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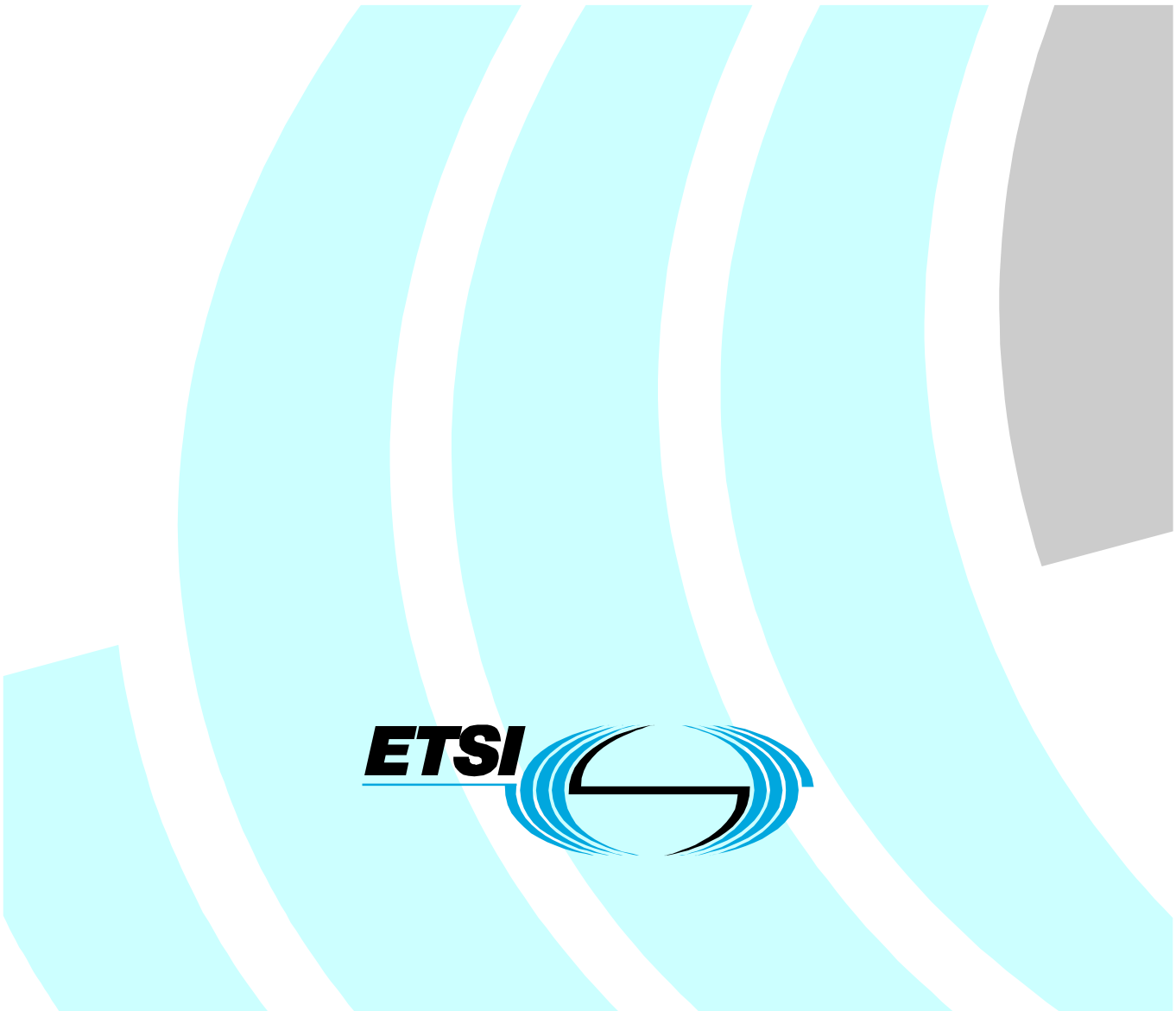
ETSI Guide

Human Factors (HF); User education for mobile telecommunications devices and services



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Foreword

This ETSI Guide (EG) has been produced by ETSI Technical Committee Human Factors (HF), and is now submitted for the ETSI standards Membership Approval Procedure.

Intended users of the present document are user experience and interaction design professionals, developers of mobile terminals, services and applications, mobile network and system providers, terminal approvers, standard writers, product managers and developers. Other stakeholders who may benefit from its use include service and application providers, virtual operators and others.

The focus of the guidelines provided in the present document is on public mobile network terminals and services but they are mostly also applicable to other technologies, e.g. cordless or IP-based (unlicensed) telephony and Wi-Fi.

Introduction

Information and communication technologies (ICT) play a key role in the everyday life of many people and mobile communication services are a mass market.

New applications and services are increasingly used to perform necessary or entertaining tasks. Connectivity and interoperability between telecommunications networks, personal computing, the Internet and ever-smarter mobile devices and services offer enormous potential for improving quality of life, if used as intended and usable by all.

Users who cannot understand and learn how to efficiently use their terminals, services and integrated or additionally offered applications will be permanently excluded from the *e*Society. Ensuring access to mobile communication for all is a common goal of vendors, operators, service providers, user associations, as well as policy makers, often referring to the creation of the *e*-inclusive information society.

In the past (and currently still in underdeveloped countries), the question of the "digital divide" defined the "haves" and "have-nots" mainly in economic terms, dividing those who can afford new technology from those who cannot. Technological progress in network and infrastructure deployment and manufacturing and economy-of-scale effects in household availability and service provision make access to services affordable to the largest proportion of the European society. More recently, a new facet of a possible "digital divide" has been noted, namely the one that is related to the comprehension of how to use new terminals and services. This latter aspect of the "digital divide" has direct economic and societal consequences as the uptake of mobile services will only be at a successful level if the new terminals and services can actually be accessed, set up and used by the European citizens.

Improved user education helps end users to discover, understand, access, maintain and make use of new and existing services. Consequently, this also benefits service and network operators through increased service uptake and society, as a whole, by ensuring improved access to mobile Information and Communications Technologies (ICT) for consumers who might otherwise be excluded (e.g. older users or users with disabilities).

The present document introduces and analyses the most important areas and issues of relevance to user education and provides clear sets of guidelines on how user instructions for mobile terminals and services ought to be provided, taking into account the requirement of different user groups (e.g. young, older, disabled and less literate users) and the possibilities offered by different media. The guidelines have a practical focus on the most common difficulties and problems faced by ICT users. The guidelines provided take into consideration the constraints faced by the ICT industry in the provision of user education e-service.

The present document provides ***generic*** guidelines covering the content and development and validation process of user education material for mobile terminals and services, in addition to the general guidelines provided in [25]. In addition, it provides generic guidelines applicable to the terminology and illustrations used.

This is followed by the provision of ***specific*** guidelines, applicable to paper-based user guides, terminal-based user guides, PC-screen based user guides (also when presented from portable storage devices), audio user guides and other information sources. In the last clauses, specific guidelines for improved accessibility and usability evaluation are presented.

In Annex A (normative), a listing of all design guidelines previously introduced in the document is provided (without introducing any new guidelines in addition to those in earlier clauses). These carry an indication about their applicability and the clause they can be found in the present document, together with further details and information.

