ISO / IEC JTC 1 Special Working Group on Accessibility (SWG-A)

JTC 1 SWG-A N 193

2006-08-01

Document Type:	Contribution
Title:	**JTC 1 / SC 37 Contribution About the Work of SC 37 Concerning Accessibility**
Source:	SC 37 Secretariat and Representative
Requested Action:	For consideration at the September 2006 SWG-A meeting.

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ISO / IEC JTC1 SC37 "Biometrics" in JTC1 Special Working Group on Accessibility (SWG-A)

Accessibility in Biometrics

Contribution to the September 2006 JTC 1 SWG-A meeting in Brussels, Belgium

1 Premise

Accessibility is a primary sector of interest of the ISO / IEC JTC1 SC37 "Biometrics" WG 6 on "Cross-jurisdictional and societal aspects". In particular, the Technical Report TR 24714-1, edited by Julian Jones (editor) and Kristina Unverricht (co-editor), offers a detailed description of several accessibility issues connected to biometrics.

The present document is almost totally extracted from a draft version of the above mentioned TR which has now reached (July 2006) the stage of DTR and, according to the ISO procedures, could be definitively published before the end of 2006.

2 Accessibility

2.1 Introduction

A biometric system should be easily accessible to all subjects and should not disadvantage any subject. The accessibility of a biometric system is dependent on specifics of the subjects using a biometric system and on the usability, including the physical environment, of a biometric system (see 5.5). For subjects that cannot use the biometric system due to permanent or temporary conditions, alternative systems are necessary and should be provided. Any additional costs to the subject that are associated with the use of biometric applications should be clearly stated.

Accessible systems should be designed to be

- *equitable in use for data subjects who have physical or psychological inabilities,*
- *flexible in use,*
- *simple and intuitive to use,*
- *easy-to-understand with appropriate additional prompts,*
- *appropriately signed,*
- *tolerant of error,*
- *usable with low physical effort,*
- *of a size and space for easy approach and use.*

User interfaces could make use of a range of tactile, audio and visual prompts.

Accessibility issues may be long term, temporary and/or may occur without warning, for example, as the consequence of sudden onset of illness such as laryngitis or a sore throat, dental or eye surgery, or other physical injuries.

Subject groups may be internal or external to the implementing organization or may be a combination of both. It is imperative that any organization contemplating the introduction of biometrics identifies all stakeholders, considers how the subject groups might respond to the technology and identifies potential issues and solutions prior to programme implementation. Human factor issues are not confined to those who are the subjects of the technology but may also include system implementers, designers, technicians and attendants, who may all be subject to system limitations and errors.

Reasonable efforts will need to be made to support accessibility based on analysing costs and benefits such that fewer exceptions need to be handled and less impact made on other users.

Many countries have adopted inclusive policies and enforced them with legislation (e.g. the USA's Americans with Disabilities Act of 1990. Standards and Workshop Agreements on Design for All are being developed at European and international level. ISO/IEC Guide 71 Guidelines for standards developers to address the needs of older persons and persons with disabilities [4] gives an overview on the possible impairments of subjects and helps to address their problems when standardizing and/or implementing systems. The United Nations Standard Rules on Equal Opportunity for Persons with Disabilities [5] provides guidelines on the enhancement of participation opportunities for people with disabilities in education, employment, social security, culture, recreation, transport and accessibility to the built environment and information. In Japan, the domestic standard (JIS X8341) with regard to the accessibility, was established in May 2004. Biometrics is described in the standard.

The system operator and/or designer should take into account the following disabilities and problems for subjects using a system. These conditions can be temporary. Note also that many people have a combination of impairments, the cumulative effect of which will amplify the impact of individual impairments.

1. The absence of physical body parts required for the correct operation of a biometric or its specific instantiation in the system.

> *Example: missing index finger(s) in an access control system using prescribed fingers*

2. The absence of behavioural features required for the correct operation of a biometric or its specific instantiation in the system.

> *Example: data subject with no power of speech required to use a voice-activated door entry system*

3. Unusable physical body parts required for the correct operation of a biometric or its specific instantiation in the system.

> *Example: person with extreme arthritis asked to use a flat plane hand geometry biometric*

4. Unusable behavioural features required for the correct operation of a biometric or its specific instantiation in the system.

