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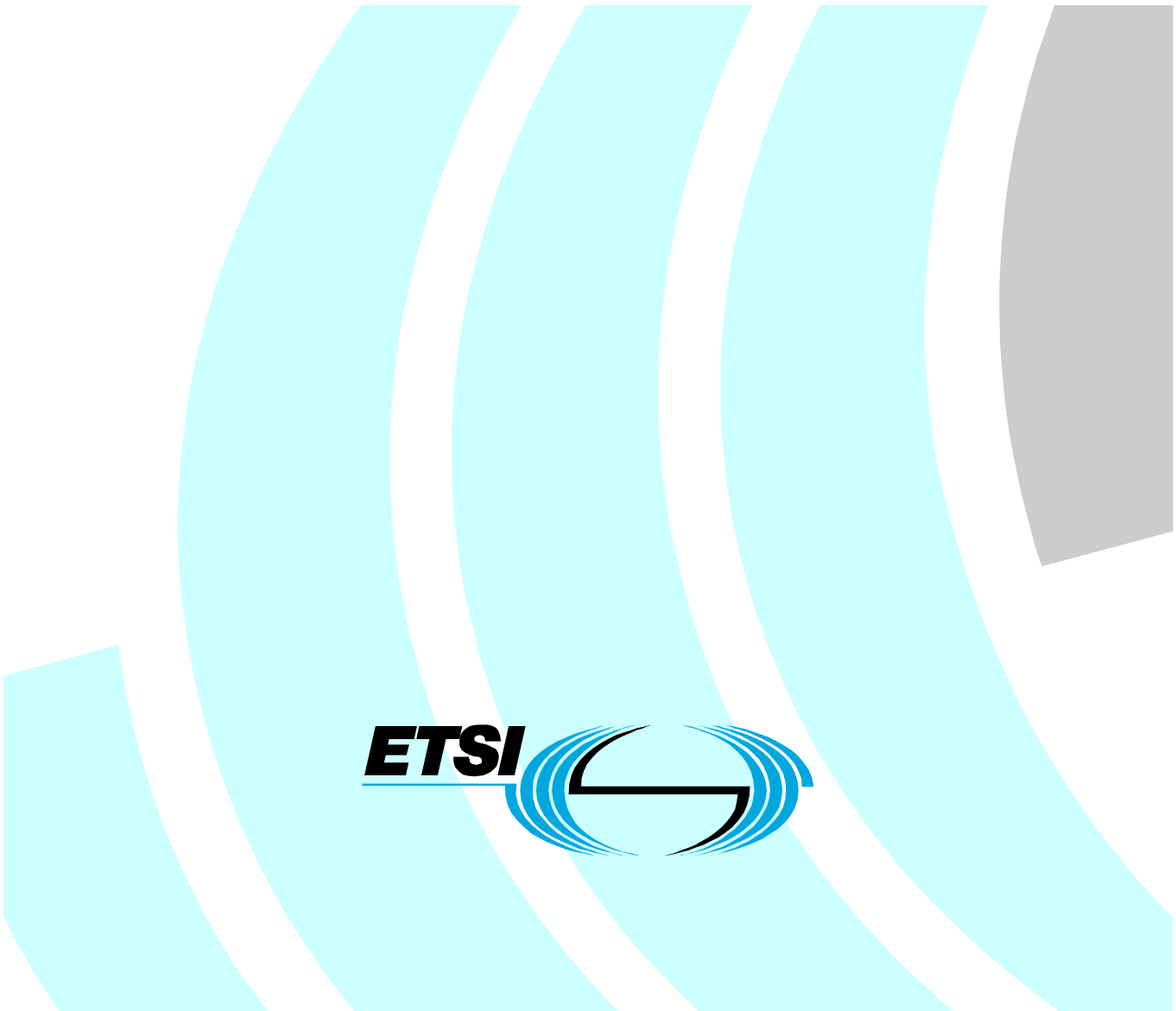
Special Report

Human Factors (HF); An annotated bibliography of documents dealing with Human Factors and disability



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Contents

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Foreword

This Special Report (SR) has been produced by ETSI Technical Committee Human Factors (HF).

1 Scope

The present document provides a listing of standardization documentation relevant to Telecommunications on the subjects of Human Factors and disability and gives a brief outline of the content of the listed standards that are published and provides some comments on their applicability.

The present document is a living document which will be updated at intervals.

2 References

As the document is itself a listing of reference documents, it contains no specific references.

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CEPT	Conférence des Administrations Européennes des Postes et Télécommunications
CLI	Calling Line Information
DTMF	Dual Tone Multi-Frequency
ETNS	European Telephony Numbering Space
GSM	Group Special Mobile
ISDN	Integrated Services Digital Network
MIA	Multiple Index Approach
MIRS	Multimedia Information Retrieval Services
MMI	Man-Machine Interface
PBI	Phone Based Interface
PBX	Private Branch eXchange
PSTN	Public Switched Telephone Network
SDL	Specification and Description Language
TETRA	Trans-European Trunked RAdio
TMN	Telecommunications Management Network
UPT	Universal Personal Telecommunications
VDT	Visual Display Terminal

4 Standards, recommendations and reports

4.1 ETSI documents

ETSI ETR 029: "Human Factors (HF); Access to telecommunications for people with special needs Recommendations for improving and adapting telecommunication terminals and services for people with impairments".

ETR 029 identifies some of the main factors that can inhibit the access to and use of telecommunications services by people with special needs, such as those caused by advanced age, temporary or permanent physical disability, intellectual impairment, lack of education or membership of a cultural or linguistic minority group.

It is an early report which has now been superseded by EG 202 116 which incorporates much of its content.

ETSI ETR 039: "Human Factors (HF); Human Factors standards for telecommunications applications".

An early bibliography, now well out of date.

ETSI ETR 051: "Human Factors (HF); Usability checklist for telephones Basic requirements".

A short report demonstrating the use of a simple usability checklist for the very basic operations of setting up and clearing a call on a simple telephone.

ETSI ETR 068: "Human Factors (HF); European standardization situation of telecommunications facilities for people with special needs".

ETR 068 sets out to review the situation on standards and facilities for people with special needs in the major European Countries. The methods used for the document survey are reported and some attempt is made to predict future telecommunications trends. The report provides a somewhat out of date view of the facilities available and makes proposals for further standardization work.

ETSI ETR 070: "Human Factors (HF); The Multiple Index Approach (MIA) for the evaluation of pictograms".

A report describing one method of assessing the value of pictograms. It gives a reasonably detailed description of the experimental procedures and gives an example of the use of a questionnaire for the evaluation of pictograms for use with videotelephones.

The report gives no guidance on mathematical treatment of the results.

