aggressively challenge each other. There is also a possibility that companies hesitate to challenge others if they think not challenging to others reduce the likelihood of receiving challenges from

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19 Ministry of Internal Affairs and Communications, "Ordinance Concerning Technical Conditions Compliance Approval etc. of Terminal Equipment," http://www.soumu.go.jp/joho_tsusin/eng/Resources/Legislation/MRA/040416_1.pdf

20 See in detail in the following URL: http://ec.europa.eu/enterprise/electr_equipment/emc/index.htm

21 The Government Accountability Office provides a forum for bidders seeking federal government contracts who believe that a contract has been or is about to be awarded in violation of the laws and regulations that govern contracting with the federal government. See in detail in http://www.gao.gov/

others.

Best practitioner method

The self police mechanism implies a penalty. On the contrary, best practitioner method rewards the best company. In order to do so, a measure is necessary.

In Japan a magazine which circulates mostly among government officials publishes "e-city" ranking every year[22]. The magazine distributes questionnaires to local governments. Surprisingly, because this questionnaire survey is very popular to officials, the response rate is as large as 87.5% in 2006.

Questions cover a wide areas for example information and service provisioning to the public via the Internet, website accessibility, office work informatization inside local government, policy practices related to community informatization, and information security. Regarding the accessibility, the magazine prepares 31 questions such as existence of guidelines, alternative texts to image, consideration to color blindness, introduction of Content Management System and practice of user testing.

Relative scores for the answers are calculated and the rankings are published in the magazine. Nishinomiya City won the first prize this year and has held the position for two years. Fujisawa City moved to the second from the fourth last year, and Ichikawa City got the third prize. The top page of the Nishinomiya City website is shown in Fig. 5.

In this ranking, not quantitative measure but relative score is used. But because of the popularity of the survey, every city competes with each other to get the highest ranking. This example of best practitioner method demonstrates that even if every accessibility function is measured qualitatively and relatively, it is possible to identify the best practitioner.

However, to operate the best practitioner method in industry, we need a secretary similar to the magazine in the Japanese case. It is possible to have industry association work the secretary role. Another option may be to organize a committee that includes users and neutral parties.

[22] The latest version of "e-city" ranking is in Nikkei BP Government Technology Autumn 2006 (in Japanese)

Fig. 5 The Top Page of Nishinomiya City website

Source: http://www.nishi.or.jp/

Top runner approach

The top runner approach is used in regulation to improve energy efficiency of vehicles and electronic appliances. In Japan the "Law Concerning the Rational Use of Energy (Energy Conservation Law)" is the legal background. The approach set the next efficiency standard based on efficiency levels of the most efficient products supplied domestically, including future technological development. It is reported that energy efficiency of air conditioners has improved 67.8% since the introduction of the approach in 1997. Energy efficiency of gasoline passenger vehicles had been improved 22.0% between 1995 and 2004[23].

To hasten this shift to products with higher efficiency, plans for promoting procurement of products that achieve standards is needed.

The top runner approach can be applied in public procurement of accessible ICT products. If the public sector procures more products of higher ranking, it is a good

[23] Energy Conservation Center, Japan, "Top Runner Program: Developing the World's best energy efficient appliances," http://www.eccj.or.jp/top_runner/index.html

incentive for companies to implement accessibility functions in mainstream products. In other words, the public sector sets procurement criteria referring to the data the top runner achieved.
This top runner approach uses the results of the best practitioner survey for the public procurement; therefore, identical pros and cons can be identified.
For the best practitioner method and/or the top runner approach, involvement of a third party should be carefully considered. In academia, the peer review is a common practice; e.g. academic papers are published after reviews by peer scientists and academic societies choose Fellows and Honorary Members by peer review. If the best practitioner method and/or the top runner approach work satisfactory by peer review in industry associations, there is no need of third party involvement.
Involvement of third party increases the social costs. However, users may feel judgments are more objective by the involvement of third party. It is important to acquire user confidence in order to smoothly launch the best practitioner method and/or the top runner approach.

Third-party testing system

Another possible approach is third-party testing system.
The Electrical Appliance and Material Safety Law of Japan applies to companies that manufacture or import electrical appliance in Japan. Electrical appliances are divided into two categories, specified electrical appliances and non-specified electrical appliances, taking into account the degree of danger of electric shock. Specified electrical appliances are subject to conformity testing conducted by an accredited inspection body and receive a certificate of conformity from the body while self declaration can be used for non-specified electric appliances[24]. This is an example of a third-party testing system.
A third-party testing approach may have an advantage that the test can be more objective than self declaration which could facilitate acceptance of accessible mainstream products in the market.
However, third-party testing systems also need quantitative metrics, a viable, consistent validation process, and accumulation of expertise in inspection bodies. If third-party testing system is initiated without any of the three essential conditions, it may create chaos in the market or at least it becomes unclear whether the tested product really conforms to standards.

