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Human Factors (HF) - User Experience Guidelines for real-time communication services expressed in Quality of Service terms

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Human Factors (HF); User Experience Guidelines for real-time communication services expressed in Quality of Service terms

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Foreword

This ETSI Guide (EG) has been produced by ETSI Technical Committee Human Factors (HF).

The present document is primarily for the HF community.

The present document updates and replaces EG 202 534 [i.11]. New guidelines have been added and some guidelines from EG 202 534 [i.11] were not considered relevant for the present document (e.g. because of being out of date with technology developments). In addition, whereas EG 202 534 [i.11] focused on person-to-person (two-way) communication services, the present document extends to real-time person-to-machine (one-way) communication services.

Introduction

The real-time communication services that are currently available and in development place different demands on the communication channel and terminal equipment. Also they continue to evolve for both mobile and fixed usage. The services offer great potential but also complex choices regarding the most appropriate technologies and media that are suitable for different communication situations. Taking video communication as an example, there are advances at the two extremes of usage: for video calls with mobile telephones and conference-room 'Telepresence' systems and between these extremes video communication is increasingly available through personal computer-based 'Web-conferencing' services.

TR 102 353 [i.64] identified the need to develop guidelines on real-time communication services. The main aim is to provide guidelines for network operators, equipment manufacturers and service providers that address the user experience of different communication services in terms of either:

- the configuration and quality of service (QoS) of a particular communication service;
- the best choice between different communication services, where user experience data exists to enable recommendations on the basis of of set-up time, reliability, type of user tasks and user situations.

The general requirements for the guidelines contained in the present document are / main inclusion criteria for the guidelines are:

- **Empirical basis** - the guidelines are based on user test results where data has been collected on user performance and/or user opinion. The guidelines are therefore justified on the basis of either a laboratory experiment, field study, survey or an expert panel of people with empirical knowledge gained through experience with users or user tests.
- **Known QoS** - the test systems were of specified QoS parameter values, thereby enabling a statement of expected user experience for a given service with particular QoS.
- **Technology independent** - because the user experience results were related to test systems with specified QoS rather than a particular technology.

- **Vendor independent** - because the user experience results were related to test systems with specified QoS rather than a particular vendor.
- **User communication phase** - the guidelines concern user experience once communication is established, therefore the guidelines do not address interface design and call control;
- **Stakeholder interest** - priority has been given to developing guidelines in areas where stakeholder interest has been shown or is anticipated. Therefore Guidelines are provided for topics that have been identified as important for intended guideline users and for which user-based data existed or could be collected. For this reason, the development of guidelines from published literature is not exhaustive.

The guidelines are grouped into topics that include different user tasks (e.g. decision making, negotiation, persuasion), technical parameters (e.g. delay, packet loss, frame-rate) and special user groups (e.g. people with speech impairments, deaf and hearing impaired people, people with cognitive impairments). The user test results are derived primarily from industry and European Commission Framework Programme research reports, journal articles, conference proceedings and standards documents.

1 Scope

The present document provides guidelines for the user experience of real-time communication services. The services include person-to-person (two-way) communication and person-to-machine (one-way) communication.

The present document is revised from EG 202 534 [i.11] that was restricted to person-to-person communication services. The revision adds new guidelines that have been requested by stakeholders and omits some of the previous guidelines that are no longer considered relevant.

The guidelines are based on empirical data about user experience. Most of the data is obtained from scientific papers. A minority of guidelines are based on existing standardisation documents to ensure that relevant normative and informative standards material is clear amongst results available from journal articles, conference papers, research reports, etc.

The present document does not replace any existing standards.

Most of the guidelines derived from scientific papers are specific to a particular context, in that the original user tests were for specific tasks, users and technical parameters and therefore the results may not be generalisable. Although the guidelines provide information about the main user experience measure(s) and technical parameter(s) of a particular test result, it is beyond the scope of the present document to provide all of the variables concerned with each user test. However, the origin of each empirical source of a guideline is shown and listed in the References.

Those readers interested in the details of a particular guideline empirical source are also directed to a web-based system (http://portal.etsi.org/STFs/STF_HomePages/STF354/STF354.asp) that provides this information.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
  - for informative references.

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2.1 Normative references

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Not applicable.