ETSI ETR 095: "Human Factors (HF); Guide for usability evaluations of telecommunications systems and services".

A useful and detailed discussion on the concept of usability. The report provides definitions and descriptions of the evaluation process. Descriptions of a number of methods of evaluating usability are provided and their advantages and disadvantages discussed. Measurement theory and scales are described.

It provides a useful introduction to the field of work for anyone needing to assess the usability of a system and gives a number of references for further study. ETR 095 has now been updated by EG 201 472.

ETSI ETR 096: "Human Factors (HF); Phone Based Interfaces (PBI); Human factors guidelines for the design of minimum phone based user interface to computer services".

A very basic introduction in general terms to the use of a telephone with DTMF keypad for services with a voice response.

ETSI ETR 113: "Human Factors (HF); Results of an evaluation study of pictograms for point-to-point videotelephony".

ETR 113 gives the results of an evaluation study of pictograms for use in videotelephony. It was used to justify the effectiveness of the Multiple Index Approach for evaluation. Unfortunately the results are only as good as the design of the restricted number of original sets of pictograms offered for testing. The work was the basis for ETS 300 375.

ETSI ETR 116: "Human Factors (HF); Human factors guidelines for ISDN Terminal equipment design".

ETR 116 has now been superseded by EG 202 116 where its contents have been largely reproduced and expanded. It is a vade mecum and checklist for all of those aspects of a design that affect the user. ETR 116 was the chef-d'œuvre of the ETSI Human Factors group and covered most aspects of terminal design.

ETSI ETR 131: "Terminal Equipment (TE); An investigation into the need for standardization in the area of stored voice services".

ETR 131 reports a study into a range of services which make use of stored voice. The description "Stored Voice Services" was first used in this report which identified the need for guidelines on user procedures and dialogues and on their usability.

ETSI ETR 147: "Human Factors (HF); Usability checklist for Integrated Services Digital Network (ISDN) telephone terminal equipment".

ETR 147 provides a simple list of features of terminal design that should be checked to determine whether human factors aspects have been properly dealt with in a design.

It should be useful both to designers and specifiers of terminal equipment.

ETSI ETR 160: "Human Factors (HF); Human Factors aspects of multimedia telecommunications".

ETR 160 defines and discusses many aspects of multimedia but deals mainly with automatically provided multimedia services. It treats hypermedia issues such as links and navigation and in general provides advice on the main Human Factors problems in multimedia.

ETSI ETR 165: "Human Factors (HF); Recommendation for a tactile identifier on machine readable cards for telecommunication terminals".

ETR 165 presents the results of tests of tactile identifiers on a number of machine readable cards. The results condemned the British Telecom phone cards then in use and a CEN TC 224 draft proposal. The design was subsequently superseded by a different recommendation in ETS 300 767 which was adopted by British Telecom and other manufacturers.

ETSI ETR 166: "Human Factors (HF); Evaluation of telephones for people with special needs; An evaluation method".

ETR 166 is based on the checklist of ETR 051 applied to conventional telephones and adds evaluation criteria said to be appropriate for groups of people with various disabilities. It does not apply to telephones for those people so severely disabled as to need special devices or features which cannot be expected to be supplied in conventional telephones.

It is an early report which has now been superseded by EG 202 116 which incorporates and updates much of its content.

ETSI ETR 167: "Human Factors (HF); User instructions for public telecommunications services; Design guidelines".

ETR 167 gives good advice for the design of user instructions intended to be placed on or near payphones. It contains some references to additional source material and gives a couple of (Italian) examples of instruction layouts.

ETSI ETR 170: "Human Factors (HF); Generic user control procedures for telecommunication terminals and services".

ETR 170 describes general concepts related to user control procedures and interaction with telecommunication terminals and services. A number of general rules are described and example user procedures are described in SDL format.

The report is rather theoretical, being purely generic, with no detailed recommendations for particular procedures.

ETSI ETR 175: "Human Factors (HF); User procedures for multipoint videotelephony".

ETR 175 deals with user procedures for setting up multipoint videotelephone calls, procedures for switching multipoint video signals within the framework of the switched mode, and procedures for controlling the mixture of video signals within the framework of the mixed mode.

Much of ETR 175 does little more than identify organizations working in the field. A little over two pages are on preliminary recommendations for the broad outlines of procedures. Recommendations are made for more research.

ETSI ETR 187: "Human Factors (HF); Recommendation of characteristics of telephone services tones when locally generated in telephony terminals".

A largely discredited report based generally on ITU-T Recommendation E.180 written by the author of the Recommendation. Contains the content of a putative ETS that failed its vote.

ETSI ETR 198: "Human Factors (HF); User trials of user control procedures for Integrated Services Digital Network (ISDN) videotelephony".

ETR 198 gives the results of four European experiments in videotelephony to evaluate a set of control procedures for ETR 170. The experiment showed that the original procedures were defective. The report provided the basis for further Human Factors work.

NOTE: ETSI ETR 170: "Human Factors (HF); Generic user control procedures for telecommunication terminals and services".

ETSI ETR 208: "Human Factors (HF); HF aspects of Universal Personal Telecommunications (UPT); User requirements".

ETR 208 identifies types of UPT users by reference to a UPT model which was used to generate user requirements. Interaction between users and between users and tasks are described.

The report provides a detailed description of the facilities that may be provided by UPT. An annex describes a number of procedures in SDL.

ETSI ETR 261-1: "Human Factors (HF); Assessment and definition of a harmonized minimum man-machine interface (MMI) for accessing and controlling public network based supplementary services; Part 1: General approach and summary of findings".

ETR 261-1 presents the results of research to develop a harmonized MMI particularly for supplementary services. Part 1 describes the approach to the work and summarizes results from the data collected.

It sets out a useful introduction to the elements to be considered in the design of an MMI for supplementary services.

ETSI ETR 261-2: "Human Factors (HF); Assessment and definition of a harmonized minimum man-machine interface (MMI) for accessing and controlling public network based supplementary services; Part 2: Literature review - Memory and related issues for dialling supplementary services using number codes".

ETR 261-2 presents the results of research to develop a harmonized MMI particularly for supplementary services. Part 2 gives a literature review on memory and other issues related to supplementary services accessed and controlled with numeric codes.

ETR 261-2 provides a basic tutorial on memory and related issues and provides a useful bibliography of the subject.

**ETSI ETR 261-3: "Human Factors (HF); Assessment and definition of a harmonized minimum man-machine interface (MMI) for accessing and controlling public network based supplementary services;
Part 3: Experimental comparison of two MMIs - Simulated UPT access and prototype ISDN supplementary services".**

ETR 261-3 presents the results of research to develop a harmonized MMI particularly for supplementary services. Part 3 describes the experimental comparison of two MMIs, one a phase 1 UPT simulation and the other and the other an ISDN prototype.

