

Project Number: IST-1999-11577
Project Title: Fitness-for-Purpose of Person-Person
Communication Technologies
Short Title: Eye-2-Eye
Deliverable Type: Public



Volume 1 of 2: The development of the Evaluation Methodology

CEC Deliverable Number: IST11577/SEF/DIS/DS/Pub/013/b1
Contractual Date of Delivery to the CEC: 28 February 2003
Actual Date of Delivery to the CEC: 19 March 2003
Title of Deliverable: Fitness for Purpose Evaluation Methodology
Workpackage contributing to the Deliverable: WP 1
Nature of the Deliverable: Report
Author(s):
SINTEF Jan Heim, Peter Brooks, Asbjørn Følstad, Trond Schliemann
University of Nottingham Claire O'Malley, Patrick Brundell
Telenor Bjørn Hestnes, Svein Heiestad, Trond Ulseth
IvD Han Frowein, Paul Devoldere
TANDBERG Carl Aaby

Abstract: This report describes the process and development of the Eye-2-Eye Evaluation Methodology (EM) (Volume 1) and provides the actual EM as a stand-alone resource (Volume 2). The process included extracting relevant key data and information from the Eye-2-Eye empirical studies, feedback from external workshops with increasingly mature versions of the EM, and performing internal and external case studies. The EM is a collection of: guidance on research design, checklists, data collection tools, forms and templates, and reference data for designing and performing empirical studies on real-time person-person communication.

Keyword list:

Telephony, audio conferencing, avatar telephony, videoconferencing, multimedia conferencing, face-to-face, quality of service, fitness-for-purpose, Human Factors, baseline experiment, laboratory experiment, field study, focus group study, evaluation methodology, toolkit

Table of Content

Executive Summary	iii
1 Background and Scope of this Report	1
1.1 Terminology	1
1.2 Fitness-for-Purpose of real-time person-person communication	2
1.3 Main Eye-2-Eye goals, approach and exploitable results	3
1.3.1 Fitness-for-Purpose Guidelines	4
1.3.2 Cost-Benefit Analysis Tool	5
1.3.3 Fitness-for-Purpose Evaluation Methodology	5
2 The process of developing the Evaluation Methodology (EM).....	6
2.1 The Mission.....	6
2.2 Role of the EM in the project.....	7
2.3 Input and experience from the Baseline Studies	7
2.4 Input and experience from Field study and Laboratory studies	8
2.5 Audience feedback	9
2.5.1 External workshops	10
2.5.2 External case studies	10
2.5.3 Internal Case study	11
2.6 Conclusions.....	12
3 The result: A Fitness-for-Purpose Evaluation Methodology.....	13
4 References	14
5 Glossary of main Eye-2-Eye terminology and concepts	15
6 List of Main Project Abbreviations.....	18

Executive Summary

This report is a deliverable of the Eye-2-Eye project that runs from April 2000 to March 2003. The main objective of Eye-2-Eye is to produce, disseminate, and exploit fitness-for-purpose guidelines, a cost-benefit analysis tool, and a fitness-for-purpose evaluation Methodology for real-time person-person communication services. The primary target audience organisations for these three exploitable results are: network providers, service providers, content providers, equipment manufacturers, and standards bodies.

This report describes in two separate volumes:

1. The process of development of the Evaluation Methodology. The process is briefly described and refers the different steps taken in the project. The process includes extracting relevant key data and information from the project empirical studies, feedback from external workshops where different versions of the product have been presented, and performing internal and external case studies.
2. The Evaluation Methodology (EM) is a collection of: guidance on research design, checklists, data collection tools, forms and templates, and reference data for designing and performing empirical studies on real-time person-person communication. The Actual EM is intended as a stand-alone document, complementary to existing materials, for use by persons external to the project team who may wish to perform fitness-for-purpose testing of real-time communication services.

1. Background and Scope of this Report

This report describes the development and content of the Eye-2-Eye Fitness-for-Purpose Evaluation Methodology.

To set the context of the need for and development of this Evaluation Methodology, the current section introduces:

1. key terminology
2. the focus on the fitness-for-purpose of communication services for real-time distance communication
3. the main goals of the project.

1.1 Terminology

A glossary of Eye-2-Eye terms and concepts is included as Section 5. In particular, this report uses the terms “communication media” and “communication services”. Eye-2-Eye uses the following definitions of this terminology:

Communication media: Types of information with which humans communicate. Examples are text, audio and moving image (graphics and video). This is consistent with the “Nature of information” component of the ETSI definition of a *representation medium*, which has various possible coded forms (ETSI ETR 160, 1995).

Communication services: Services that are provided via a telecommunication network. Examples are ordinary telephony, email, desktop videoconferencing, studio videoconferencing, avatar-phone, audio-conferencing.

For current purposes, these terms are interchangeable because each communication service studied comprises uniquely of one or more different information types and therefore provides the end users with different communication media with which to interact (as illustrated in Figure 1). Therefore, each communication service is qualitatively different from the other on the basis of the communication media employed, as summarised in Table 1.