Annex B (informative) introduces key aspects of user needs and user segmentation.

It should be noted that the guidelines provided in the present document should only be regarded as enabling, not guaranteeing, the creation of user education material meeting the above discussed goals.

The guidelines provided have been developed by experts with considerable expertise in technical communication and have been discussed and agreed with key players of the ICT industry in a consensus-oriented way. They have also been presented at various conferences and dedicated requirement collection and consensus building workshops.

1 Scope

The present document provides guidelines for the development, presentation, and evaluation of user education such as paper-based user guides or digital help systems for mobile terminals and services. The aim of the present document is to provide generic and specific guidelines, based on stakeholder and expert consensus that help increase the uptake and usage of mobile terminals and services for available and emerging mobile infrastructures.

Appropriate examples of best practices are provided to ensure that users will receive user instructions and other guidance that are appropriate for their level of expertise and abilities, using media or a combination of media that benefits the largest range of users; and that are structured in a way to offer an excellent user experience.

An integrated Design-for-All approach has been adopted throughout the present document, taking into account the needs and requirements of children, older users and users with disabilities. It is acknowledged, however, that some users with very extensive and complex disabilities may have requirements beyond the level addressed in the present document. Furthermore, mechanisms for user instructions documents are explored that facilitate the production of specific versions of user guides, addressing users with specific requirements.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- 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.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

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

[2] ETSI DEG 202 416: "Human Factors (HF); User Interfaces; Setup procedure design guidelines for mobile terminals and services". .

[3] ETSI DEG 202 421: "Human Factors (HF); Multicultural and language aspects of multimedia communications ".

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

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

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

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

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

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

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3 Definitions and abbreviations

3.1 Definitions

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

design for all: design of products to be usable by all people, to the greatest extent possible, without the need for specialized adoption

end user: See **user**.

e-service: See **service**.

function: abstract concept of a particular piece of functionality in a device or service

ICT devices and services: devices or services for processing information and/or supporting communication, which has an interface to communicate with a user

impairment: any reduction or loss of psychological, physiological or anatomical function or structure of a user (environmental included)

manual: See **user guide**.

on-line tutorial: computer-assisted instruction technique; interactive, user-controlled and typically multimodal, introducing new information sequentially, on a step-by-step basis

service: ICT service that provides the complete capability, including terminal equipment functions, for communication between users, systems and applications, according to agreed protocols

technical communicator: communications specialist who processes complex technical information into a format comprehensible to defined end-users to enable them to carry out an action or to understand a concept

NOTE: Main work areas include user information policy advice, documentation projects management and the design and creation of user-oriented information devices.

terminal: physical device which interfaces with a telecommunications network, and hence to a service provider, to enable access to a telecommunications service

NOTE: A terminal also provides an interface to the user to enable the interchange of control actions and information between the user and the terminal, network or service provider.

usability: effectiveness, efficiency and satisfaction with which specified users can achieve specified goals (tasks) in a specified context and particular environments, see ETR 095 [14] and ISO 9241-11 [16]

NOTE: In telecommunications, usability should also include the concepts of learnability and flexibility; and reference to the interaction of more than one user (the A and B parties) with each other and with the terminals and the telecommunications system, see ETR 116 [13].

user: person who uses a telecommunications terminal to gain access to and control of a telecommunications service or application

NOTE: The user may or may not be the person who has subscribed to the provision of the service or owns the terminal. Also, the user may or may not be a person with impairments.

user education: any information provided to users of a product or service on the functionality provided by the product or service and any instructions on how this functionality is to be used

NOTE: User education can be provided through a range of media from paper to multimedia.

user guide: technical communication documents, intended to give assistance to users using a particular product

NOTE: They are written by a technical communicator and are also known as "manual".

user interface (UI): physical and logical interface through which a user communicates with a telecommunications terminal or via a terminal to a telecommunications service (also called man-machine interface, MMI)

NOTE: The communication is bi-directional in real time and the interface may include control, display, audio, haptic or other elements, in software or hardware.

user requirements: requirements made by users, based on their needs and capabilities, on a telecommunication service and any of its supporting components, terminals and interfaces, in order to make use of this service in the easiest, safest, most efficient and most secure way

3.2 Abbreviations

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

ARPU	Average Revenue per Unit
CAT	Computer Aided Translation Tool
CD	Compact Disc
CD-ROM	Compact Disc-Read Only Memory
CM	Content Management
CMS	Content Management System
DTD	Document Type Definition
DTP	Desk-Top Publishing
FAQ	Frequently Asked Questions
FM	Frequency Modulation
HTML	Hyper Text Mark-up Language
ICT	Information and Communication Technologies
ISO	International Organization for Standardization
MMS	Multimedia Messaging Service
MP3	MPEG-1 Audio Layer-3
OTA	Over-the-Air (Configuration)
PC	Personal Computer
PIN	Personal Identity Number
PDF	Portable Document Format
SID	Support In Device
SIM	Subscriber Identity Module
SMS	Short Message Service

UI	User Interface
WAP	Wireless Application Protocol
Wi-Fi	Wireless-Fidelity (ISO/IEC local area network standard family 802.11, also known as WLAN)
XML	eXtensible Mark-up Language

4 The role of user education for mobile terminals and services

4.1 The increasing importance of user education

The user guide of a product is an important part of the overall user experience, and it therefore contributes to the user's general perception and evaluation of the product's quality. Just like advertising, packaging, industrial design and the user interface, the user guide is one of the means through which a brand expresses its values and messages, and the perceived quality of the user guide reflects directly on the brand image.

A common-sense statement often heard is that the user guide for a product would be superfluous if the quality of the product's user interface was sufficiently good. While this may be true, it is unlikely that there ever will be fully self-explanatory ICT products. Some of the reasons for this are:

- Many mobile ICT products are highly complex - the feature sets of standard mobile phones or cordless phones frequently exceed 200 functions.
- Users have problems in simply understanding what the terminal can and cannot do [36].
- Mobile ICT products have miniaturized input and output devices (compared to personal computers) with the display often presenting only six or less lines of a complex menu. Therefore, the means of representing a complex functionality to the user are very limited.
- There is a continuing trend towards ever more miniaturized products which increases the problem above even though screen resolution is increasing.
- Mobile ICT devices "evolve" fast: users replace their mobile product after three or four years, sometimes even more frequently, and receive a different terminal in terms of functionality and available services, requiring a great deal of learning.
- In the past, data-processing devices were specialist products used only by trained operators. Today, mobile ICT devices have an increasing number and range of functions intended for a mass-market where users are less specialized. This is increasing the usability gap (see e.g. [7]).
- The user-interfaces of mobile ICT products (and in particular of smart phones) are often borrowed from those of personal computers. This means that users often expect the mobile product to behave in the same way, whilst the PC desktop philosophy is supported only to a limited degree (e.g. icons that cannot be moved, copied, or pasted).
- Many mobile ICT products interact with personal computers or other devices (e.g. for synchronizing agenda items or for transferring music files). The user, therefore, needs to understand not only how to use the mobile terminal but also how this device interacts with others.
- Many users struggle to understand the difference of feature concepts and their concrete implementations, e.g. the fact that a mobile phone's number "resides" on the SIM card and that the phone will not respond anymore to a particular number if the SIM card has been replaced.
- Services are often presented in a seamless way where some functions reside locally in the device while others provided by the network. For the user, this distinction is not always obvious even though there may be cost implications. Generally, the interests of network operators and users tend to conflict: while network operators strive at increasing Average Revenue per Unit (ARPU), users tend to aim at minimizing air time: the challenge for the user is to understand which costs are associated with a particular functionality.
- There are increasingly more possibilities for errors caused by the terminal, the service, the network or the user, i.e. the user needs to cope with more complex situations than before. The users cannot always be sure where the problem or error occurred and what caused it.