The experiment compared interfaces using a 12 button keypad, tones and announcements with another that also had a text display. The results were limited and somewhat inconclusive.

**ETSI ETR 261-4: "Human Factors (HF); Assessment and definition of a harmonized minimum man-machine interface (MMI) for accessing and controlling public network based supplementary services;
Part 4: Experimental comparison of the effect of categorized and non-categorized formats within user instructions".**

ETR 261-4 presents the results of research to develop a harmonized MMI particularly for supplementary services. Part 4 describes the experimental comparison of two forms of instruction manual.

One form of manual is structured to reflect a user model of a supplementary service and the other is structured to reflect the necessary user procedures. The report is at times difficult to follow due to editorial errors in the figure and table numbering.

**ETSI ETR 261-5: "Human Factors (HF); Assessment and definition of a harmonized minimum man-machine interface (MMI) for accessing and controlling public network based supplementary services;
Part 5: Experimental evaluation of the CEPT and GSM code schemes".**

ETR 261-5 presents the results of research to develop a harmonized MMI particularly for supplementary services. Part 5 describes the experimental comparison of CEPT and GSM code schemes used to access and control supplementary services.

**ETSI ETR 261-6: "Human Factors (HF); Assessment and definition of a harmonized minimum man-machine interface (MMI) for accessing and controlling public network based supplementary services;
Part 6: Survey of existing PSTN, ISDN and mobile networks, and a user survey of supplementary service use within Centrex and PBX environments".**

ETR 261-6 presents the results of research to develop a harmonized MMI particularly for supplementary services. Part 6 describes the questionnaire and survey data collected in two surveys of supplementary services, one in public networks and the other in Centrex and PBX environments.

**ETSI ETR 261-7: "Human Factors (HF); Assessment and definition of a harmonized minimum man-machine interface (MMI) for accessing and controlling public network based supplementary services;
Part 7: Experimental evaluation of draft ETS 300 738".**

ETR 261-7 presents the results of research to develop a harmonized MMI particularly for supplementary services. Part 7 Presents the results of an experimental evaluation of the harmonized MMI proposed in a draft ETS for the minimum MMI for the control of public supplementary services

ETSI ETR 294: "Terrestrial Trunked Radio (TETRA); Voice and Data (V+D) and Direct Mode Operation (DMO); Mobile Station (MS) Man Machine Interface (MMI)".

ETR 294 sets out the minimum man machine interface required to gain access to and to control TETRA services and supplementary services.

It describes a standard and an expanded keypad and provides information on supplementary service codes.

ETSI ETR 297: "Human Factors (HF); Human Factors in Videotelephony".

ETR 297 identifies HF issues in videotelephony and stresses the need for usability. It provides advice on many aspects of videotelephony. An annex provides recommended pictograms.

ETSI ETR 329: "Human Factors (HF); Guidelines for procedures and announcements in Stored Voice Services (SVS) and Universal Personal Telecommunication (UPT)".

ETR 329 provides a set of generic user commands for access to and control of any service that uses recorded voice announcements and also deals with the prompts and feedback for use with voice services, the use of tones and the provision of equivalent text.

It provides a useful introduction to these services and gives advice on the creation of a satisfactory and usable service.

ETSI ETR 333: "Human Factors (HF); Text Telephony; Basic user requirements and recommendations".

ETR 333 summarizes in simple terms the basic user requirements for text telephony. It gives information on existing text telephony methods and describes the characteristics of possible alternative implementations. It also gives recommendations for the use of V.18 capable modems for implementation of text telephony in different networks.

ETSI ETR 334: "Human Factors (HF); The implications of human ageing for the design of telephone terminals".

ETR 334 gives much information on the characteristics of the elderly including demographic changes, attitudes to technology, economic resources and employment. It also gives details of most kinds of age related changes.

ETSI ETR 345: "Human Factors (HF); Characteristics of telephone keypads and keyboards; Requirements of elderly and disabled people".

ETR 345 sets out to give recommendations about the physical characteristics of telephone keypads corresponding to the requirements of elderly and disabled people.

No research results are given to support the recommendations provided.

ETSI TCRTR 023: "Human Factors (HF); Assignments of alphabetic letters to digits on push button dialling keypads".

A report formally stating that TC-HF supports option "A" of ITU-T Recommendation E161 but with no commitment to recommend any service that assumes this option.

ETSI ETS 300 375: "Human Factors (HF); Pictograms for point-to-point videotelephony".

ETS 300 375 specifies a set of pictograms representing eight point to point videotelephony functions.

ETSI ETS 300 381: "Telephony for hearing impaired people; Inductive coupling of telephone earphones to hearing aids".

ETS 300 381 specifies the requirements for the magnetic field to be produced at the earphone to permit satisfactory coupling to a hearing aid.

ETSI ETS 300 488: "Terminal Equipment (TE); Telephony for hearing impaired people; Characteristics of telephone sets that provide additional receiving amplification for the benefit of the hearing impaired".

ETS 300 488 specifies the electro-acoustic performance characteristics of telephones with receive amplification greater than that normally provided.

ETSI ETS 300 640: "Human Factors (HF); Assignment of alphabetic letters to digits on standard telephone keypad arrays".

ETS 300 640 specifies which letters go on which keys on keypads for all terminals, both public and private. It is fully harmonized with ITU-T Recommendation E.161 and with ISO/IEC 9995-8.

ETSI ETS 300 679: "Terminal Equipment (TE); Telephony for the hearing impaired; Electrical coupling of telephone sets to hearing aids".

ETS 300 679 specifies the electrical and mechanical requirements for the direct electrical connection of a telephone set to a hearing aid.

ETSI ETS 300 738: "Human Factors (HF); Minimum Man-Machine Interface (MMI) to public network based supplementary services".

ETS 300 738 defines the format of the control actions required to gain access to and to control public network based supplementary services. It describes the necessary information to be provided by the network during the resultant dialogue.

It sets out to provide a complete listing of supplementary services and their codes based upon information derived from CEPT, ETSI standards and common usage. Some of the codes listed appear never to have been brought into use. No definitions are provided for the service names listed

ETSI ETS 300 767: "Human Factors (HF); Telephone Prepayment Cards; Tactile Identifier".

ETS 300 767 specifies the form, dimensions and position of the shape cut out of the short edge of a machine readable card as a tactile identifier.

ETSI EN 301 104: "Human Factors (HF); Human factors requirements for a European Telephony Numbering Space (ETNS)".

EN 301 104 specifies the human factors requirements dealing with aspects of a European telephony numbering space. It covers those aspect of a ETNS services of importance to users of those services and to other affected users.