Communication media	Communication service
Text	Real-time text
Audio	Audio-telephony and Audio-conferencing
Audio + Graphics (Virtual Reality)	Avatar-telephony
Audio + Video	Videoconferencing
Audio + Video + Data	Multimedia conferencing

Table 1: The Relationship between the Communication Service and the Communication media it employs.

The term ‘medium/media’ is used at times as an abbreviation of ‘Communication medium/media’. It also includes physical face-to-face communication in addition to digital person-person communication through Communication services.

The term ‘conference’ is used as follows:

- From a *technical orientation* it is a point-to-point connection (i.e., no multipoint connection)
- From a *service orientation* it is person (or group)-to-person (or group) communication.

1.2 Fitness-for-Purpose of real-time person-person communication

Current and emerging real-time person-person communication services provide complex choices regarding the most appropriate technologies, services and media that are suitable for different communication situations. Communication service groupings are real-time text, audio-telephony, avatar-telephony, videoconferencing and multimedia conferencing. These service groupings offer users the opportunity to interact using the communication media of text, audio, video and data. Furthermore, there are numerous existing and upcoming communication services which employ qualitatively different communication media of different Quality of Service, such as Videoconferencing via a desk-top terminal and a mobile terminal (Figure 1) and with different demands placed on the communication channel (Figure 2).

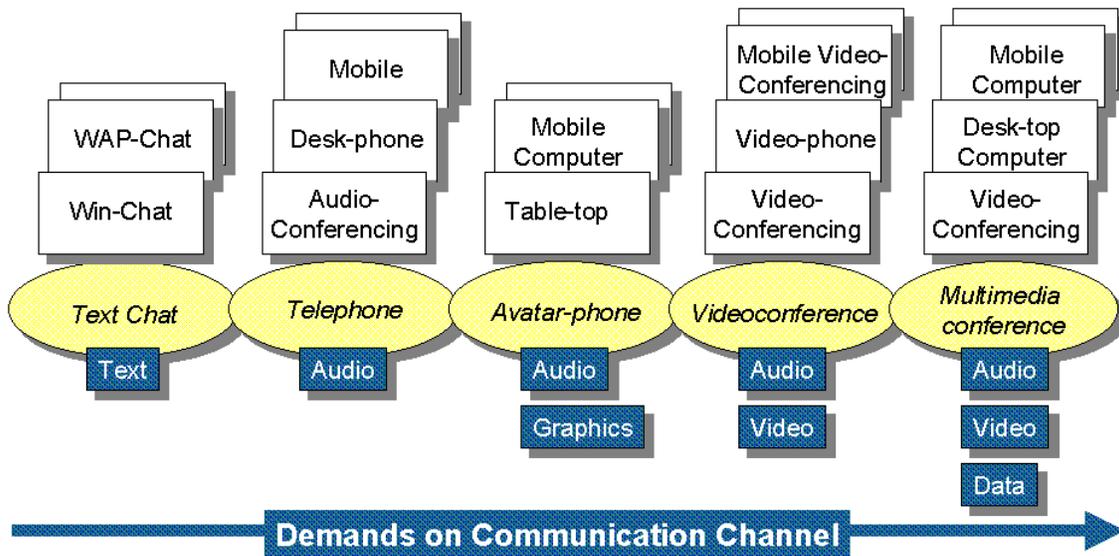


Figure 1. Real-time person-person communication media, services and service groupings

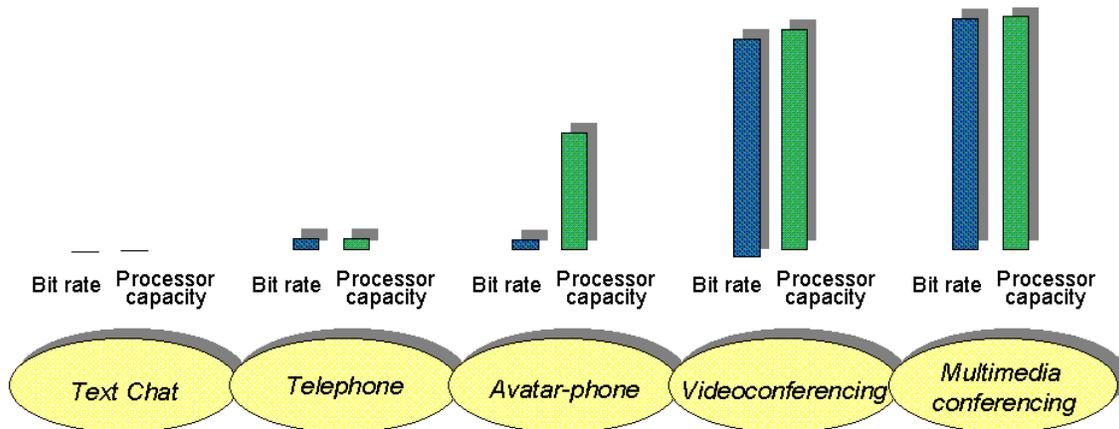


Figure 2. Generalised demands on communication channels placed by different communication service groups.