In spite of the issues raised above, many users report that they manage to set up and use a new product or service without the need for a user guide, so why is there problem? Firstly, if a user does not know about or understand a particular function or service, he/she is unlikely to use it, thus missing out the opportunity of benefiting from what the device or service has to offer. This will also mean that the service provider will miss out on the chance of earning revenue. User education can play an important role not only in explaining how to use a feature or service, but also in explaining that this feature or service exists at all and how it can benefit the user. Hence, user education plays a crucial role in service discovery.

As stated above, modern ICT devices are consumer products to be used by the broadest range of consumers. The users of ICT devices and their associated services are, however, not homogeneous in terms of their knowledge about services, features and types of user interfaces. For some, their new mobile phone will be just the latest in a long sequence of terminals previously used; and many are familiar with user-interface components such as soft keys and touch screens. For others, their new phone may be their first mobile ICT terminal requiring them to learn entirely new feature and user-interface concepts (this is particularly the case in countries where the users' first mobile phone is also their first telephone). User education has to reflect the vast range in previous knowledge and has to accommodate both the novice and the expert user. In addition, users make use of different subsets of the terminal or service functionality: while some users just appreciate the assurance of being reachable in cases of emergency or require the terminal for specific applications such as telecare, others are keen to explore every aspect of a device or service and to adopt new features at the earliest point in time. The focus of user education cannot be restricted to the one group but has to enable all users to fully benefit from what the terminal or service has to offer to them.

User education also plays a particularly important role for very young, older and/or disabled users who run a serious risk of being left out of the modern information society. ICT has enormous potential for (re-)activating and (re-)integrating people with special needs into society, but only if this new technology can be handled by them. The design of ICT devices and services often excludes certain user groups (e.g. blind and visually-impaired users are excluded if information is being presented only visually). There is, fortunately, a growing body of expertise on how to design ICT terminals and services to be used by the largest possible range of users (see e.g. [7]). To implement features in such a way to allow older and/or disabled people to use a terminal or service is one step, the users have also to be aware that these features exist and how to use them. User education is, therefore, particularly important for these user groups requiring a design-for-all approach to be taken when designing user guides and other types of user education with the aim of presenting the right information to the disabled user in a suitable way (clause 11 presents principles and examples of how this can be done). A further motivation for considering the needs of older and/or disabled users is the fact that often many or even most users benefit from user education produced for people with e.g. limited literacy skills.

User education also plays a role in the context of some well-known problems that potentially hamper service adoption. Some of these problems are:

- users fail to set up their terminal or service and subsequently cannot use it: many services require certain parameters to be set (e.g. the SMS service centre or parameters required for sending and receiving MMS) before the services can be used (see [2]).

- certain features can facilitate the usage of certain services, but only if the user knows the details of his/her personal subscription (e.g. long press on the key "1" can be configured for access to the personal mailbox, but the user has to know the subscription number of his/her personal mailbox in order to associate that number to the "1" key and many users do not know how to reach their personal mailbox e.g. from fixed-line networks).

- user guides are needed in first-use and in error situations. In case of errors, the user needs support in problem solving. A problem like not being able to receive an MMS may be related to the terminal, the operator service, the service provider, security, PC software, compatibility and other factors. Today's user guides typically only give help with the mobile terminal.

- features like Call Forwarding are complex and have certain consequences (if call to subscriber A are forwarded to subscriber B, subscriber A cannot be reached anymore directly, e.g. to de-activate Call Forwarding to access a local answering machine; Call Forwarding also leads to additional costs).

- little or no information on tariffing is available for services, the information may be presented on the service providers' Web pages but is not available to the users in the actual situation they need it (e.g. information on roaming costs when calling from abroad). This type of information cannot be easily included in a user guide, as the manufacturer cannot predict which provider a user will subscribe to and as tariffs are frequently changed. If the user guide is provided as customer-specific (i.e. operator-specific) documentation, a reference to a Web page containing the current roaming costs can be included.

These and other issues currently limiting the uptake of services can be addressed with adequate user education explaining to users what the service does for them, how it is being used and what the possible consequences are (e.g. the associated rates).

Even though guidelines and standards such as [39] and [40] exist, a large number of problems with the user guidance provided for current telecommunications terminals and services can be observed, including the following:

- The user guide is not complete (i.e. the information is not there).
- The information cannot be found (i.e. the information is there but not where the user is looking for it).
- The language of the user guide is inadequate (i.e. the language is too abstract, uses unknown abbreviations, uses technical and/or foreign language terms).
- The structure of the guide is inadequate (i.e. alphabetical feature list as opposed to the likely order in which users encounter or use features).
- The explanation of how to use a feature is too abstract (i.e. the subject index leads the user to a particular page on which the feature is explained, but an explanation of how to invoke the feature or of how to get to a particular branch in the menu tree is explained elsewhere).
- The information cannot be perceived adequately (i.e. in particular elderly users find it unacceptable to read print in 8 points).
- The functionality / software implementation is not frozen at the time the user guide has to be completed (or sometimes the software implementation has to be changed at an even later stage) - the user guide is therefore wrong and has to be corrected in later editions.
- Often, there is no obvious or useful linkage between printed user guide, support in the Web and in-device help if these are created by different suppliers without a guiding framework.

Finally, one particularly important problem is that while the user often receives the mobile terminal and the service subscription from one source (e.g. the network operator), the user guidance provided by the terminal manufacturer and that of the network operator are only loosely related. This is because (with the exception of co-branded editions produced specially for one particular operator), the device manufacturer has no way of knowing which operator the end user of a terminal is going to subscribe to, and equally, the operator has no way on knowing what kind of terminal an end user is going to use (particularly in those cases where an end user receives only the SIM card without a terminal). One possible solution for this dilemma is to provide information about the services provided by different network operators on the manufacturer's Web page and information about the terminals from different manufacturers on the operator's Web page. Maintaining Web pages of this kind and keeping them up to date is very costly but is an option for ensuring that the user has access to all the information he/she needs.

Solutions for how to deal with the issues raised above and other problems related to user education are addressed in the remainder of the present document.

4.2 User education during the product life cycle

User education plays a role throughout the whole product and e-service life cycle. From an end user's perspective, the product life cycle can be described as containing the four stages "Pre-purchase/ Pre-subscribe", "Purchase/subscribe", "Ownership" and "Repurchase/Upgrade" (see figure 1).