It provides rules for the formatting of numbers, for migrating from an ETNS service to a global service, for CLI information, call charging information, delays and linguistic difficulties.

ETSI EN 301 462: "Human Factors (HF); Symbols to identify telecommunications facilities for the deaf and hard of hearing people".

EN 301 462 specifies a range of symbols to identify telecommunications facilities for deaf and hard of hearing people. The symbols derive from the work described in TR 101 767. The document does not provide any indication of preferred colours.

ETSI EG 201 013: "Human Factors (HF); Definitions, abbreviations and symbols".

EG 201 013 provides a convenient listing of those definitions, abbreviations and symbols used in documents prepared by TC HF.

ETSI EG 201 024: "Human Factors (HF); User interface design principles for the Telecommunications Management Network (TMN) applicable to the "G" Interface".

EG 201 024 provides a set of design principles for the human to computer interface of telecommunications management networks. The time criticality of networks is identified and methods are described for reducing the quantity of information to be handled. A set of symbols is recommended.

ETSI EG 201 103: "Human Factors (HF); Human factors issues in Multimedia Information Retrieval Services (MIRS)".

EG 201 103 focuses on the principles that are important for navigation in Multimedia Information Retrieval Services identified as provided by ETSI members. The guide proposes general Human Factors guidelines aimed at being applicable to a range of different services.

The document provides useful information to assist in the design of an easily usable and successful system.

ETSI EG 201 379: "Human Factors (HF); Framework for the development, evaluation and selection of graphical symbols".

EG 201 379 is intended to provide a framework for the development, evaluation and selection of graphical symbols for use in a telecommunications environment. Some difficulties have been found in evaluating symbols in accordance with the guidance given.

ETSI EG 201 472: "Human Factors (HF); Usability evaluation for the design of telecommunication systems, services and terminals".

EG 201 472 is intended to give guidance on usability evaluation methods with special emphasis on its use within the Human-Centred Design Process. The document updates the techniques described in ETR 095 and provides a readable and very useful tutorial on the subject.

ETSI EG 201 795: "Human Factors (HF); Issues concerning user identification in future telecommunications systems".

EG 201 795 is a brief document which sets out the issues in user oriented identification requirements. It provides guidelines for authors of standards to ensure that users' identification needs are met by the systems that they specify.

The document is concerned explicitly with the set-up of communications and not with their content.

ETSI EG 201 940: "Human Factors (HF); User identification solutions in converging networks".

EG 201 940 details the user requirements for a unique end user identification. A number of potential solutions are investigated which require little or no change to existing numbering schemes and identification mechanisms. The Universal Communications Identifier (UCI) is proposed as a solution.

ETSI EG 202 048: "Human Factors (HF); Guidelines on the multimodality of icons, symbols and pictograms".

EG 202 048 is a somewhat academic study of the design and use of multimodal symbols with special emphasis on the requirements of people with disabilities and elderly people. It provides guidelines to good practice and describes how their use can facilitate the Design for All approach.

The subject is treated in some detail and an extensive bibliography is provided.

ETSI EG 202 067: "Universal Communications Identifier (UCI); System framework".

EG 202 067 is a major report providing an introduction to the framework of UCI and that defines the system architecture and operations needed to implement UCI, capitalizing on existing and emerging standards which are identified in the document.

The main UCI functional entities, the required capabilities and technical requirements are described. Further descriptions cover details of communications using UCI and how it assists in privacy protection, the data handled and the security framework. An introduction is given to administration issues and the standards that could support UCI.

ETSI EG 202 072: "Universal Communications Identifier (UCI); Placing UCI in context; Review and analysis of existing identification schemes".

EG 202 072 contributes to the third phase of the UCI project and provides a detailed overview of existing naming, numbering and addressing schemes. It also reports on the application programming interface work ongoing in ESTI.

ETSI EG 202 116: "Human Factors (HF); Guidelines for ICT products and services; Design for All".

EG 202 116 is a revised and updated version of ETR 116 which takes on board the concept of Design for All. It provides a one-stop shop for advice on the Human Factors aspects of ICT devices and is aimed at the practical designer rather than the Human Factors expert.

ETSI EG 202 132: "Human Factors (HF); User Interfaces; Guidelines for generic user interface elements for mobile terminals and services".

EG 202 132 reports on the consensus building within the mobile telephone industry to achieve generic user interfaces without restricting the ability of market players to further improve and develop their terminals and services. It aims to provide simplified access to basic and selected advanced functions of mobile communications. It provides detailed advice on the harmonization of many aspects of terminals and services.

ETSI EG 202 191: "Human Factors (HF); Multimodal interaction, communication and navigation guidelines".

EG 202 191 deals with multimodal interaction, communication and navigation at the user interface showing how to reduce the exclusion of people with disabilities by using multimodality to compensate for impairments. The document sets out a number of design principles for multimodal systems. It also reports the results of a number of consultations with key researchers in the area.

ETSI EG 202 249: "Universal Communications Identifier (UCI); Guidelines on the usability of UCI based systems".

This is a lengthy document (101 pages) which gives detailed usability guidelines for the development and implementation of UCI systems. It also identifies those areas where further research is necessary or where technical details are not yet resolved.

ETSI EG 203 072: "Universal Communications Identifier (UCI); Results of a detailed study into the technical areas for identification harmonization; Recommendations on the UCI for NGN".

This guide sets out in some technical detail the requirements for users, terminals and networks whereby UCI can be implemented in an NGN environment.

ETSI ES 201 125: "Human Factors (HF); Universal Personal Telecommunications (UPT); Specification of the minimum Man-Machine Interface (MMI) for Phase 1 UPT".

ES 201 125 defines the minimum Man-Machine Interface for the phase 1 UPT service, describing the requirements to be met by the service provider, the network operator and the terminal device.

The minimum transitions are illustrated with state transition diagrams and the UPT control procedures are profusely described in Specification and Description Language (SDL) in a set of diagrams.

ETSI ES 201 275: "Human Factors (HF); User control procedures in basic call, point-to-point connections, for Integrated Services Digital Network (ISDN) videotelephony".

ES 201 275 specifies the minimum set of user procedure necessary to control a basic call point to point connection for the ISDN videotelephony service. It covers fallback to ordinary ISDN and PSTN telephony. It describes the various videotelephony services available and the different communication modes.

User control procedures and the call handling processes are described in a set of SDL diagrams. Compliance requirements and procedures are described.

ETSI ES 201 381: "Human Factors (HF); Telecommunications keypads and keyboards; Tactile identifiers".

ES 201 381 specifies the form, dimensions and location of tactile identifiers on digit "5" of keypads and on the "F" and "J" keys of keyboards.

ETSI ES 201 382: "Human Factors (HF); Procedure for registering a supplementary service code".