1.3 Main Eye-2-Eye goals, approach and exploitable results

The communications industry needs to know which technologies have different utility, the set-up requirements for different users & tasks and how rational business & service decisions can be made. Fitness-for-Purpose testing is required to assess requirements for the Quality of Service of terminals and networks and the effects on human communication efficiency and user satisfaction. This is the need to which the Eye-2-Eye project responds.

The Eye-2-Eye project provides fitness-for-purpose information based on empirical testing and translates its results into formats accessible to the communication industry. To achieve this the primary objective of the project is to produce, disseminate and exploit:

- Fitness-for-Purpose Guidelines
- a Cost-Benefit Analysis Tool
- a Fitness-for-Purpose Evaluation Methodology.

The main target audiences for these three exploitable results are specific individuals within network provider organisations, service provider organisations, content provider organisations, equipment manufacturers and standards bodies. For the Guidelines and the Cost-Benefit Analysis Tool they are people with direct knowledge-based decision-making responsibility, such as a director of Research and Development. The Evaluation Methodology is intended for persons who require additional test results and have the responsibility or opportunity to collect data, such as system and service developers. The Guidelines are also intended for developers as well as more senior management.

These three results are therefore complementary for the needs of industry. Their different roles in within a problem-solving process are illustrated in Figure 3.

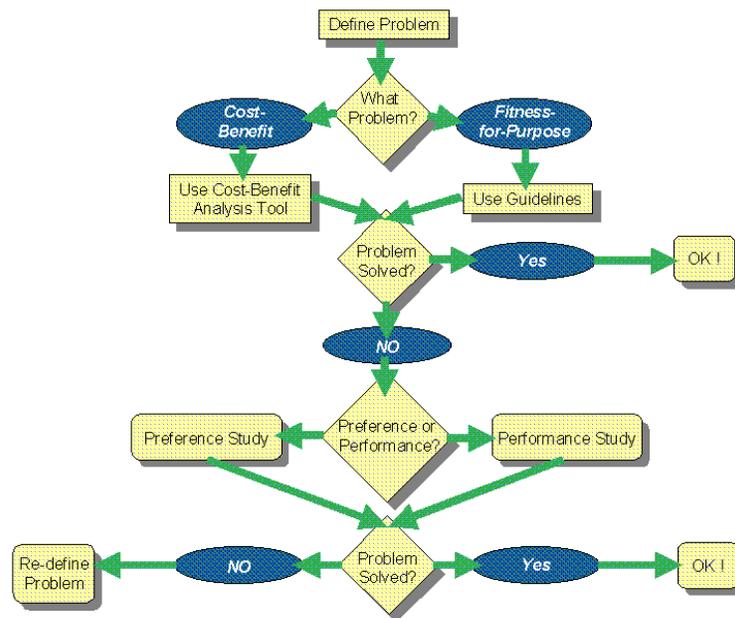


Figure 3. Simplified decision flow for using the Guidelines, Cost-Benefit Analysis Tool and the Evaluation Methodology.

1.3.1 Fitness-for-Purpose Guidelines

The purpose of the Guidelines is to communicate fitness-for-purpose knowledge to target audiences in an effective way for exploitation. They are primarily intended to support system and service design.

The Guidelines are represented at three fundamental levels:

- **Intermediate Guideline Format:** A representation of knowledge as a rule-based, semi-formal *If-Then* format. The aim of the Guideline Intermediate Format is to be explicit and comprehensive of potential guideline information. It consists of Attributes, Sub-attributes (where relevant) and Values, with core attributes:
 IF <communication situation>
 AND <service prescription>
 WITH <technical parameters>
 THEN <user behaviour>.
- **Intermediate Guideline Set:** The individual guidelines expressed by the Intermediate Guideline Format together form an Intermediate Guideline Set. This set is intended as *internal* data for the Eye-2-Eye consortium rather than for an external target audience.
- **Guideline Presentation Format(s):** Guidelines for presentation to the target audiences are extracted from the Intermediate Guideline Set in order to make them more easily accessible to persons *external* to the project team. Specific Presentation

Formats of key guidelines are developed for identified target audiences (e.g., codec manufacturer).

1.3.2 Cost-Benefit Analysis Tool

The purpose of the Cost-Benefit Analysis Tool is to analyse the utility of different communication services from end-user perspectives. End-users include both individuals and organisations.

The tool is a computer-based implementation designed to model non-financial data in addition to more traditional financial cost-benefit data. In particular, the tool models users' subjective ratings of service and media utility.

The project adapts the Multi-Attribute Utility Technique (MAUT) developed within the field of decision analysis and applies it to determine comparable metrics for different communication services and end-user tasks.

1.3.3 Fitness-for-Purpose Evaluation Methodology

The purpose of the Evaluation Methodology (EM) is the collection of fitness-for-purpose knowledge. It enables the collection of empirical data for technical parameters and communication situations for which results are not yet available within the Fitness-for-Purpose Guidelines and the Cost-Benefit Analysis Tool.