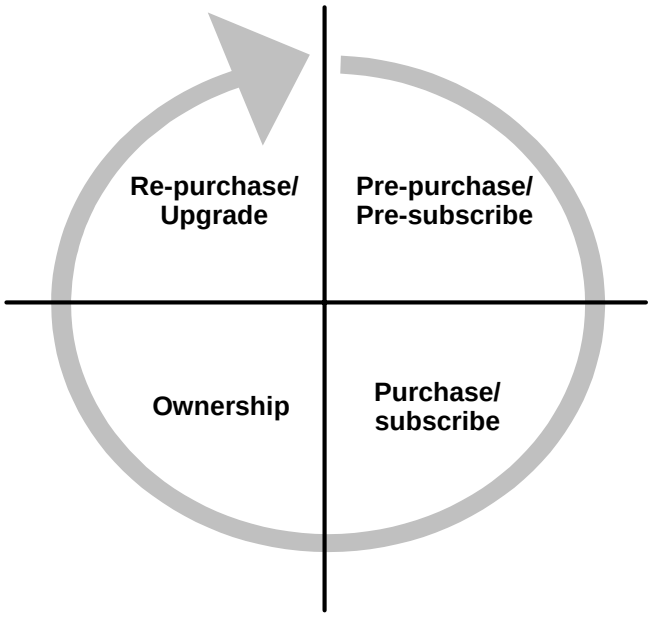


Figure 1: Products and services life cycle from a user perspective

In each of the four stages, the users' needs for information about the product / service differ, requiring from the manufacturer / service provider a different approach to the provision of user education:

- In the "Pre-purchase/ Pre-subscribe" phase, the users typically try to assess whether the product / service meets their requirements. E.g. the user wishes to know whether a particular mobile phone supports certain features. Users intending to upgrade to the next generation of product or service are usually interested in knowing whether the user interface of the new terminal or service will seem familiar to them allowing them to use it straight away without much learning. Finally, some customers acquire the product not for themselves but for others (e.g. their parents or grand parents) who have special requirements such as suitability of the product for older users.

- In the "Purchase/subscribe" phase, users need information on the steps required for being able to use the product (i.e. on how to unpack the product or its components, on how to set it up and prepare it for first use). These steps may include the definition of personal access parameters (PINs) and the set up of the terminal or service to operate with the user's pre-existing environment (e.g. his/her SIM card). The information needed at this stage can possibly be made available in the form of a "Quick Start" guide.

- In the "Ownership" phase, users need to how to solve problems arising in terminal or service usage or both at the same time. In addition to problem solving, user education plays an important role in this phase for service and feature discovery.

- In the "Repurchase/Upgrade" phase, users need to know how to properly discard/dispose of the terminal or its components and on how to replace it with another one. An important issue at the end of the life cycle is how stored data or settings can be transferred to the replacement terminal or service. At this stage, many users may already have displaced or discarded the printed user guide.

Table 1 summarizes which user tasks are likely to occur in each of the phases of the product's life cycle, by whom the information should be provided and through which type of media (see also clause 4.3).

Table 1: User tasks, information provisioning recommendations and recommended media throughout product life cycle phases

Life Cycle phase	User Task	Information source	Recommended medium
Pre-purchase of terminal	Learn about the availability, price and attributes of the feature set of the terminal	Manufacturer (or service provider in case of subsidized terminals)	Manufacturer's Web site, in particular commercial information and feature lists
	Learn about the user interface of the device	Manufacturer (or service provider in case of subsidized terminals)	Manufacturer's Web site, in particular Web-based user guides and simulations of the device
	Decide whether a product is suitable for the indented user	Manufacturer (or service provider in case of subsidized terminals)	Manufacturer's Web site, in particular Web-based user guides and simulations of the device
Purchase of device	Prepare the product for first-time use (unpacking, initial set up)	Manufacturer (or service provider in case of customized user guides)	Printed user guide, possibly a Quick-start guide, Support in the device (Set-up assistant)
	Personalize the device (defining PINs, choose ring tones, etc.)	Manufacturer (or service provider in case of customized user guides)	Printed user guide
Ownership of device	Solve problems with the device as they arise (how to use a certain feature)	Manufacturer (or service provider in case of customized user guides)	Printed user guide, Support in the device, Web-based support
	Discover (new) features of the device	Manufacturer (or service provider in case of customized user guides)	Printed user guide, Support in the device, Web-based support
Re-purchase / Upgrade	Transfer personal settings and data to the next device	Manufacturer (or service provider in case of customized user guides)	Printed user guide
	Discard of the device	Manufacturer (or service provider in case of customized user guides)	Printed user guide
Pre-subscription of service	Learn about the availability, price and feature set of the service	Service provider	Service provider's Web site, in particular commercial information and feature lists
	Decide whether a service is suitable for the indented user	Service provider	Service provider's Web site, in particular Web-based user guides and simulations of the service
Subscription of service	Prepare the first-time use of the service and to personalize the service	Service provider	Printed user guide, possibly a Quick-start guide, "guided tours" on the service provider's Web site / CD-ROMs
Ownership of service	Solve problems with the service as they arise (how to use a certain feature)	Service provider	Printed user guide, Web-support from the service provider
	Discover (new) features of the service	Service provider	Printed user guide, Web-support from the service provider
Upgrade of service	Transfer personal settings and data to the upgraded or next-generation service	Service provider	Printed user guide, Web-support from the service provider

4.3 Choice of media

User instructions on how to use a terminal or service can be provided by means of different media. In many markets, however, national regulations define the minimum requirements as to what kind of information has to be provided in written format (see clause 6.5 on Legal requirements). In any case, the users should be provided with access to information on how to start the terminal and with basic instructions on how to use the terminal.

The multiplication of the sources of support can lead to redundancies in the information and support provided to the users. Some users prefer to read a paper user guide, some go to the Web for information and others only read the help texts provided in the terminal itself (see clause B.3).

As table 2 illustrates, different user-education media differ in the degree to which they are suitable at a given product life cycle phase and in terms of the options they offer to the manufacturer and to the end users with or without impairments.

In table 2, the rows indicate different media available for user education:

- paper-based user guide: the traditional and still preferred-by-users booklet provided with the product / service (see clause 6);
- support in the device: information based in the terminal itself, provided in the form of hep texts, demonstrations, interactive tutorials or avatars (see clause 7);
- Web-based user guides and support: information provided on the manufacturer's or service provider's Web page, ranging from electronic versions of the paper-based user guides for download to interactive simulations of the product (see clause 8). Web-based support also includes "Frequently asked questions" and the possibility to send written questions to service staff;
- user guides on portable storage devices such as CD-ROMs: information stored on media that are delivered with the product (see clause 8.5);
- avatars: these are electronic assistants often taking the form of a human, animal or fictitious character that has a limited repertoire of answers to questions asked by the user; avatars sometimes act as assistants explaining a certain functionality (see clause 7.2.3);
- audio-based user guides: instructions provided by acoustic channels (e.g. spoken instructions in .mp3-format to be downloaded from the manufacturer's Web side, see clause 9);
- call centre staff and point of sales staff: human experts operating on behalf of the manufacturer (call centre) or of the vendor (point of sales) who usually receive information from the manufacturer / service provider and support the user in product choice and handling;
- user forums: friends and family: humans usually not associated with either manufacturer or service provider who support users in case of problems or questions (see clause 10.1).