ES 201 382 describes the procedure to be followed when applying for a supplementary service code for use in a public network that is to be registered in the ETSI register of supplementary service codes.

ETSI ES 201 930: "Human Factors (HF); Specification of user requirements for use in ETSI deliverables".

This document lays down a requirement that all ETSI deliverables should contain an annex setting out the users of the product or service described, their goals, the equipment used, the tasks and feedback for users and the circumstances in which the product or service is intended to be used. The annex should also state how the answers have been validated.

ETSI ES 202 076: "Human Factors (HF); User Interfaces; Generic spoken command vocabulary for ICT devices and services".

ES 202 076 specifies a set of spoken commands in five European languages that can be used to control the functions of ICT devices equipped with speech recognition. All languages for the commands were user tested in their respective countries.

The commands are applicable to the functions of navigation, information retrieval, basic call handling and the configuration of preferences and they address the most common telecommunications services.

ETSI ES 202 130: "Human Factors (HF); User Interfaces; Character repertoires, ordering rules and assignments to the 12-key telephone keypad".

ES 202 130 specifies the assignment of characters to the keys in a 12 button keypad to enable such a keypad to be used for writing an SMS message or entering information into a database. It also deals with the ordering of characters.

It covers Latin Greek and Cyrillic script and is applicable to the official languages of the EU as at 2003, those used in EFTA and Russian, 28 languages in all.

This standard provides a major contribution to the work of handling cultural diversity in Europe.

ETSI SR 001 996: "Human Factors (HF); An annotated bibliography of documents dealing with Human Factors and disability".

This is the present document which gives a listing of ETSI, ISO/IEC and ITU-T documents dealing with Human Factors and disability together with some comment on their content.

ETSI TR 101 041-1: "Human Factors (HF); European harmonization of network generated tones; Part 1: A review and recommendations".

TR 101 041-1 reports the results of a project to study and investigate the potential for the harmonization of information tones generated by public networks. It reviews the range of tones currently in use within Europe and world-wide. Suggestions are made for possible implementation strategies for the harmonization of tones and the difficulties of doing so are identified. Little progress appears to have been made to use regulation to encourage the process of harmonization.

ETSI TR 101 041-2: "Human Factors (HF); European harmonization of network generated tones; Part 2: Listing and analysis of European, World and Standardized tones".

TR 101 041-2 provides the most up to date listing of tones in use throughout the world and is a useful reference document for terminal designers working in the field of automatic tone detection.

ETSI TR 101 056: "Human Factors (HF); European Numbering Task Force (ENTF); Human Factors aspects of the European Telephony Numbering Space (ETNS)".

TR 101 056 deals with the human factors aspects of a European telephone number and was later developed into a standard (EN 301 104) in accordance with the European Numbering Task force work programme. It treats number length issues, portability issues, the identification of services and charging, routeing options linguistic problems and usability testing.

ETSI TR 101 767: "Human Factors (HF); Symbols to identify telecommunications facilities for deaf and hard of hearing people; Development and evaluation".

TR 101 767 describes the background research on symbols development and evaluation of symbols to identify telecommunications facilities for deaf and hard of hearing people that led to EN 301 462. The quality of the evaluation was somewhat undermined by the difficulty of obtaining sufficient test results using voluntary effort. Some difficulty was also found in reconciling the test results with requirements of international standards bodies.

ETSI TR 101 806: "Human Factors (HF); Guidelines for Telecommunication Relay Services for Text Telephones".

TR 101 806 provides guidelines for the provision of relay services, especially those which enable a text telephone user to converse with a telephone user or with another text telephone user. It also deals with spoken to spoken relays and relays using videotelephones.

ETSI TR 102 015: "Human Factors (HF); Supplementary Services; A review of ETSI deliverables".

A slight document intended solely for internal HF use that reviewed HF documents dealing with Supplementary Services and recommended change to one of them and to the ETSI Web site.

ETSI TR 102 068: "Human Factors (HF); Requirements for assistive technology devices in ICT".

TR 102 068 reviews the requirements of those users in need of assistive technology and classifies the signal information exchanged between assistive devices and ICT equipment. Interface technologies are reviewed and recommendations made for protocols and interfaces appropriate to differing types of information.

Proposals are made for an AT command to identify specific commands from assistive devices.

ETSI TR 102 083: "Human Factors (HF); Supplementary service codes for use in public network services".

TR 102 083 describes the use of those supplementary service codes that were identified in the answers to a questionnaire sent out to the ETSI membership. The document provides categorized listing of supplementary services and gives a set of network independent definitions.

It also describes the creation of an ETSI register of codes. The application and registration procedures are described in ES 201 382.

ETSI TR 102 125: "Human Factors (HF); Potential harmonized UI elements for mobile terminals and services".

TR 102 125 identifies common basic tasks and goals of users of mobile terminals, analyses them, and examines the possibilities and difficulties of harmonization of the user interface.

It recommends the drawing up of a guide aimed at simplification of end user access to mobile information communication devices and services.

ETSI TR 102 133: "Human Factors (HF); Access to ICT by young people: issues and guidelines".

TR 102 133 reviews the human interaction issues for access by children to ICT. The development of children is described together with their use of ICT. Relevant ethical and legal issues are discussed. Conclusions are drawn and recommendations made on the treatment of the identified issues.

A number of initiatives and projects in the field are described and a useful bibliography is provided.

ETSI TR 102 202: "Human Factors (HF); Human Factors of work in call centres".

TR 102 202 deals with the human factors aspects of work in call centres and gives some recommendations of best practice. It is based on reviews of existing studies of call centre operation in the UK and other countries, supported by some practical research. The document identifies jobs and tasks in call centres and the attributes and skills of call handlers and related training issues. The practical issues of disability are considered.

It is aimed at managers of call centres, their customers, call centre equipment and software designers and manufacturers, occupational health and human resources management. The focus is on call handlers, but the advice is also pertinent to employees with other roles in call centres.

ETSI TR 102 274: "Human Factors (HF); Guidelines for real-time person-to-person communication services".

This report presents fitness for purpose human factors guidelines for real time person to person services developed from the eye-to-eye project. The work addresses mainly business communications services and provides initial guidelines and recommendations for their future development.

ETSI TR 102 279: "Human Factors (HF); Two surveys on assistive technology".

This is a minor document giving details of the results of two surveys on the requirements of assistive technology devices in ICT systems. The information is provided solely to make the information available for use by other researchers in the field of disability.

ETSI TR 102 415: "Human Factors (HF); Telecare services; Issues and recommendations for user aspects".

This report provides an initial study into the delivery of health and social care to individuals within the home or their wider community with the support of ICT enabled systems. It identifies key stakeholders that are active in the provision of telecare services and discusses aspects such as service provision elements, stakeholders' concerns and ethical, privacy and security issues. It is basically a document that sets the scene for telecare, discussing the presently available and possible future means its provision.