<p>This document describes the process of developing and producing the EM (Volume 1) and provides the actual EM as a stand-alone resource (Volume 2).</p>

2. The process of developing the Evaluation Methodology (EM)

2.1 The Mission

The project objective for the EM is:

“the evaluation procedure and tools developed for the project's baseline -, laboratory - and field studies are refined for exploitation beyond the project and for dissemination to interest groups such as Standards bodies and other usability practitioners.”

(from technical annex, page 41)

The project also set itself the objective that, through conducting case studies, the main strengths and weaknesses of the Evaluation Methodology for different users (e.g., non-evaluation professionals) should be identified.

Eye-2-Eye would therefore examine the appropriateness and feasibility of producing an easy-to-use toolkit, designed for a broad range of target audience, including system developers, network operators and other technical oriented users, both with and without formal background in psychology, ergonomics or human factors.

Experience and results from the early stages of the project would feed into the EM (see Figure 4), and the core of the EM would be the methods and test materials used for data collection in the Eye-2-Eye baseline studies, laboratory studies and field study.

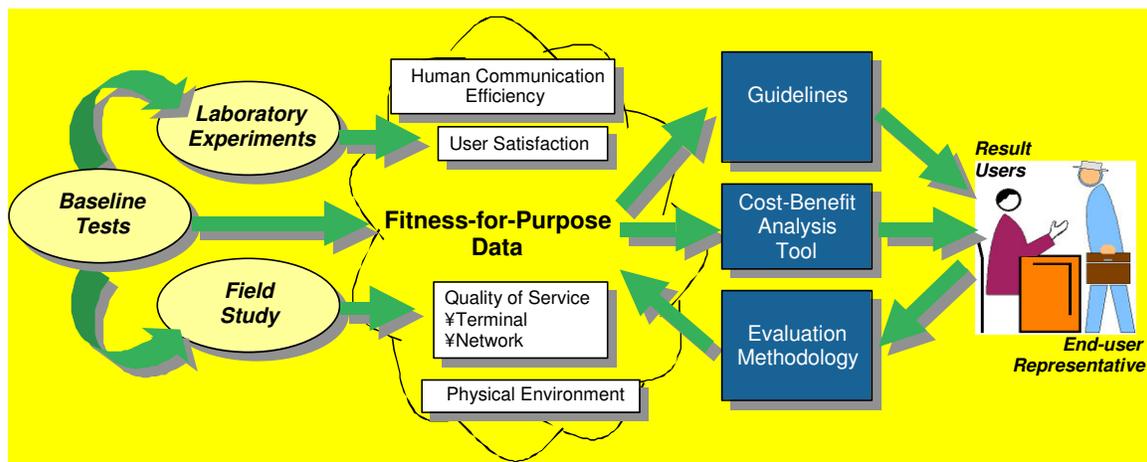


Figure 4. Translation of empirical results from the three phases of Eye-2-Eye data collection to the Eye-2-Eye Guidelines and Tools.

2.2 Role of the EM in the project

The EM contains recommended procedures, test materials and equipment for collecting data to answer fitness-for-purpose questions, as well as guidance on research design and planning the process of collecting empirical data in fitness-for-purpose questions. The EM also provides a pool of reference data from selected Eye-2-Eye studies, for comparison with future data to be collected.

As the handbook provided in Volume 2 of the current report the EM provides instructions for use, examples and paper versions of generic test materials. As a future Web-site and CD-ROM, it provides electronic versions of forms and test materials, as well as online instructions on how to set up and use the toolkit.

The EM has been developed and refined iteratively, with three main phases - one during each year of the project life cycle, to maximise usability and utility. The first plans and implementation of a year 1 version were based on exploitation of the videotelephony results from AC314 Vis-à-Vis (Brooks et al., 1999), as well as theoretical studies done during the planning of the Baseline studies. The year 2 version was based on the results from the Baseline studies (Schliemann et al., 2001), as well as draft test materials for the data collection in laboratory (O'Malley et al., 2002) and field studies (Følstad et al., 2002). The year 3 version includes the results of the Laboratory and Field Studies.

Three external workshops were held, one for each cycle (approximately one year) of the project. Status of the development of the project's exploitable results was presented. Feedback from the external workshops guided further work towards finalisation of the EM.

An updated year 2 version was tested by a series of case studies (one internal and two external to the Eye-2-Eye consortium) in order to evaluate the anticipated usability and suitability of the tool, according to project ambitions. The feedback from these case study processes has been fed into the development and refinement process.

Requirements for the content and design of the EM as a working tool have also guided some high-level choices on designing the Eye-2-Eye laboratory experiments and the field study.

2.3 Input and experience from the Baseline Studies

One intention with the Eye-2-Eye Baseline studies was to identify tasks and measures that showed to be sensitive to the use of different communication services. Four different studies were conducted, and the main measures taken were:

- Media preference for a set of 17 hypothetical scenarios (study 1)
- Task outcome, opinion change and person perception for a persuasion task (study 2)
- Task outcome and communicative behaviour for a negotiation task (study 3)
- Task outcome and person perception in a joint problem solving task (Study 4).