The columns in table 2 indicate:

- the different product life cycle phases (see clause 4.2) during which user education may be required;
- different characteristics of the guidance provided:
    - mobility (is the medium mobile like e.g. a printed user guide, or is it fixed like e.g. a desk-top PC);
    - ease of updating (can the medium be easily updated e.g. like Web-based content or is it fixed like e.g. a printed user guide that can only be replaced, but not updated);
    - completeness (is the user guide complete in the sense of covering all functions which is something that can hardly be achieved with printed user guides but more easily with content made available over the Internet);
    - use of animations (does the medium offer the possibility of displaying animated / dynamic content);
    - flexibility (can the content be scaled or otherwise re-arranged on the medium according to the user's preference);

- interactivity (does the medium offer a step-by-step, interactive exchange with the user);
- pro-activeness (does the medium allow for pro-actively informing the user of the availability of (new) information);
- promptness of response (is the response immediate as in the case of a human answering a question in a real time dialogue, or is it delayed as in the case of a human answering a question by email);

- suitability of media for people with different kinds of impairments, including hearing impairments, visual impairments, and low literacy;
- implications for manufacturers / service providers: these cover the costs of providing user guidance through a particular medium, the extent to which the use of a given medium can be controlled by the manufacturer / service provider, and the extent to which user education via a particular medium can be customized.

EXAMPLE 1: The paper-based user guide is well suited for the "Purchase/Subscribe" phase, as the user will have the user guide at hand when first familiarizing himself/herself with the product while it is usually not yet available to him/her at "Pre-purchase/Pre-subscribe", and may not be available anymore at the "Ownership" and "Re-purchase/Upgrade" phases.

EXAMPLE 2: A Web-based user guide or a "try-me version" allows the interested customer to learn about the product or service at a very early stage. This medium has the additional benefits of potentially allowing a large degree of interactivity and of fast and cheap updating of the information while offering a limited degree of mobility.

Table 2: Recommended applicability of user education media

	Life	Life	Life	Life	Mo	E	Co	Use	Flex	Inte	Pr	Pr	Su	Su	Su	Co	Pos
Paper-based user guide	-	+	+	+	+	-	+	-	-	-	-	+	+	-	-	+	+
Support in the device	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+
Web-based support	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+
User guide on CD-ROM	-	+	+	+	-	-	+	+	+	+	-	+	+	+	+	+	+
Avatars	-	+	+	-	+	+	-	+	+	+	+	+	+	+	+	+	+
Audio-based user guide	-	+	+	-	+	+	-	-	-	-	-	+	-	+	+	+	+
Call centre staff	+	+	+	+	+	+	+	-	+	+	-	+	+	+	+	+	+
Point of sales staff	+	+	+	+	-	+	-	-	+	+	-	+	+	+	+	-	n/a
User forums	+	+	+	+	-	+	+	n/a	+	+	-	-	+	+	-	-	-
Friends and family	+	+	+	+	+	n/a	-	n/a	+	+	+	+	+	+	+	-	-

Legend:
"+" = Recommended
"-" = Not recommended
"n/a" = Not applicable

NOTE: The recommendations represent the current state of technology.

4.4 Legal and safety considerations

A further motivation for investing in excellent user education can be derived from the various national, regional and international legal and regulatory requirements on user documentation [26]. Some regulations require that written documentation on how to use the product in the language(s) of the country in which the product is being sold be included with the product. Others specify details on issues such as hazards associated with the use of the product, environments and environmental conditions suitable for product use, and possible age restrictions. In addition, first regulations requiring access to user education also for people with disabilities are being prepared. For more details see clause 6.5.

4.5 Cost-benefit trade-offs and current industry practices

There are a number of benefits associated with the provision of high-quality user education and risks associated with failing to do so. A careful analysis of the trade-offs of possible costs and benefits is required to identify the appropriate level of quality in user education to be provided to the end user.

Some of the relevant costs and benefits related to providing user education are:

- The user's frustration with not fully being able to use the product can lead to low brand loyalty and to further negative effects as dissatisfied end users may comment negatively on the product to their friends and colleagues who may consequently abstain from purchasing the product [37].

- Insufficient user education can lead to increased costs in customer care centres. Recently, most manufacturers have started to charge callers ("premium customer care lines") whereas calls to customer help lines previously used to be free [15]. Even with calls charged to callers, the operation of an international, always operational call centre is costly for the manufacturer. At any rate, having to make (and possibly pay for) a call in order to understand how a product works is rarely a positive experience that strengthens brand loyalty as the time spent in the queue, the fees associated with the call and the effort required from the user (e.g. in providing information and trying to understand the solution that is provided only verbally) are perceived negatively.

- The written user guide is often not up to date at the time of print, as last-minute changes to the product (in many cases to its software) cannot be reflected in the documentation. In these cases, it is important to provide the user with information on how to obtain an updated version of the user guide (often provided via the Internet) in order to prevent irritation about discrepancies between product and documentation.

- In many cases, not even the product is up to date at the time of shipping. Software updates, often "over the air" (OTA) are offered to eliminate software bugs [2]. The end user has to be informed (a) that the update is available, (b) how the update can be conducted, and (c) whether a new user guide is available documenting new or improved functionalities. In addition, the user needs to be made aware whether any data stored in the terminal will be lost after the update.

- In many cases, users send in their product reporting them as faulty while the customer-care staff cannot identify any problems with the product. Good user education can help reducing the "No trouble found" rates, e.g. by providing checklists ("Before you call the service centre …" or "Have you already tried to …") or by pointing the users to Internet pages with frequently asked questions (FAQs), even though this may add necessary user-guide variants and therefore costs.

In spite of the obvious benefits of investing in good user education and in spite of the costs associated with failing to do so, most companies' current practice is to either give the topic less attention than it deserves, or to review it as a candidate for cost-cutting attempts.

Current practice includes:

- choosing the cheapest, minimum-effort solution without considering subsequent additional costs;

- the choice of very small fonts to save on paper and print costs;

- symbols being used to save space and translation costs where text would be superior;

- reducing volume (to save in paper and technical communicator / translator costs but also to reduce box sizes);

- making (often wrong) assumptions about what the user already knows;

- outsourcing all user-guide related activities, thus removing them from the product-development activities;
- user education being provided exclusively by means of a paper-based manual, using the product-related Websites primarily for advertisement purposes;
- no effort being made to address the user-education needs of disabled users;
- too little time being made available for adjusting the user guides to changes made in the product at a very late stage of product development;
- not all procedures being described in detail, with some only having a cursory mention (i.e. the user guide is formally complete but does not cover all functions in the necessary level of detail). Following a link from the subject index may lead to a sub-branch of a user procedure the beginning of which is described several pages before;
- functions being described without reference to possible preconditions, i.e. a function is only available if certain conditions are met; and
- usability tests of user guides are the exception.

Hardly any minimum requirements for the provision of user education with industry-wide acceptance exist. The following clauses attempt to fill this gap by providing generic and media-specific guidelines.

5 Generic guidelines for user education

5.1 General

This clause covers issues that are independent from the media chosen for user education, pointing out guidelines and basic requirements that are important to consider.