Example: data subject in a country with a writing system based on non-Latin alphabet required to use a dynamic signature system designed for Latin alphabets

5. An inability to present the required biometric characteristic in a sufficiently consistent and predictable manner under the particular conditions of operation.

Example: uncontrollable movement of the eyeball resulting in difficulty in operating an iris recognition system

Example: person with a speech impediment (e.g. stuttering) asked to use a speaker verification scheme

6. An accelerated drift, that is a change in a characteristic over a period of time in physical or behavioural aspects resulting in increasing difficulty in meeting the matching criteria for an identification or verification.

Example: data subject with conditions that rapidly age the facial features being verified in certain automatic face verification systems

7. An inability to access, or difficulty with physical access to, the biometric sensor or user terminal.

Example: wheelchair data subject or person with a stature not tall enough to access a sensor or user terminal fixed at a specific height

8. An inability either to read, due to illiteracy, or to understand the instructions, or to recall the correct procedures, in order to operate the biometric system successfully.

Example: Forgetting which finger was enrolled in an unattended access control system, and being locked out after three attempts

9. Psychological conditions that prevent the data subject operating the biometric systems correctly.

Example: Persons with extreme compulsive-obsessive disorder required to use sensors or keypads/keyboards with physical contact

10. Conditions, such as those listed above, that result in disproportionate use of resources.

Example: Senior citizens who require a longer period of adjustment to changes in context and situation, exceeding the notional time allowed for an authentication

11. Inability to capture biometric for children or individuals that don't have "standard" size biometrics.

Example: Child using a hand geometry reader due to the position or size of the sensor.

In addition to those who are not able to use the system, there are occasions when a data subject may want to opt out of the use of the biometric and the system operator and/or designer may wish

to consider granting this as an option. This option may affect the benefits of the use and the functionality of this method of authentication.

In some cases, the problems may be mitigated by changes in the design of the environment (e.g. by providing height-adjustable sensors or optimized lighting conditions). In other instances, alternative designs may need to be considered.

The approach to the design of accessible biometric systems (as well as other alternative, non-biometric approaches) will be dependent on a number of factors, including

- *whether or not the use of the system is voluntary or mandatory,*
- *the consequences of an adverse outcome, failure to recognise, to the subject (e.g. personal safety, financial impact, social exclusion or embarrassment, or affect on quality of life),*
- *the likely demographics of the target data subject group.*

Designers should aim for the best overall performance for the maximum number of potential subjects, and creative and innovative design should be encouraged. The sharing of knowledge and experience of best practice should in due course lead to consistency in presentation and use of biometric systems.

Specific accessibility recommendations regarding specific technologies and applications will be given in the Technical Report - Cross Jurisdictional Aspects of Implementing Biometric Systems Part 2.

2.2 Principles for subjects with disabilities

In order that potential data subjects with disabilities should not be disadvantaged in the application of systems using biometrics, care should be taken to design these systems to operate in accordance with the following accessibility principles.

1. *Inclusive Design:*
   Biometric systems should be designed so that as many subjects within the target population as is reasonably possible can use the system effectively and with the minimum of discomfort.

2. *Early consideration of the needs of disabled*
   In the design of such new systems or services, the needs of disabled subjects should be considered from the outset.

3. *Testing*
   Before systems are deployed, they should be thoroughly tested by subjects who represent the widest range of abilities (that is, in respect of visual, auditory, physical, cognitive and behavioural ability).

4. *Training*
   For subjects with a disability, training appropriate to mitigate the disability in the use of the system should be offered.

5. *Choice*
   Wherever practicable, the subject should have a choice of biometric systems to use, and should not be disadvantaged if their disability prevents them from using a specific biometric.

6. *Alternative method*
   Where no alternative biometric technology is available and where the disability prevents the use of the particular biometric technology, subjects should be permitted to use an alternative method. Wherever practicable, the use of such an alternative should not result in an inferior level of service or functionality to the subject.

7. *Re-enrolment*
   If the subject can no longer reliably use a verification system, the subject should be provided, wherever feasible, with the opportunity to repeat the registration process.

8. *Staff training*
   Staff who operate systems that use a biometric technology should be trained in how to work with disabled subjects.

9. *Consent*
   A biometric system should not store details of a subject's disabilities without his or her informed consent.

10. *Equality*
    The rights to privacy of a disabled subject should be the same as those of a non-disabled subject.