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Technical Report

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Foreword

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

1 Scope

The present document provides documentation on the specification, implementation and maintenance of the WBGTS (Web-based Guideline and Tutorial System) for real-time communication services.

The WBGTS can be accessed from the ETSI site: http://portal.etsi.org/stfs/STF_HomePages/STF354/.

It contains guidelines from EG 202 670 [i.1]. It is based on a specification of user requirements described in TR 102 643 [i.3].

Like EG 202 670 [i.1], the Web-based system presents guidelines for real-time communication services that provide text communication, speech communication, video communication, multimedia communication, IP-TV, mobile-TV and real-time games. Unlike EG 202 534 [i.9], the Web-based system offers both greater detail of the empirical sources of each guideline and tutorials on key concepts to support understanding and applying the guidelines.

2 References

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

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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

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.

[i.1] ETSI EG 202 670: "Human Factors (HF); User Experience Guidelines for real-time communication services expressed in Quality of Service terms".

[i.2] ETSI TR 102 535: "Human Factors (HF); Guidelines for real-time person-to-person communication services; Future requirements".

[i.3] ETSI TR 102 643: "Human Factors (HF); Quality of Experience (QoE) requirements for real-time communication services".

[i.4] Hestnes, B., Brooks, P., Heiestad, S. (2009): "QoE (Quality of Experience) - measuring QoE for improving the usage of telecommunication services", Telenor R&I R 21/2009.

[i.5] ITU-T Recommendation E.800: "Definitions of terms related to quality of service".

[i.6] ITU-T Recommendation P.10/G.100: "Amendment 2: New definitions for inclusion in Recommendation ITU-T P.10/G.100".

[i.7] Nielsen, J.: "Usability Engineering". Boston, MA: Academic Press, 1993.

[i.8] W3C Web Accessibility Initiative, online.

NOTE: Available at http://www.w3.org/WAI/.

[i.9] ETSI EG 202 534: "Human Factors (HF); Guidelines for real-time person-to-person communication services".

[i.10] ISO 9001: "Quality management systems - Requirements".

3 Definitions and abbreviations

3.1 Definitions

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

Quality of Experience (QoE) (1): measure of user performance based on both objective and subjective psychological measures of using an ICT service or product

NOTE 1: It takes into account technical parameters (e.g. QoS) and usage context variables (e.g. communication task) and measures both the process and outcomes of communication (e.g. user effectiveness, efficiency, satisfaction and enjoyment).

NOTE 2: The appropriate psychological measures will be dependent on the communication context. Objective psychological measures do not rely on the opinion of the user (e.g. task completion time measured in seconds, task accuracy measured in number of errors). Subjective psychological measures are based on the opinion of the user (e.g. perceived quality of medium, satisfaction with a service).

EXAMPLE: A service provider may conclude that a service with a certain level of QoS used for a particular communication situation offers users excellent QoE, whist with a different level of QoS provides poor QoE.

Quality of Experience (QoE) (2): 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/G.100 Amendment 2 [i.6] definition.

Quality of Service (QoS): 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.5] definition.

real-time communication service: service with which users expect to share information instantly and continuously with one or more other user

NOTE 1: A real-time communication service generates and delivers either text, audio, graphics, video and data or some combination of these communication media.

NOTE 2: The information sharing process occurs either by: (1) a person interacting via technology directly to another person (person-to-person) or; (2) a person interacting with a machine (person-to-machine).

EXAMPLE: An example real-time person-to-person communication service is videoconferencing and an example real-time person-to-machine communication service is Live TV.

3.2 Abbreviations

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

BC	Book Chapter
CP	Conference Proceedings
EP	Expert Panel
FAQ	Frequently asked questions
ICT	Information and Communications Technology
IP-TV	Internet Protocol Television
ITU	International Telecommunication Union
JA	Journal Article
QoE	Quality of Experience
QoS	Quality of Service
RA	Research Article
REF	Reference
RR	Research Report
STF	Specialist Task Force
WBGTS	Web-Based Guidelines and Tutorial System
WP	Workshop Proceedings

4 Overview of the System

The Web-Based Guideline and Tutorial System (WBGTS) addresses the Quality of Experience (QoE) of real-time communication services by providing guidelines developed from user test results. Each guideline includes one or more important Quality of Service (QoS) parameter that was tested with users. Therefore the web-based system provides QoE Guidelines expressed in QoS terms. A description of the concepts of QoE and QoS and how guidelines are developed is provided in [i.4]. An overview of the real-time communication services covered is provided in TR 102 643 [i.3].