ETSI TR 103 073: "Universal Communications Identifier (UCI); Improving communications for disabled, young and elderly people".

This document reports the results of questionnaires answered in interviews with elderly people, disabled people and young children in ICT environments. The results which are reported identified a number of communications issues relevant to the target groups.

ETSI TR 103 077: "Universal Communications Identifier (UCI); Maximizing the usability of UCI based systems".

TR 103 077 expands on earlier UCI Guides and identifies a number of user requirements which are suitable to be expanded into guidelines. Other areas requiring further work are also identified.

4.2 ISO/IEC documents

ISO/IEC Guide 71:2001: "Guidelines for standards developers to address the needs of older persons and persons with disabilities".

This document sets out a useful checklist for standards developers of those factors that should be considered to ensure that standards take into account the needs of elderly and disabled users Some simple recommendations are provided.

This document also exists with similar content as CEN/CENELEC Guide 6.

ISO/IEC Guide 74:2004: "Graphical symbols – Technical guidelines for the consideration of consumers' needs".

This document sets out procedures for the development of signs and symbols for public information and for safety signs to be used on equipment and products. It identifies the standards that give recommendations for their development and evaluation

ISO 9186: "Graphical symbols - Test methods for judged comprehensibility and for comprehension".

This standard describes the procedures for selecting a graphical symbol and describes the procedures for comprehensibility judgement testing and comprehension testing. It also defines the circumstances that control when comprehension testing should be carried out.

ISO 9241: "Ergonomic requirements for office work with visual display terminals (VDTs)".

ISO 9241 is targeted primarily at system designers but can also be used by those responsible in organizations for the procurement of equipment. Although the title refers to requirements for office work, the application of the standard is not restricted to offices.

ISO 9241-1:1997/Amd 1:2001: "General introduction".

Introduces the standard as a whole and provides an overview of the standard. It deals with text and data processing (not Computer Aided Design or process control tasks) and describes the basis of the user performance approach which details the important ergonomic factors and how to measure them.

An amendment deals particularly with the software parts of the standard and gives advice on their use.

ISO 9241-2:1992: "Guidance on task requirements".

Provides guidance on office task design in VDT based information processing systems relevant both to users and to designers of such systems.

The objectives of task design and the characteristics of well designed tasks are described and guidance is provided on how task requirements can be identified and specified.

ISO 9241-3:1992/Amd 1:2000: "Visual display requirements".

Deals with the characteristics of a visual display which determine its effectiveness in presenting an image to the user. It specifies image quality requirements for the design and evaluation of VDTs. A user performance assessment method is provided in an annex which is replaced in amendment 1. Although it deals specifically with displays used in offices, it is appropriate to specify it for most applications which require general purpose displays to be used in an office-like environment.

ISO 9241-4:1998/Cor 1:2000: "Keyboard requirements".

Specifies the ergonomics design characteristics of an alphanumeric keyboard which may be used comfortably, safely and efficiently to perform office tasks. It also specifies methods of conformance testing.

ISO 9241-5:1998: "Workstation layout and postural requirements".

Specifies the ergonomics requirements for a Visual Display Terminal workplace which will allow the user to adopt a comfortable and efficient posture.

ISO 9241-6:1999: "Guidance on the work environment".

Specifies the ergonomics requirements for the Visual Display Terminal working environment which will provide the user with comfortable, safe and productive working conditions. It takes into account lighting, the effects of noise and vibration, electrical and magnetic fields, static electricity, the thermal environment, space organization and the workplace layout.

ISO 9241-7:1998: "Requirements for display with reflections ".

Makes recommendations for image quality with the aim of making VDTs legible and comfortable in use. It specifies methods of measurement of glare and reflections from the surface of display screens, including those with surface treatments.

ISO 9241-8:1997: "Requirements for displayed colours (CD)".

Specifies the requirements for multi-colour displays which are largely in addition to the monochrome requirements in Part 3. It is intended to be independent of display technology providing a lot of technical detail and test descriptions.

ISO 9241-9:2000: "Requirements for non-keyboard input devices (CD)".

Specifies the ergonomics requirements for non-keyboard input devices which may be used in conjunction with a visual display terminal. It covers such devices as the mouse, trackball and other pointing devices. It also includes performance test requirements. It does not address voice input.

ISO 9241-10:1996: "Dialogue principles".

Provides ergonomic principles in general terms for dialogue in visual display terminals. It deals with suitability for the task, suitability for learning, suitability for individualization, conformity with user expectations, self descriptiveness, controllability, and error tolerance by giving examples of applications.

ISO 9241-11:1998: "Guidance on Usability".

Defines usability and explains how to identify what it is necessary to take into account when specifying or evaluating usability in terms of measures of user performance and satisfaction. Annexes provide guidance on specifying the context of use of the product and give examples of usability measures. It includes an example of how the usability of a product can be specified and evaluated.

ISO 9241-12:1998: "Presentation of information".

Contains specific recommendations for presenting and representing information on text-based and graphical user interfaces used for office tasks. It includes guidance on ways of representing complex information using alphanumeric and graphical/symbolic codes, screen layout, and design as well as the use of windows.

ISO 9241-13:1998: "User guidance".

Provides recommendations for the design and evaluation of user guidance attributes of software user interfaces including Prompts, Feedback, Status, On-line Help and Error Management.

ISO 9241-14:1997: "Menu dialogues".

Provides recommendations for the design of menus used in user-computer dialogues. The recommendations relate to dialogue, input and output and cover menu structure, navigation, option selection and execution, and menu presentation. Sample techniques and a checklist are given for assessing compliance.

ISO 9241-15:1997: "Part 15: Command dialogues".

Provides recommendations for the design of command dialogues. It covers command language structure and syntax, command representations, input and output considerations, and feedback and help. Sample techniques and a checklist are given for assessing compliance.

ISO 9241-16:1999: "Direct manipulation dialogues".

Provides recommendations for the design of direct manipulation dialogues where the user acts directly on objects on the screen It covers those aspects of Graphical User Interfaces which are directly manipulated, and not covered by other parts of ISO 9241. Sample techniques and a checklist are given for assessing compliance.

ISO 9241-17:1998: "Form filling dialogues".

Provides recommendations for the design of form filling dialogues. The recommendations cover form structure and output considerations, input considerations, and form navigation. Sample techniques and a checklist are given for assessing compliance.

ISO/IEC 9995: "Information Technology - Keyboard layouts for text and office systems".

ISO/IEC 9995-1:1994: "General principles governing keyboard layouts".