A full description of the Baseline studies and results is provided by Schliemann et. al., (2001). General conclusions for the current report are:

- Medium preference seems to follow a general media richness trend
- Medium effects on task outcome was not as prominent as firstly expected
- Task outcome measures indicate that performance is sometimes better when communicating over audio only than over video.
- Person perception seems to be affected by the medium used, and the task at hand.

Another interesting aspect of the results was the discrepancy between medium preference measures (favouring Video and Face-to-Face over Audio) and actual task performance for the corresponding tasks (favouring the Audio-condition). This prompted the questions:

- Is it so, that users believe one medium is better than the other, but actually perform differently when given both options?
- And what if the user was given the choice between all the media?

This inspired the project to focus on the concept of medium choice in a real-context situation for the Eye-2-Eye field study.

The tools used for data collection and two of the three tasks used in the task outcome studies have been included in the EM. The persuasion task (study 2) was considered too complex to replicate for anyone without long experience in designing and working with human factor experiments. Hence, it was discarded as not relevant for the EM document and inspired the investigation and development of other, more simple tasks to be included in the EM. As part of the Laboratory studies, SINTEF piloted a wide range of communication tasks, in order to find media sensitive task effects. A part of the same pilot study was the investigation and development of media sensitive measures of more subjective nature.

Conclusively, the ambitions and objectives for developing the EM partly guided our choice of research questions and approach for the laboratory studies and field study.

2.4 Input and experience from Field study and Laboratory studies

The Eye-2-Eye laboratory studies included the piloting and development of suitable tasks for inclusion in the EM. The criteria for suitability were:

- 1) the task should be easy to replicate
- 2) the task should be of a generally “global” cultural nature (i.e. understandable and applicable to a wide range of users)
- 3) the task should show medium sensitivity to the measures taken.

A general finding from these laboratory studies was that task performance is generally not very medium sensitive, while more subjective measures are. Users seem to perform more according to their former experience with, and attitude towards, the different media, rather than to the medium as such. Hence, tasks to be included in the EM were not chosen on the basis of task performance measures only.

A range of subjective measurement tools was therefore developed for the laboratory studies, in addition the person perception measures used in the Baseline studies. These subjective measures showed to be sensitive to different services used, and to technical variations within one specific service. The measures taken in the laboratory studies included:

- Person perception
- Social presence
- Task perception
- Symbolic value
- Perceived effectiveness
- Cost-Benefit assessment.

Data collection and results for cost-benefit assessment are described in Eye-2-Eye deliverable D5.2 (Frowein et al., 2003) as cost-benefit analysis is a separate project objective (see Section 1.3.2). Measures on task perception, symbolic value and perceived effectiveness did not show significant media sensitivity. However, measures on Person Perception and Social presence showed to be sensitive to the variations included in the laboratory experiment series, and hence are included in the EM document.

Experience from conducting the field study was that it is difficult to describe a general approach to the collection of data in a field context. Most of the subjective measures collected in the laboratory studies were also collected in the field context, but administered through qualitative interviews rather than (quantitative) questionnaires. The general understanding of the “non-general” nature of collecting field data led to the decision that field studies should have a less prominent role in the final EM document.

Hence, the approach to collecting field related data is described on a more general level, while collecting empirical data in a laboratory context is described on a more detailed level, including the actual data collection instruments and reference data.

Earlier project deliverables describing the laboratory experiments (O’Malley et. al., 2003) and field study (Følstad et. al., 2002) provide detailed descriptions of the methodological approaches used and results obtained.

2.5 Audience feedback

Three main sources of feedback were:

- External workshops
- Internal case study
- External case studies.

The Evaluation Methodology document has developed from an “idea” to an actual exploitable result during the lifespan of the Eye-2-Eye project. Three external workshops have been held, where the current status of the EM was presented to an external

audience¹. The first comprehensive version of the EM was produced by the summer of 2002. It included draft versions of all the subjective measure tools used in the Laboratory and Field studies. It was this version that was assessed by different users in a process of two external and one internal case studies.

2.5.1 External workshops

Three external workshops were held at three different stages of the project:

- June 2001. Venue: Nottingham, UK. Audience were project members of the VIRTUE project²
- June 2002. Venue: Ipswich, UK. Audience were project members of the VIRTUE project and British Telecom researchers on audio and video quality
- January 2003. Venue: ICOB-03 conference in Berlin. Audience was conference participants and EC IST concertation members, with the theme of immersive communication and broadcast systems.

The feedback from the two first workshops was mainly of a general nature, as it is difficult to get concrete feedback on a result when it is on a concept stage, or under constant development. The feedback from all three workshops has been essential to the choice of focus and content of the EM. Main feedback issues included:

- There is a general need and interest for the EM, and it could be used by a range of user groups, including network providers, system integrators and other “technical people”, in addition to human factor professionals
- Due to expected development in the field of real-time communication, the EM should also be available electronically and on the web, to allow future updating of the content
- The tools of the EM would be applicable to assessing the suitability of different kinds of communication technologies. Liaison with the VIRTUE project concluded that the EM would be used for assessing the VIRTUE demonstrator terminal in a real user context
- The EM should provide sufficient number of examples to illustrate the application of the different tools and instruments described.