5.2 Development process

Processes are strongly related to organizations and their culture, values and people, but also to tools, methods and the management system. For this reason, it is difficult to propose a reference process that can apply to all stakeholders in a company. Nevertheless, certain generic aspects, relevant to development processes can be identified:

- the development and production of the user guide should be part of a formal development process;
- user education issues should be considered at an early stage of the product development;
- the knowledge about the target users of the product is very important for the design of the supportive material offered, in order to meet user expectations and needs;
- the technical communicator should be involved in the development of the product at a very early stage, be (if possible) provided with a well functioning hardware or software prototype of the product, and be updated on all changes.

A general process includes the following steps:

- investigate options of how the product is going to be described (pedagogics, concept, media);
- draft the user education design, according to the chosen concept and media (paper manual, support in the device, quick guide, etc.);
- design and verify the content of the description and explanations of the mobile terminal or service;
- conduct a usability test with a representative set of target users;
- translate, validate and deliver the user education;
- archive and follow-up;

- maintain, optimize, phase out and ramp down user education, coordinated with the product lifecycle.

It is of high importance to clarify internal and external dependencies and interfaces at an early stage and to identify the owners of deliverables at various development phases (e.g. when the user interface localization is due to deliver the helptexts for a mobile terminal).

There is a considerable lead time for the translation and production of user guides and the product development process (e.g. the development of product functionality) should take this into consideration. Late updates of the product's software can influence the user guides and make the provided help insufficient, misleading, or even incorrect. Furthermore, late changes can lead to considerably increased expenses. In order to make the development process easier and well structured, the different development stages should be linked to well-defined milestones(also known as toll gates), to verify the achievement of developmental requirements.

It is recommended that user guide documentation plans are developed which are supportive and specify important aspects such as content, audience, design, format, production team, schedule and other project deliverables.

Furthermore, practical issues such as development tools infrastructural requirements, productions tools (e.g. software) and information transfer and archiving are also important issues and should be integral parts of the process.

Generic guidelines for user education

5.2.a User guides (including layout development, translation, localization and production aspects) should be developed by staff with the necessary professional qualifications (e.g. educational background, skills and experience).

5.2.b A development process should be defined, agreed, documented and communicated to all stakeholders at an early stage of the product development process.

5.2.c External partners (e.g. translators, printers) should be involved in the development of the processes for a smooth and easy hand-over (e.g. access to databases) and production.

5.2.d A clear time schedule should be set up, including the deliverables, responsibilities and milestones.

5.2.e The process should include an evaluation of the chosen concept (e.g. usability tests of new concepts), as well as of the user guide itself.

5.2.f Project monitoring should be included in the process in order to verify time schedules, costs, deliveries and other aspects of relevance to the process.

5.3 Content, structure and evaluation

5.3.1 Content

There is a minimum amount of user education that should be provided with to the user together with the new terminal. Additional information can be provided on a portable storage device (see clause 8.5) or via the Web (see clause 8.2).

The following parts should be included in the kit that is provided with the terminal (see also clause 6.2):

- the name of the product;
- the list of languages in which the user information is presented;
- care and maintenance of the product (how to clean the product);
- legal and safety information;
- first steps on how to use the product;

- schematic overview of the terminal exterior with labelling of the user-interface elements such as the keys;
- explanation of all product features (if not fully explained with reference where to find more information);
- information on where to find more information or to get further help (call centres, Web pages, help in the device itself (see clause 7), etc.;
- information about which extra modules (e.g. Memory Stick) can be used with the product;
- information on how to dispose of the product and relevant environmental considerations.

Content guidelines

5.3.1.a User education should include the following information: the name of the product and the languages represented, care and maintenance of the product, legal and safety information (preferably at the start), first steps on how to use the device with a schematic overview (and all features explained, if not complete, the information where to find more details).

5.3.1.b Information about the service providers the services they offer should be clearly visible to the user.

5.3.2 Content Management Systems (CMS)

Planning and structure is crucial when developing good user information. As the production of this is a very complex process with many people involved and with many different outputs, the manufacturers are looking for ways that could ease the workload/problems when writing/translating. To re-use as much information as possible is the only way to be able to handle the large amount of information that the user will need to have explained. One possible way can be a content management system. In an environment where a large number of publications are created and where a large percentage of the information within the publication is shared, it becomes very important to know what information is available. Companies aim at avoiding the large costs involved in creating information that already exists within organizations and to translate or re-translate information that is already translated.

Content Management (CM) allows organizations to better utilize the information resources that are available. CM is a generic term for structuring and organizing information in order to store, edit and publish the information in a controlled way. CM is based on ideas around single-sourcing and re-use.

A CMS consists basically of a database where the information is stored, an editor that allows authors to edit the contents, and a number of publishing engines that allows authors to produce publication in many different output formats. XML is often used as the data format for managing the information in a CMS.

Important aspects of CMS are:

- Single-sourcing: Single-sourcing is the concept of authoring a piece of information once. This piece of information can then be published in many different output formats. As the information is often stored in XML, which is platform and application independent, it allows for standard methods to produce publications in different output formats. For example, via standard XML, it is possible to create HTML files and via Extensible Style sheet Language Formatting Objects (XSL-FO), publication can be created in PDF, all from the same source of information.
- Re-use: Re-use refers to authoring a piece of information for one intended context and audience. It is then possible to re-use this piece of information in a distinct and different context without modifying any information. This means that the writer must produce text that does not assume any initial context or audience and that can be re-used in multiple contexts. The text can be re-used within the same publication as well as in publications for other products. When information that is re-used is updated, publications that use the specific piece of information are automatically updated.

- Information separated from layout: Traditionally, most authors use "What You See Is What You Get" (WYSIWYG) authoring tools. These tools often focus as much on form and layout as on content, leading to situations where authors focus on making the information look good rather than making it useful to the reader. In a CMS, information is separated from form and layout. The author focuses on writing content that is not tied to a particular output or display method, thus the text is output-independent However, any system should be thoroughly tested so that the conversions from XML to any desired layout are smooth.

- Topic-based authoring -chunks of information: In order to produce re-usable information, stand-alone entities of text must be produced. Such an entity is called a topic. A topic is a discrete piece of information, independent of other topics, covering a specific subject. The topic must contain enough information so that the reader can perform a task, learn about a concept or control a reference value without having to refer to another topic. It is important to determine the optimal size of a topic - a topic should be large enough to be useful to the reader, but it should also be small enough to be re-usable.

- Metadata: Metadata is data about data. Metadata identifies the scope, content and the purpose of topics so that they can be re-used. Metadata defines the relationship between topics and the type of information that is included in the topic. Without metadata it is very hard for technical communicators to efficiently manage the information in the information repository. Examples of metadata are time and data of the latest update, functionality that is covered within a topic, market requirements, etc.

The advantages of a CMS are:

- Reduced lead-times: The author only sends new and updated information. Text that has not been changed is already translated and all language versions are already available in the database. This means that the translation agency has less information to work with and therefore the lead-times will be shorter. As the author does not have to wait until the complete publication is ready for translation, it is possible to send topics to translation as soon as they are finalized and approved. As the layout is automated, small chunks of information can be translated at the very end of a project. The translated information is rapidly imported into the system and a print-ready PDF file can be generated immediately. This means that manufacturers are less vulnerable to last-minute changes.