Identifies the division of keyboards into sections and zones and defines key positions in the form of a grid. The general principles governing key labelling and symbol position are described.

ISO/IEC 9995-2:2002: "Alphanumeric section".

Divides the alphanumeric section of the keyboard into zones and describes the characters to be accommodated. It does not define an allocation of specific characters to specific key positions, leaving that to national customs and standards.

ISO/IEC 9995-3:2002: "Complementary layouts of the alphanumeric zone of the alphanumeric section".

Defines a secondary set of characters which, when used in combination with a national keyboard layout, allows the input of the full graphic character repertoire defined in ISO/IEC 6937. It also defines an allocation of specific characters to specific key positions for use where national standards do not exist.

ISO/IEC 9995-4:2002: "Numeric section".

Deals with the layout of the numeric section of a keyboard. It describes both the "1-2-3" and the "7-8-9" layouts of the numbers with the telephone type "1-2-3" layout being preferred. it also allocates functions to the keys above and to the right of the numeric keys.

ISO/IEC 9995-5:1994: "Editing section".

Divides the editing section of the keyboard into zones and describes the allocation of the functions to the keys.

ISO/IEC 9995-6:1994: "Function section".

Divides the function section of the keyboard into zones and describes the allocation of the functions to the keys.

ISO/IEC 9995-7:2002: "Symbols used to represent functions".

Aims to define symbols for the functions on any type of numeric, alphanumeric or composite keyboard. The symbols described cannot be said to be in common usage. An amendment defines some more common arithmetic symbols.

ISO/IEC 9995-8:1994: "Allocation of letters to the keys of a numeric keypad".

Specifies which letters go on which keys on the numeric zone of a keyboard. The use of letters on such keys is strongly deprecated. It is fully harmonized with ETS 300 640 and with ITU-T Recommendation E.161.

ISO 639 (1998): "Code for the representation of names of languages".

Although not strictly a human factors standard, ISO 639 provides a two letter coding for representing the names of languages to enable them to be called up as required in any system.

ISO/IEC 11581: "User symbol interfaces and symbols - Icon symbols and functions".

ISO/IEC 11581-1:2000: "Icons - general".

Contains a framework for the development and design of icons, including general requirements and recommendations applicable to all icons.

ISO/IEC 11581-2:2000: "Object icons".

Contains requirements and recommendations for icons that represent functions by association with an object, and that can be moved and opened. It also contains specifications for the function and appearance of a number of icons.

ISO/IEC 11581-3:2000: "Pointer icons".

Describes the user interaction with and appearance of pointer icons that are logically attached to an input device that the user manipulates to interact with other screen elements. It describes the function and appearance of a number of icons.

ISO/IEC 11581-4: "Control icons".

Future work.

ISO/IEC 11581-5:2004: "Tool icons".

This part describes user interaction with and appearance of tools on the screen. It also specifies the relationship between tools and pointers.

ISO/IEC 11581-6:1999: "Action icons".

Describes the user interaction with and appearance of action icons that represent actions and which act upon a selected source and/or target, providing single step access to functions typically available by a menu. It describes the function and appearance of a number of icons.

ISO/IEC 13714:1995: "Information Technology - Document processing and related communications - User interface to telephone based services: Voice messaging applications".

Deals with the features of the DTMF controlled stored voice service of voice messaging. It defines a new record tone (a chime) to identify standard systems and allocates usage for some of the keys to specific functions.

It is becoming the base standard for most stored voice services and is now being specified by in the UK by British Telecom.

4.3 ITU-T documents

4.3.1 E series Recommendations

E.120 (11/88): "Instructions for users of the international - telephone services".

Sets out guidelines for the structure and content of telephone directories and proposes the provision of pocket guides to travellers.

E.121 (06/04): "Pictograms, symbols and icons to assist users of the telephone service".

Gives examples of a number of graphical symbols which can be used in various environments to give instructions, to identify function keys or to convey information to users with the minimum of reliance on language. It also describes graphical means of describing tones.

It is of value to authors of handbooks and to terminal designers and it would be well if some of these standard symbols were more widely used.

E.122 (11/88): "Measures to reduce customer difficulties in the international telephone service".

Suggests use of recorded announcements and instructions on the use of the trunk prefix.

E.123 (02/01) Notation for national and international telephone numbers, e-mail addresses and Web addresses".

Provides a recommended layout for presenting international numbers on letterheads and business cards etc.

E.124 (11/88): "Discouragement of frivolous international calling to unassigned or vacant numbers answered by recorded announcements without charge".

Gives advice to administrations on dealing with outbreaks of frivolous calling to foreign announcements.

E.125 (10/84): "Inquiries among users of the international telephone services".

Merely a reference out to questionnaires in Volume II of the Red Book which may be used to ascertain users opinions on services.

E.126 (11/88): "Harmonization of the general information pages of the telephone directories".

Suggests a common presentation and content of the general information pages in a directory so as to assist foreign users.

E.127 (11/88): "Pages in the telephone directories intended for foreign visitors".

Gives recommendations on the content of directory pages specifically intended for foreign visitors.

E.128 (11/88): "Leaflet to be distributed to foreign visitors".

Gives guidelines on the structure and content of leaflets intended for distribution to foreign visitors.

E.130 (11/88): "Choice of the most useful and desirable supplementary telephone services".

A trivial introduction on factors to decide which supplementary services should be offered.

E.131 (11/88): "Subscriber control procedures for supplementary telephone services".

Describes AT&T, CEPT and NTT code schemes for some supplementary services but without giving any real recommendations. Contains a useful glossary.

E.132 (11/88): "Standardization of elements of control procedures for supplementary telephone services".

Gives recommendations on some actual code elements for use in supplementary services.

E.133 (11/88): "Operating procedures for cardphones ".

Recommends a sequence of procedures for use in cardphones.

E.134 (03/93): "Human factors aspects of public terminals: generic operating procedures".

A brief document setting out a basic sequence of user actions for operating a public terminal. It defines when payment should occur and recommends a "next" call facility.

E.135 (10/95): "Human factors aspects of public telecommunications terminals for people with disabilities".

Provides advice for the design of public terminals to assist disabled users to carry out the steps described in E.134.

E.136 (05/97): "Specification for tactile identifier for use with telecommunication cards".

A document recommending the tactile identifier specified in ETS 300 767.

E.137 (05/97): "User instructions for payphones".

Gives advice for the design of user instructions intended to be placed on or near payphones. It is based on and extends the advice given in ETR 167.

E.138 (06/02+Erratum 02/03): "Human factors aspects of public telephones to improve their usability for older people".

Describes characteristics of older people and their likely handicaps and gives a number of recommendations covering all aspects of the Man/Machine interface.

E.161 (02/01): "Arrangement of figures, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network".