2.5.2 External case study

A draft version of the EM was tested by external case studies during the period from September to December 2002. Liaison with the Virtue project led to the planning and performing of two different processes:

- 1) The technical manager of the VIRTUE project performed a ‘walk-through’ of the whole process of planning and conducting empirical studies, from a network provider/non human-factor perspective. The intention was to evaluate the legibility of the content and main stages of the processes described.

¹ All external workshops included presentations of all the three project exploitable products: Guidelines, Cost-Benefit Analysis tool and Evaluation Methodology

² Project IST-1999-10044 VIRTUE - Virtual Team User Environment

- 2) The Human Factor group of the VIRTUE project applied the actual tools in their own evaluation of the VIRTUE terminal, and gave feedback on the applicability of tool from a Human Factors perspective.

Feedback from the two processes was quite different. The ‘technical walk-through’ approach revealed a need for more concrete examples and checklists to be included, as well as more thorough descriptions of some of the processes. The Human Factors approach suggested the EM to be very useful and applicable to their purpose, though the tools had to be adjusted to fit the three-party nature of their communication terminal.

2.5.3 Internal Case study

The main process described in the EM is a 4-stage model of planning and performing empirical studies in the laboratory. The four stages involve

- 1) Planning and designing the general approach
- 2) Planning and designing a pilot study
- 3) Performing the actual study
- 4) Analysing, reporting and presenting results.

The internal case study was performed by Telenor R&D over a two month period. They focused on the first two sub-processes. Regular status meetings between SINTEF and Telenor were held in order to discuss challenges and difficulties with the process.

The general feedback from this process was positive, but also revealed the need for more examples and detailed descriptions of the processes necessary to perform the different phases of work.

The general feedback from the internal case study evaluation led to a reconsideration of the required background knowledge necessary to use the tool. It became obvious that personnel with no prior experience in human factor work will have difficulties performing the different steps of an empirical user study on their own. As expanding the scope of the EM was not a realistic option, the conclusion was not to increase ambitions with regard to any applicability for a more general audience.

2.6 Conclusions

Experience and knowledge gained over a three-year period has confirmed certain expectancies regarding the EM:

- The primary target audience group requires some Human Factors knowledge. The main target audience is:
 - Human factor persons without knowledge of communication studies
 - “Technical oriented” communication people with some HF knowledge
- The EM is not a self-contained handbook for all Human Factors work in communication studies:
 - the EM is an “add-on” to existing literature in the field (and sources are recommended in the EM)
 - the genuine novelty of the EM is its focus on real-time person-person communication.

2.7 Further work beyond the project

The EM deliverable is developed as fully as the current project scope allows. It is however relevant and interesting to plan some future refinement of the EM. Further development beyond the project should focus on:

- continuous updating to reflect recent developments in the area of communication studies
- inclusion of future data collected, into the pool of reference data
- further development of checklists and guidance on field studies
- depending on user feedback - consider describing a flowchart on the use of the handbook sections, as well as the process of empirical data collection
- evaluation of the validity and reliability of the EM
- development of the EM as a CD-ROM
- development of the EM as a Web-site.

3. The result: A Fitness-for-Purpose Evaluation Methodology

The results of the process described in Section 2 - the Fitness-for-Purpose Evaluation Methodology itself - is presented as a separate volume. This is because the actual methodology is intended for use independently of the mainly background information described in the current volume.

The Fitness for Purpose Evaluation Methodology will be available upon contacting the project manager. Description of the EM and contact information can be found on the project web-site: www.eye-to-eye.org

4. References

- Brooks, P., Brundell, P., Hamnes, K., Heiestad, S., Heim, J., Hestnes, B., Heydari, B., O'Malley, C., Schliemann, T., Skjetne, JH., Ulseth, T. (1999). *Final Report. ACTS Project AC314 Vis-à-Vis: Fitness-for-Purpose of Videotelephony in Face-to-Face Situations*, CEC Deliverable A314/NSS/PB/DS/P/005/b1, June 1999.
- ETSI ETR 160 ed.1 (1995-01) Human Factors (HF); Human Factors Aspects of Multimedia Telecommunications.
- Følstad, A., Brooks, P., Heim, J., Schliemann, T., Wiig, S., Hestnes, B., Heiestad, S., Ulseth, T., Frowein, H., Aaby, C., O'Malley, C., Brundell, P. & Lonsdale, P. (2002) *Results of Field Experiments With Communication Media*, IST Project IST-1999-11577 Eye-2-Eye: Fitness-for-Purpose of Person-Person Communication Technologies, CEC Deliverable IST11577/SEF/DIS/DS/Pub/004/b1, October 2002
- O'Malley, C. , Brundell, P., McFadzean, J., Lonsdale, P., Schliemann, T., Brooks, P., Følstad, A., Heim, J. Hestnes, B., Heiestad, S., Ulseth, T., Frowein, H., Devoldere, P., Aaby, C. (2002) *Results of Laboratory Experiments of Communication Media*. IST Project 1999-11577. Eye-2-Eye: Fitness-for-purpose of Person-Person Communication Technologies, CEC Deliverable IST11577/UON/SOP/DS/Pub/003/b1, December 2002
- Schliemann, T., Astring, T., Brooks, P., Følstad, A., Heim, J., Skjetne, J., Hestnes, B., Heiestad, S., Ulseth, T., Frowein, H., Devoldere, P., Aaby, C., O'Malley, C., Brundell, P. & Lonsdale, P. (2001) *Results of Baseline Communication Experiments*, IST Project IST-1999-11577 Eye-2-Eye: Fitness-for-Purpose of Person-Person Communication Technologies, CEC Deliverable IST11577/SEF/DIS/DS/Pub/002/b1, July 2001.