The guidelines are from EG 202 670 [i.1] and the WBGTS is based on a specification of user requirements described in TR 102 643 [i.3].

4.1 The main facilities of the web-based system

The web-based System offers three main facilities:

- Navigation
- Education
- Dissemination

4.1.1 Navigation facility

The aim of the navigational facility is to assist guideline users to discover whether or not guidelines exist that cover the issue in which they are interested.

The navigation facility offers three paths to reach a specific guideline, via:

- Communication services
- Guideline topics

- User keyword *search*

EXAMPLE: A network provider is considering launching a new ADSL product for video calls. A Strategic network planner in this organization would like to determine the number of subscriptions that are possible on the same sub-network. By using the "Find a guideline" link it is possible to find guidelines about "Services" and then "Video communication" as a Service sub-set. Also, navigating through the Topic of "Technical parameters" will similarly lead to information on Packet loss.

If the need concerns one specific service, such as Speech communication, all other information is excluded. This is also the case when selecting a particular topic, such as "Purpose of communication". If the topic of "Purpose of communication" is chosen and then Negotiation task, then all guidelines from user tests based on a negotiation context will be presented for all the services for which there are test results.

If neither of these paths provide relevant information for a particular guideline user it is possible that the general search engine could identify additional information. There could be a problem with terminology; for example, between use of the words "Delay" and "Latency". Whilst navigating via Services and Topics enables a relatively simple but effective traverse through a relatively broad information space, the Search function is available as a final option to the user when necessary.

The navigation engine also enables guideline users to enter deeper into available data than in a traditional ETSI Standard, ETSI Guide or an ETSI Technical Report. Due to the constraints of a mainly "linear" paper or electronic document, these documents usually present single-sentence summary justifications for guidelines whereas detailed information for each empirical source is made available with the web-based system. These detailed justifications provide more comprehensive information about the test result from which it is derived (e.g. types of users, experimental design, complete technical set-up, statistical results). Some key original literature sources for the guidelines are also available for download directly by the user of the web-based system.

Table 1 shows the services and topics in which the Guidelines are grouped.

Table 1: Guideline topics per service

Service	Topic	Service	Topic
Text communication	Delay	Face-to-face video (continued)	Deaf or hearing impairment
	Duration		Speech impairment
	Negotiation	Remote inspection video	Audio-video asynchrony
	Person perception		Resolution
	Deaf or hearing impairment		Frame-rate
Speech communication	Delay		Packet loss
	Stereo		Cost-benefit
	Spatial speaker recognition		Self view
	Packet loss		Instruction task
	Media Quality		Problem solving task
	Business communication		Showing surroundings
	User performance		Object recognition task
	Listening task		Blind or visual impairment
	Negotiation task	Multipoint video	Window configuration
	Problem solving task	Multimedia communication	Audio-video asynchrony
	Instruction task		Appearance
	Person perception		Eye contact
	Elderly		Media Quality
	Deaf or hearing impairment		Urgency
Face-to-face video	Packet loss		Deaf or hearing impairment
	Audio-video asynchrony		Cognitive impairment
	Delay		Medical interview task
	Packet loss	Real-Time Games	Delay
	Resolution		
	Media Quality		Background noise
	Screen size		Person perception
	Reliability		Social wellbeing
	Cost-benefit	IP-TV	Frame-rate
	Urgency		Packet loss
	Negotiation task		Colour depth
	Problem solving task	Mobile TV	Frame-rate
	Instruction task		Resolution
	Decision making task		Packet loss
	Medical interview task		Bit-rate
	Group video communication		Screen size
	Human support		Content type
	Appearance		Pattern of use
	Eye contact		Viewing distance
	Person perception		

4.1.2 Education facility

The aim of the education facility is to assist guideline users to understand terms, expressions and concepts used. The guidelines deliberately incorporate multidisciplinary data (e.g. linking QoE and QoS aspects). Guidelines users working in technical areas may understand Packet loss, whereas persons working in more marketing and financial areas may benefit from an explanation of this term. On the other hand, the more technically-oriented guideline users may benefit from explanations of the more user-centred concepts, such as a communication task based on Negotiation.