- Reduced translation costs: As only new or modified text is sent for translation, the number of words that the translators will work with will decrease. This will cut down the translation cost. Re-used topics that are already translated do not have to be handled and these translations are included in subsequent publications without generating extra costs. However, the major cost at the translation agency is the cost for DTP work. By utilizing the publication engines that handles the DTP work automatically, the DTP work will be transferred from the agency to the CMS and it will be performed for "free".

- Content control: In a CMS, information is never lost. With a rigid version control system and the possibility to select what text to include in a publication, information is never deleted. When authors create a publication, they just pick the topics that should be included in the publication. Topics that should not be included are simply not selected. This way there is never a need to delete information. The information is always available in the database for usage in another publication.

- Consistency: By having just one source the text will be more consistent. A topic or a feature will be described the same way throughout the documentation. By using XML, the DTD rules allow the writers to follow a common set of rules. This means that all instructions or concept text will look the same throughout the documentation. In a CMS, the amount of information that needs to be reviewed decreases. This makes it is easier for the editor to control that the technical communicators comply with the information model.

- Efficiency: By using one source the writing process will become more efficient. When a feature is updated, the writer only updates the text once. Publications that use that specific text are automatically updated the next time they are generated. This way there is more time to concentrate on improving texts and generating better publications. This also means that, whenever an error is found in the documentation, the writer only have to change this once and all subsequent publications are corrected as well.

Possible disadvantages of CMS are:

- Even though most manufacturers have introduced or plan to introduce CMS into their processes, there currently is no de-facto or industry-wide standard on CMS, and the experience with introducing and running CMS is limited. For this reason, any CMS system should be thoroughly tested before being put to routine use.

- As several suppliers are involved in the writing/translating process, any CMS needs to take account of organizational aspects such as shared sources with restricted access rights for reading and writing.
- When implementing CMS everything has to be decided in advance (tagging text, which output, etc.), which can be difficult as the CMS system is a fairly new way to work and the manufacturers may not foresee all demands they eventually will have on the system.
- A complex CMS can also misplace information that is not tagged carefully with metadata.
- Implementing CMS has high investment costs, requires a lot of training and will have an impact on many of the previous processes.

Content Management Systems guidelines

5.3.2.a When building a CMS within a company, one should work in close co-operation with all parties involved (translators, printers etc.) and co-ordinate towards the same standards.

5.3.2.b Consistent processes for approving or rejecting text and all translations are of considerable importance for the successful use of a CMS system. Preferably, a working group is responsible for all changes and developments made.

5.3.2.c It is recommended to have a clear picture of all demands made on the CMS system before implementing it, as changes within the system are very inflexible.

5.3.3 Structure

The information structure should be defined at an early point of writing the user guidance. The structure can be either menu based (the way it looks in the user interface of the terminal) or function based (built up after the assumed use of the terminal, e.g. easy start up in the beginning, setting time and date, using the phone book and more complicated features explained later on (e.g.: synchronization). Either way can be chosen, as long as the structure and navigation within the media is clear to the user. The information provided will be used both for first time usage and on a long-term basis when the user wants to use a new feature or something does not work intuitively.

The following points support a consistent overall structure:

- mapping: clear grouping of information in small units;
- relevance: instructions that affect each other should be presented together;
- headings: headings should describe what is going to be described;
- consistency: similar information should be presented in a similar way all through the media;
- availability: easy access to find information by links and search functions, index, table of contents;
- illustrations: graphics can be used to clarify instructions;
- hierarchy: the information structure should be clear.

If these basic principles are followed, the user will easily find the information she is looking for.

Structure guidelines

5.3.3.a The choice of structure should be consistent within the media chosen.

5.3.3.b The structure of the information should be transparent to the user, to ease the navigation between the different subject searched for (e.g. a good Table of Contents or index in a paper user guide, search modes on digital user guides, etc.).

5.3.4 Evaluation

It is not sufficient for the development team to agree on the content and style of the user guides. In order to assess the usability of the user guides it is important to evaluate it for effectiveness, efficiency, and satisfaction with a sample of the intended end users before and after producing user guides (see clause 12).

5.4 Language and terminology

5.4.1 Language

Most developers of user education materials use style guides they employ throughout their work. This clause gives guidelines of and examples for what a language style guides could include. As most technical communicators write in English, the examples are in English (similar style guides can be provided in other languages as each language has its own conventions).

Active voice: Sentences using the active voice are clearer (it is clear who is doing what), shorter and less formal. However, bear in mind that there may be cases where the passive voice is more suitable, for example, if the active form gives a sentence that is clumsy or sounds unnatural, or if the focus of the sentence needs to be highlighted.

EXAMPLE 1: Write: "You can easily dial the number" instead of "The number can be easily dialled".

EXAMPLE 2: Compare passive voice: "Some pictures that you have taken can be edited". (Focus on "some pictures", the user understands that this means "not all pictures"), with active voice: "You can edit some of the pictures that you have taken". (Focus on the user being able to edit, so you could easily miss the fact that it is not all pictures that can be edited.)

Imperative form: Use the imperative form to give a crisper, shorter style. State what the outcome is first, then how to get there. This means that a reader who does not want to perform that particular action can stop reading after the first part of the sentence.

EXAMPLE 1: Write: "To reset the stopwatch press "Reset"" instead of "The stopwatch can be reset by pressing the "Reset"-button".

EXAMPLE 2: Write: "To reset the stopwatch press "Reset"" instead of "You can press "Reset" to reset the stopwatch".

Preferred tone: Focus on what the user can do, rather than on what the phone allows or lets the user do.

EXAMPLE: Write: "Use the calendar to keep track of important events". Or: "You can keep track of important events with the calendar". Or: "With the calendar, you can keep track of important events" instead of "The calendar allows you to/lets you keep track of important events".

Tense: Use the present tense, and not the future tense, when describing a sequence of events.

EXAMPLE: Write: "When you turn on your phone, it automatically selects your home network" instead of "When you turn on your phone, it will automatically select your home network".

General vocabulary: For general words, if there is a choice, always use the simpler, shorter, more familiar, or less technical word, and use it consistently throughout. Do not use unnecessary words

EXAMPLE 1: Write: "**If** your subscription supports …" instead of "**Provided** your subscription supports …"

EXAMPLE 2: Write: "To **go** up one level in the menus …" instead of "To **jump** up one level in the menus …"

EXAMPLE 3: Write: "If text is grey …" instead of "If text is grey in colour …"

Describing key presses and navigation through menus: When describing actions like press/press and hold, click etc. it is recommended to use the same wording for an action all through the whole document.

EXAMPLE: Use "press" (= a short press), and "press and hold" (= a long press). Do not use any other expressions such as "briefly press", "quickly press "or "long press".
Use "press" together with the icons for keys 0 to 9, C key and the "Back" key, and all icons for the navigation key.

Abbreviations: For clarity, write the following phrases in full (if these phrases occur in the middle of a sentence, use a comma before and after them).

EXAMPLE 1: write: "for example", not: "e.g." (exempli gratia).