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

audio: all signals that are audible to human beings, including speech, music and background noise

audio/video asynchrony: when audio and video information that leaves one communicating party is received by the other communicating party at different times (e.g. typically the audio information arrives before the video information in an asynchronous situation)

NOTE: It is calculated as audio delay subtracted from video delay (e.g. if audio delay is 50 ms and video delay is 200 ms, then asynchrony is 150 ms; if audio delay is 100 ms and video delay is 50 ms, then asynchrony is -50 ms).

audio delay: mean time required for an audio signal to reach the listener's ear

audio protocol: set of rules defining the way audio information is represented in a network

avatar communication: use of a service that transmits voice or text in real-time over a telecommunication network in combination with a graphical (human) representation of the speaker

CD quality: audio quality with a 44,1 kHz sampling rate without compression

communication service: user-initiated service that is provided via a telecommunication network for people to share information

NOTE: Examples are speech telephony, email, videoconferencing, avatar-telephony, audio conferencing.

communication situation: combination of task, motive, content and user (group) characteristics

communication task: what the end-users (want to) do with a communication service (e.g. social chatting, buying or selling shares, conducting a job interview, etc.)

communicative behaviour: end-user behaviour while using a communication service, including turn taking, interruptions, verbal and non-verbal back-channels and gaze

conversational text: See real-time text.

data communication: use of a service that transmits personal computer-based information (e.g. presentation slides)

data conferencing: See data communication.

duration: length of time of the communication task

dyadic communication: (distance) communication between two people

effectiveness: accuracy and completeness with which specified users can achieve specified goals in particular environments

NOTE: See ISO 9241 [i.31] definition.

efficiency: resources expended in relation to the accuracy and completeness of goals achieved

NOTE: See ISO 9241 [i.31] definition.

end-users: people who use a communication service

face-to-face (videoconferencing): the use of video communication to see the person who is talking

frame-rate: frequency by which a full frame is updated, in the case of video frame-rate sometimes called video temporal resolution or image frequency

group: (distance) communication between three or more people

NOTE: Either in a point-to-point or a multi-point configuration.

high quality videoconferencing: video communication using an analogue simulation of PAL quality, with technical parameter values: delay < 40 ms; frame rate 25 fps; resolution 4CIF (PAL); no packet loss

NOTE: A laboratory and field study set-up used for the user tests described in annex B

instruction task: communication task to between two or more people collaborate in order to transfer information. The communication may be more one-way and unequal with respect to expertise

media effects: effect a particular communication medium has on an end-users task outcome, communicative behaviour, attitudes and beliefs

monitor size: number in inches of the diagonal of the image screen on a screen

multimedia communication: use of a service that transmits voice, video and data signals in real-time over a telecommunication network

multimedia conferencing: service for transmitting voice, video and data signals over a telecommunication network

multi-point: distance communication between three or more locations

negotiation task: communication task between people in order to achieve an agreement

network performance: the ability of a network or network portion to provide the functions related to communications between users

NOTE 1: Network performance applies to the network provider's planning, development, operations and maintenance and is the detailed technical part of QoSO.

NOTE 2: Network performance parameters are meaningful to network providers and are quantifiable at the part of the network which they apply.

NOTE 3: From ITU-T Recommendation E.800 [i.34].

network quality of service: degree of conformance of the service delivered to a user by a provider with an agreement between them

NOTE: From ITU-T Recommendation E.860 [i.63].

packet loss: loss of one or more packet that can be described using a certain statistical model

packet size: magnitude of a unit of data transmitted over a packet switching network as part of a message transferred in number of Bytes

personal involvement: extent to which the communication parties are committed to the outcome of the task or perform the task more on behalf of another party than themselves

person perception: extent to which the perception of the other person's attributes (how likeable, intelligent, friendly, etc.) is positive or negative

persuasion task: communication task in which one person attempts to make one or more other do or believe something that previously they would probably not do or believe

NOTE: The communication involves giving another person a good reason to do something or making someone believe something.

point-to-point: communication between two locations

problem solving task: communication task where the primary goal is for two or more people to collaborate and share relatively equal but different expertise to find a solution to a problem

quality of experience (QoE): overall acceptability of an application or service, as perceived subjectively by the end-user

NOTE 1: Quality of experience includes the complete end-to-end system effects (client, terminal, network, services infrastructure, etc.).

NOTE 2: Overall acceptability may be influenced by user expectations and context.

NOTE 3: ITU-T Recommendation P.10 [i.40]/G.100 Ammendment 2 definition.

quality of service: totality of characteristics of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service

NOTE: ITU-T Recommendation E.800 [i.34] definition.

quality of service experienced/perceived by customer/user (QoSE): statement expressing the level of quality that customers/users believe they have experienced

NOTE 1: The level of QoS experienced and/or perceived by the customer/user may be expressed by an opinion rating.

NOTE 2: QoSE has two main man components: quantitative and qualitative. The quantitative component can be influenced by the complete end-to-end system effects (network infrastructure).

NOTE 3: The qualitative component can be influenced by user expectations, ambient conditions, psychological factors, application context, etc.

NOTE 4: QoSE may also be considered as QoSD (QoS delivered/achieved by service provider) received and interpreted by a user with the pertinent qualitative factors influencing his/her perception of the service.