EXAMPLE: A Human Factors specialist working at a service provider organization becomes responsible for considering user implications of packet loss. However, he does not understand the implications of packet loss sufficiently to immediately apply his knowledge of psychology. He chooses the lessons about packet loss and becomes informed about the causes of errors on a digital line and the measurement of Bit Error Rate. He also learns that when packets are transported over a digital line and a Bit Error damages the packet this results in either the packet repairing itself (if it has enough information) or the packet being lost. The packet may contain audio or video information and therefore damage or loss may lead to the user perceiving some type of distortion.

The education facility offers lessons within specific areas.

4.1.3 Dissemination facility

Dissemination is not a mechanism in the web-based system. Rather, the web-based system is used to enhance the dissemination process.

EXAMPLE: An equipment manufacturer developing 3G mobile terminals recognizes that it is necessary to know if the video quality of a new device is good enough. A Development engineer in this organization wonders if there could a Standard or published Guide to which she could refer and be able to state that the new product is quality assured for users. She uses a general search function and discovers a guideline that states that CIF with 15 frames per second is good for remote inspection.

The web-based system provides a tool by which persons responsible for improving user experience may become further informed about empirical knowledge and key concepts. It should be:

- **Findable** by searching of intentional users. The URL should be associated with ETSI, the key authors and with the supporting Standardization document. The web-based system is located within the ETSI web-site. Effort is made to index the system to be dominant search result when using a search engine (e.g. Google™).
- **Accessible** when the guideline users require. An automatic feature of a website is that it is available anytime and anywhere with a terminal and internet connection.

4.2 Types of Guidelines

Figure 1 shows the distribution of guidelines across the real-time communication services. As is to be expected from the availability of user test results, there are more guidelines within some services than others. The three services with the most guidelines are face-to-face video communication, speech communication and mobile TV.

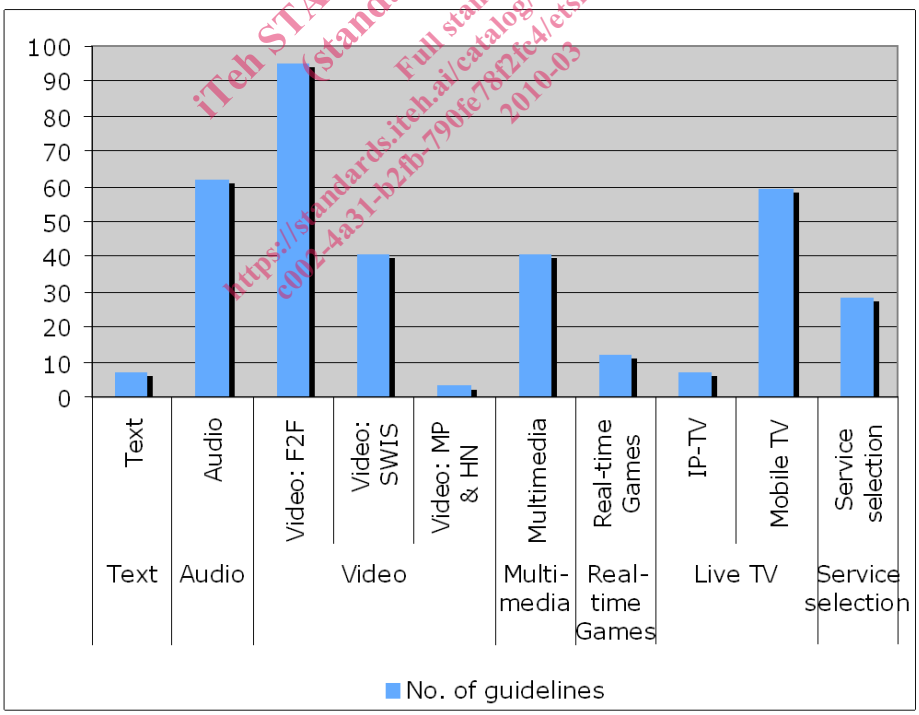

Figure 1: Distribution of guidelines across the real-time communication services

Figure 2 shows the distribution of guideline test results by the type of original source document. The two main sources are conference proceedings and research reports. This is consistent with the state-of-the-art nature of user testing of communication services, where research is disseminated by contract and company research reports and scientific conferences where the time-scales involved are less than, for example, journal articles and books. However, journal articles make up the third main source. Only 10 % of the guideline sources come from existing ETSI or ITU documents that have been found to be based on user tests.