5. Glossary of main Eye-2-Eye terminology and concepts³

Acceptable price: The price that end-users are willing to pay for a particular communication service or for improved quality of service. The price of telephony (equipment as well as service) should be used as a benchmark when asking (potential) end-users about acceptable price; and the latter should be expressed as a percentage of the price of telephony, e.g. 50% (half the price of telephony), 300% (three times the price of telephony), etc.

Asynchrony: When audio and video information that leaves one communicating party at the same time 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)

Audio telephony: An 'ordinary' telephone service as distinct from Audio conferencing

Audio conferencing: A telephone service that does not rely on amplification of the voice signal in very close proximity to the recipient's ear

Avatar telephony: A service for transmitting voice signals in real-time over a telecommunication network in combination with a graphical (human) representation of the speaker

Benefits: Benefits to the end-users from using a particular communication service (e.g. savings of travel time and costs, achievement of task goals, ease of use, easy accessibility to the called party, increased communication quality and effectiveness, etc.).

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

Communication media: Types of information with which humans communicate. Examples are text, audio, moving image (video, moving graphics) and still image.

Communication service: A service that is provided via a telecommunication network. Examples are ordinary telephony, email, videoconferencing, avatar telephony, audio conferencing.

Communication situation: The combination of task, motive, content and user (group) characteristics.

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

Conference: used as follows within the scope of Eye-2-Eye: (a) From a technical orientation a point-to-point connection (i.e., there were no studies of multi-point connection); From a service orientation it is always person (or group)-to-person (or group) communication.

Costs: Costs that the end-user has to pay for using a particular communication service. These include not only financial costs but also subjective costs; e.g. the user may see loss of privacy as one of the costs to pay for having a videophone.

Duplex: A mode of operation by which information can be transmitted in both directions simultaneously between two points.

Dyadic: (Distance) communication between two people

Effectiveness (ISO 9241 definition): The accuracy and completeness with which specified users can achieve specified goals in particular environments.

³ This is a general list for the Eye-2-Eye project as a whole and is not restricted specifically to this document

Efficiency (ISO 9241 definition): The resources expended in relation to the accuracy and completeness of goals achieved.

End-users: The people who use a communication service for person-to-person communication.

End-users: The people who use the communication service(s).

Fitness-for-Purpose: The correct balance between technological performance and human performance, such that the interaction is both sufficient and beneficial for person-to-person communication and consistent with human expectations from face-to-face communication.

Frame rate: The frequency by which a full video frame is updated, sometimes called video temporal resolution or image frequency.

Group: (Distance) communication between three or more people.

Half-duplex: A mode of operation where, at a given instance, only one of the two correspondent information streams is transmitted.

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

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

Media preferences: The subjective assessment by users or user groups of when a given communication medium is preferred over another.

Multimedia conferencing: A service for transmitting voice, video and data signals in real-time over a telecommunication network

Multi-point: Distance communication between three or more locations

Packet loss: A loss of one packet that can be described using a certain statistical model

Pilot study: A small "pre-stage study" done with a few participants when the draft test materials are produced. This is done to evaluate the materials, logistics and potential outcome of a draft test plan. Results of a pilot study will normally lead to refinement of the test plan, and in some occasions to discarding the whole test concept.

Point-to-Point: Distance communication between two locations

Quality of service: Those aspects of the service which are assumed to affect the degree of satisfaction of the user of the service (e.g. the number of frames per second in videoconferencing, the auditory bandwidth in audio conferencing).

Resolution: A term denoting the degree of detail which can be created by a particular visual display system

Satisfaction (ISO 9241 definition): The comfort and acceptability of the work system to its users and other people affected by its use.

Target audience: The people or organisations who are going to use the fitness-for-purpose guidelines, the cost-benefit analysis tool and/or the fitness-for-purpose evaluation toolkit.