Recommends arrangement of letters to be used for alphanumeric dials and keypads. Also specifies the tactile identifier for the "5" button, identical to that in ES 201 381.

E.180 (03/98) Technical characteristics of tones for the telephone service".

Gives electrical levels for tones and describes characteristic required for a number of tones. It is aimed mainly at administrations and some of its detail is getting a little out of date.

E.181 (11/88): "Customer recognition of foreign tones".

A trivial note on giving advice to customers how to tell the difference between dial tone and engaged tone. It does acknowledge that tones today can often be locally generated.

E.182 (03/98) Application of tones and recorded announcements in telephone services".

A useful discussion on its subject with an annex giving a list of tones and announcements with their definitions.

E.183 (03/98) Guiding principles for telephone announcements".

An introduction to the use of recorded announcements and synthetic speech giving advice on some general principles.

E.184 (11/88): "Indications to users of ISDN terminals".

A brief statement that the ISDN can give alternatives to tones for giving information to customers.

E.330 (11/88): "User control of ISDN supported services".

A few broad statements about ISDN supported services giving little of value.

E.331 (10/91): "Minimum user terminal interface for a human user entering address information into an ISDN terminal".

Sets out new numbering plan possibilities in the ISDN and advises structures permitting users to of cope with them on a terminal with a 12 digit keypad.

4.3.2 F series Recommendations

F.901 (03/93): "Usability evaluation of telecommunication services".

Gives fairly vague advice on the testing of usability and gives a brief example of a usability evaluation of an ISDN videotelephone.

F.902 (02/95): "Interactive services design guidelines".

Provides broad guidance in general terms for the design of the basic features of interactive services using DTMF input and voice response.

F.910 (02/95): "Procedures for designing, evaluating and selecting symbols, pictograms and icons".

Recommends a methodology for the selection and evaluation of symbols etc. and gives reasonably detailed descriptions of suitable experimental procedures for evaluation studies.

4.3.3 P series Recommendations

P.10 (12/98) + Amendment 1 (11/03): "Vocabulary of terms on telephone transmission quality and telephone sets".

Contains a listing of terms and definitions particular to Study Group 12 with annex containing a list of psychoacoustic parameters.

P.11 (03/93): "Effect of transmission impairments".

Provides a brief tutorial on the effect of various impairments on the customer opinion of transmission quality.

P.76(11/88): "Determination of Loudness Ratings; Fundamental principles".

Describes the principles of a measurement intended to represent the effects of human speech and hearing over a standard air path. Only of value for background information.

P.78 (02/96): "Subjective testing method for determination of loudness ratings in accordance with recommendation P.76".

Gives details of a subjective testing method that can be used to derive the loudness ratings described in P.76. Tests too complex for normal use. Only of value for background information.

P.79 (09/99) + Erratum (05/00) + Corr (10/00, 02/01, 01/05): "Measurements related to speech loudness".

Gives details of an algorithm for calculating loudness ratings which takes into account the various effects present in human speaking and hearing. These algorithms provide the basis for modern objective testing.

P.85 (06/94): "A method for the subjective performance assessment of the quality of speech voice output devices".

Provides a method for the evaluation of the speech output of stored voice systems. Experimental design is treated and recommendations are given for the analysis and reporting of the results.

P.311 (06/05): "Transmission characteristics of wideband (150-7000 Hz) digital handset telephones".

Gives a similar range of transmission performance requirements to Recommendation P.31 but for handset telephones capable of transmitting on bandwidths typically from 150 to 7 000 Hz. An annex describes objective test methods.

P.341 (06/05): "Transmission characteristics of wideband (150-7000 Hz) digital handsfree terminals".

Gives recommendations on the transmission performance of handsfree telephones and has an annex that deals with measurement methods.

P.370 (08/96): "Coupling hearing aids to telephone sets".

Gives figures for the sensitivity and frequency characteristics of coupling coils intended to couple to hearing aids equipped with induction pick-up coils. An annex describes measurement methods.

The provision of additional receive amplification and electrical coupling are also dealt with.

P.800 (08/96): "Methods for subjective determination of transmission quality".

Gives advice on conducting a number of different subjective tests on general aspects of speech quality. Tests too complex for normal use. Only of value for background information.

P.830 (02/96): "Subjective performance assessment of telephone-band and wideband digital codecs".

Defines a specific testing method for evaluating digital processes in a manner such that quantization distortion effects can be taken into account. Tests too complex for normal use. Only of value for background information.

P.840 (11/03): "Subjective listening test method for evaluating circuit multiplication equipment".

Describes a subjective listening test method for evaluating digital circuit multiplication and packetized voice systems which use digital speech interpolation techniques. Far too complex for normal use. Only of value for background information.

P.910 (09/99): "Subjective video quality assessment methods for multimedia applications".

Describes subjective assessment methods for evaluating the on-way overall video quality for multimedia applications such as videoconferencing, storage and retrieval applications, tele-medical applications, etc.

P.911 (12/98) +Corr (09/99): "Subjective audiovisual quality assessment methods for multimedia applications".

Describes subjective assessment methods for evaluating the on-way overall audiovisual quality for multimedia applications such as videoconferencing, storage and retrieval applications, tele-medical applications, etc.

P.930 (08/96): "Principles of a reference impairment system for video".

Describes an adjustable video reference system that can be used to generate the reference systems necessary to characterize the subjective picture quality of video produced by compressed digital video systems. Various picture degradations are described.

4.3.4 Z series Recommendations

Z.301 (11/88): "Introduction to the CCITT Man-Machine Language (MML)".

Describes the basis of the CCITT man-machine language. The language provides a consistent interface, is flexible adaptable and structured. It has an open ended structure so that the addition of new functions have no influence on existing ones so as to allow the introduction of new technology.

Z.323 (11/88): "Man-machine interaction".

Describes how interactions should take place between the user and the system from a logical viewpoint. It is aimed at presentations of the man machine interface using visual display terminals and provides guidelines for the display.

It also gives guidelines for user guidance, design of menus and forms and provides examples of dialogue procedure.

Z.351 (03/93): "Data oriented human-machine interface specification technique - Introduction".

An introduction and glossary to the data oriented Human Machine Interface (HMI) specification technique which is intended to facilitate the specification of human to machine interfaces.

Z.352 (03/93): "Data oriented human-machine interface specification technique - Scope, approach and reference model".

The scope of Z.352 is to specify the data seen at the human to machine interface of equipment and to specify the grammar for the data. The data oriented approach identifies the data passing across the interface rather than the functions to be performed.

The data oriented approach permits the partitioning of HMI specifications and software into layered specifications. The Recommendation is aimed at system management.

An annex provides guidelines for HMI developers.

History

Document history		
V.1.1.1	September 2001	Publication
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