[24] See in detail in English translation of the law.
http://www.jetro.go.jp/en/market/regulations/pdf/denan-2001nov-e.pdf

To ensure credibility of inspection bodies, it is necessary to identify or prepare an accreditation organization. In the case of electrical appliance safety in Japan, which is a quantitative measure, inspection bodies are examined and accredited by the National Institute of Technology and Evaluation under a scheme called Japan National Laboratory Accreditation System.
The necessity of accreditation schemes for qualitative accessibility conformity assessments would be difficult to create and significantly increases the social and business costs to implement accessibility certification.
Not all organizations have the knowledge and experiences to check their own products. They may wish voluntarily to have their products tested by specialized bodies. This could be the case of small and medium size enterprises that face the lack of knowledge and experiences. Small local governments could also have a willingness of checking accessibility of their websites by a third party.

Accessibility management system standard

A management standard requires no numerical figures, which are common in product standards, but suggests a way of doing management in organization based on the PDCA cycle[25]. The ISO created a set of quality management system standards (ISO 9000 series) in 1987 and then developed environmental management system standards (ISO 14000 series) in 1996.
An accessibility management system standard could request a company do the following:

1. The company shall have an information accessibility policy. The company shall ensure that the policy is followed in the plan, design, development and evaluation of ICT equipment and services.
2. The company shall specify user requirements for accessibility and produce design solutions.
3. The company shall evaluate accessibility design solutions of ICT products and services with users. Evaluation of accessibility design solutions includes user test results and other available forms of user feedback. For the evaluation an

[25] PDCA was made popular by W. E. Deming: PLAN establishes the objectives and processes necessary to deliver results in accordance with the specifications; DO implements the processes; CHECK monitors and evaluates the processes and results against objectives and Specifications and reports the outcome; and ACT applies actions to the outcome for necessary improvement. This means reviewing all steps (Plan, Do, Check, Act) and modifying the process to improve it before its next implementation. See in detail in http://en.wikipedia.org/wiki/PDCA

existing checklist mentioned in the previous chapter can be used.

4. The company shall have a transparent way of receiving and handling user complaints.
5. The company shall keep records of their activities.
6. The company shall disclose information how accessibility is improving in their products.

A third party could investigate whether the accessibility management system in the company is working or not and issue certification to the company. Governments might give priority to certified companies for public procurement. In this way, in the long run, the number of accessible products and services might continuously increase.
In this system, companies can use the checklists mentioned in the previous chapter to evaluate products. Therefore, this system is compatible with technical accessibility standards.
What is important is consistency over time. If the number of conformed to criteria increases year by year and the number of conformed to products and services increases, we do not need to focus on whether the checking is subjective or objective.
One of the benefits of an accessibility management standard scheme is the improved perception of the key accessibility issues by employees and the public. The other is that certificates can improve the ability to meet compliance with accessibility policy measures.
While each of these possible benefits make it worthwhile to consider this approach, an accessibility management system also adds social and business costs which are very similar to those with third-party testing system. The ISO 9000 and 14000 systems are criticized sometimes that both systems contribute not to improve quality and environmental measures but to create income of accreditation organizations.

Top management's declaration of accessibility policy

In ISO there exists a guide titled "Guidelines for the justification and development of management system standards[26]." It is necessary to pass the criteria provided in the Guide to develop the accessibility management system standard.
An alternative and simpler way is asking top management to declare its commitment to corporate accessibility policy. The declaration must be disclosed to the public so that the top management takes the responsibility upon itself. The declaration improves

[26] ISO Guide 72:2001 "Guidelines for the justification and development of management system standards"

perception of the key accessibility issues by their employees and the public.
Since there is no need to include accreditation organizations in this case, the social cost becomes smaller compared to the system using accessibility management system standard.

7. Comparative analysis and conclusions

Each of the alternative approaches discussed in this chapter have both pros and the cons. Self declaration is, for example, easy to implement but objectivity of judgment may be questionable. Accreditation based on accessibility management system standard may be a way of keeping objectivity but requires higher social costs than others.
What is important is to start such considerations as soon as possible to meet the necessity of developing an effective conformity assessment approach for public procurement of accessible ICT products and services.
It is also noteworthy that the alternatives are not mutually exclusive. For example a system can be designed where big enterprises use self declaration while small and medium size enterprises use third party testing system, if the measures used in these systems are compatible. Top management's declaration of accessibility policy obviously co-exists with other alternative ways.
Mixed use of alternatives or mixed modes may reduce social costs and improve the creditability of conformity assessment simultaneously.