Task elements: Features of *tasks* that can be expected to vary (e.g., extrinsic-intrinsic origin, symmetrical-asymmetrical balance, originator-recipient role, ego involvement level, information dependency, sociability level)

Task goal: The aim or object towards which the communication is directed. It is what end-users want to do with the *communication technology* (e.g. social chatting, buying or selling shares, conducting a job interview, etc.).

Task outcome: The extent to which task performance dependent on the medium

Task: What users of *communicative technology* actually do in order to accomplish some *task goal*. In experiments tasks may be described to the participants or they are embedded in scenarios as a part of a *situation*.

Usability (ISO 9241 definition): The *effectiveness, efficiency, and satisfaction* with which specified users achieve specified goals in particular environments.

User groups: End-users who with respect to their usage of communication service may be grouped together (e.g. business executives, university students, grandparents, deaf people, etc.).

Videoconferencing: A service for transmitting voice and video signals in real-time over a telecommunication network

Videotelephony: See Videoconferencing.

Willingness to pay: An end-users willingness to pay in financial terms for a given communication service in a given situation.

6. List of Main Project Abbreviations⁴

ACTS	Advanced Communications Technologies & Services
AI	Artificial Intelligence
AMR	Adaptive Multi-Rate
ANOVA	Analysis of Variance
AO	Audio only
API	Application Programming Interface
BER	Bit Error Rate
CIF	Common Intermediate Format – a video format defined by ITU-T
CBA	Cost-Benefit Analysis
CBAT	Cost-Benefit Analysis Tool
CODEC	Coder/Decoder
COST	Co-operation for R&D in Science and Technology
CSCW	Computer supported collaborative work(ing)
CVE	Collaborative Virtual Environment
EC	European Commission
EDF	European Disability Forum
ERCIM	European Research Consortium for Informatics and Mathematics
ETSI ETR	ETSI Technical Report
ETSI	European Telecommunications Standards Institute
EUD	European Union of the Deaf
FtF	Face-to-Face (real-time human communication in the physical rather than digital world)
fps	(video)frames per second
FfP	Fitness-for-Purpose
GSS	Group Support System
GUI	Graphical User Interface
H261	Standard for audio-visual coding
HDTV	High definition television
HCI	Human Computer Interaction
I2I	Eye-2-Eye (abbreviation)
ICIF	Interlaced CIF (having the same number of pixels per line as CIF but twice the number of lines (i.e., 352 pixels per line and 576 lines))
ICT	Information (and) Communication Technology
IETF	Internet Engineering Task Force
IMPP	Instant Messaging/Presence Protocol
IMTC	International Multimedia Telecommunication Consortium
IP	Internet Protocol
IPR	Industrial Property Rights, Intellectual Property Rights
IRC	Internet Relay Chat
ISDN	Integrated Services Digital Network
ISO	International Standards Organisation
IST	Information Society Technologies

⁴ This is a general list for the Eye-2-Eye project as a whole and is not restricted specifically to this document.

ITU	International Telecommunication Union
I2i	an abbreviation of the project's short name.
Kbps	Kilo Bits per Second
kHz	Kilo Hertz
LAN	Local Area Network
LEO	Low Earth Orbits – a new generation of satellite systems for mobile communication (both low and high bandwidth)
LSD	Least Significant Difference
MAN	Metropolitan Area Network
MAUT	Multi-Attribute Analysis Technique
Mbps	Mega Bits per Second
MCP	Medium Choice Pattern
MOS	Mean Opinion Score
MPEG	Motion Picture Experts Group
MPLS	MultiProtocol Label Switching
MRT	Media Richness Theory
ms	Milli-seconds
MSN	MicroSoft Network
MSP	Media Selection Panel
MUD	Multi-User Dungeon
NTSC	National Television Standard Committee
PAL	Phase Alternating Line – a TV standard used in most European countries (except France)
PC	Personal computer
PDA	Personal Digital Assistant
PSTN	Public Switched Telephone Network
QCIF	Quarter CIF
QoS	Quality of Service
R&D	Research and Development
RACE	R & D in Advanced Communications in Europe (R&D Programme, 1985-1995)
RLR	Receive Loudness Rating
RSVP	Resource ReSerVation Protocol
RTD	Research, Technological Development and Demonstration
RTP	Real-time Protocol
SDL	Specifation and Description Language
SIF	Source Input Format – a video format defined for MPEG 1
SLR	Send Loudness Rating
SMS	Short Message Service
SVHS	Super VHS – improved performance compared with VHS
SQL	Structural Query Language
TAP	Telematics Applications Programme
TCP	Transmission Control Protocol
TELR	Talker Echo Loudness Rating
TH	Talking Head

TIPHON	Telecommunications and Internet Protocol Harmonisation Over Networks. An ETSI project which started in Spring 1997 with members from Europe (including Israel), North America and Australia and co-operating with a Japanese regional standardisation organisation.
UDP	User Datagram Protocol
VHS	Video Homes System – a format for Home Video Cassette Recorders
VMC	Video mediated communication
VoIP	Voice over IP
VPN	Virtual Private Network
WAN	Wide Area Network
WAP	Wireless Application Protocol
WtP	Willingness to Pay