EXAMPLE 2: write: "and so on", not "etc." (et cetera).

EXAMPLE 3: Write: "that is", not: "i.e." (id est).

Acronyms: Expand acronyms the first time they appear in a text. Thereafter use only the acronym. If the first appearance is in a heading, do not expand the acronym in the heading.

Write the acronym first, then in brackets write the expansion using initial capitals. Make sure that the expansion comes immediately after the acronym. Do not use a hyphen between the acronym and the word associated with it. Form the plural of the acronym by adding 's".

EXAMPLE 1: write: "A SIM (Subscriber Identity Module) card…" Not: "A SIM card (Subscriber Identity Module)…"

EXAMPLE 2: write: "the SIM card", not: "the SIM-card".

EXAMPLE 3: write "PDAs", not "PDA's", "PDA:s".

Apostrophes: Use a curly apostrophe.

Quotation marks: Use double quotation marks. Use single quotation marks for a quotation within a quotation, but preferably rephrase the sentence to avoid such constructions. Use "curly 66 and 99" quotation marks.

Use quotation marks sparingly. If the quotation mark is at the end of the sentence, the full stop comes after the quotation mark. Use them for examples and use them for voice commands.

EXAMPLE 1: "If you want to write the word "Jane"".

EXAMPLE 2: "When the phone rings, say "Answer"".

Contractions: Do not use contracted forms, e.g. write "it is" not "it's". This informal style is out of place in technical documentation. (Exception: "Why doesn't the phone work the way I want?" in the user guide - this is more of a spoken question on the part of the user).

Genitive form: In general, avoid the use of the genitive form. Do not use the company name in the genitive form.

EXAMPLE 1: write "the phone battery", (not "the phone's battery", not "the battery of the phone".

EXAMPLE 2: write: "Manufacturer products" not "Manufacturer's products".

Brackets: Put the full stop after the right-hand bracket, unless the item within the brackets is a complete sentence, in which case the punctuation is within the brackets,

EXAMPLE 1: (This does not apply to fax and data calls.)

EXAMPLE 2: "Enter your nickname (maximum 11 characters)".

Commas: The main use of commas is to break up the sentence so that the meaning is clear. (When speaking, we pause naturally to make this clear). For consistency, always use commas: after an introductory phrase, to set off parenthetical phrases such as "for example" in the middle of a sentence and before "and" in a series of items.

EXAMPLE 1: "After first start-up, select the language you want for your phone menus".

EXAMPLE 2: "You can have different settings, for example, different ring tones".

EXAMPLE 3: "You can save details such as name, title, and phone numbers".

NOTE: There are two different schools of thought about whether there should be a comma before "and". A comma before "and" in series is known as "the Oxford comma" and is used to avoid ambiguity in the sentence. Insert a comma before the "and" in a series of items, even though the sentence may not always be ambiguous.

Hyphens: Use hyphens to join words into compounds and use "suspended" hyphens to create compounds in which two or more adjectives or numbers are attached to another word.

EXAMPLE 1: start-up screen, 24-hour.

EXAMPLE 2: operator-, network-, and subscription-dependent.

Numbers: In general, write numbers from one to nine in words, not figures.

EXAMPLE: "There are seven games in this phone".

Exception: Write numbers 1 to 9 in figures for:

- units of time, e.g. 3 hours.
- units of measure, e.g. 5 × 5 mm.
- percentages, e.g. 9 %.
- use a comma as the "thousands" indicator, e.g. 14,900

NOTE: only applies to English.

- use a full stop to show the decimal point, e.g. 9,6 Kbps.
- use as few figures as possible (e.g. write 9,66 kbps, not 9,600 bps).

Units: Do not use a full stop after units (cm, kg). Leave a space between a number and a unit, but not between a number and a percentage symbol or a degree symbol (5 mm, 20 g, 5 %, 5°). Indicate camera zoom capacity by a number followed by x, no space in between (the maximum zoom is 3×).

If a space is required between a number and a unit, make sure that you use a non-breaking space to ensure that the number is not separated from the unit at the end of the line (Ctrl+space).

Use the writing conventions for units in table 3.

Table 3: Recommended abbreviations for units

Unit	Abbreviation
Kilobits	kb (spell out)
Kilobits per second	kbps or kbit/s
Kilobytes	kB
Kilobytes per second	kBps or kByte/s
Kilohertz	kHz
Megabits	Mb (spell out)
Megabits per second	Mbps or Mbit/s
Megabytes	MB
Megabytes per second	MBps or MByte/s
Megahertz	MHz

Addressing the reader: Address the reader directly as "you". Use clear, simple English, bearing in mind that the majority of readers will be non-native English speakers. In general, use "the user" or "the subscriber" as appropriate. The reader may be addressed as "you" when writing an informal text in a marketing style.

The addressing of the reader can differ from language to language in particular with regards to formal and informal personal pronouns and this should be covered in other language style guides on how to address the reader accurately.

Referring to Web sites: Use italics for the address, and italics and slashes for routes on the Web site. Always make the addresses "clickable".

Language guidelines

5.4.1.a Provide consistent style guides for technical communicators and translators, covering inter alia: active/passive voice; imperative form; preferred tone; tense; general vocabulary; description of key presses and navigation; abbreviations; acronyms; apostrophes; quotation marks; contractions; genitive form; brackets; commas; hyphens; numbers; units; how to address the reader; and how to refer to Web sites.

5.4.2 Terminology

Having a good terminology process is an important part of writing good user guides. The terminals described in user guides often represent new technology and the terms used to describe new features are not always in everyday use and may have to be invented. To make user guides as easy and comprehensible as possible, the use of the terminology should follow certain guidelines and should be consistent between user guidance and the user interface of the terminal or service. An important step in ensuring consistent use of corporate terminology is the development of a terminology database for source and target languages, as well as providing technical communicators and translators with written style guides. In an ideal world such a database would be accessible and seen by as many as possible and up to date.

It is important to standardize the terminology used within a company and to promote corporate terminology for internal and external users. Internal users would be everyone within the company and technical communicators in particular. External users would include translators and writers of source texts.

Using terminology that is already an industry standard is recommended [1]. Wherever possible, terminology should be consistently used in products and in material relating to marketing, user guides, packaging and user interface.

It is of high importance, that the terminology in all user guides is consistent with the terminology in the user interface. Otherwise the user will be lost and not understand the instructions.

Terminology should be user-friendly. A user-friendly term is:

- not too technical (the user should not have to have a technical background to understand it);
- invisible (the user can use the product without having to stop and think about the new technical term);
- intuitive (if the word is new, it should be easy to guess, e.g. *push-to-talk* is intuitively understandable, *WAP* has to be explained);
- logical in its context, e.g. a terminal menu (people are used to seeing *small-medium-large* in other areas, whereas *small-medium-big* is an unfamiliar combination);
- easy to understand (neutral and plain, do not search for fancy words that are complicated to understand);
- no jargon (e.g. internal project working names) or abbreviations that are not standard;
- it is recommended that the different manufacturers standardize new terminology, instead of inventing their own separate "languages" [1];
- it is recommended to use the same terminology in the user education, the terminal or service itself and in all marketing material, in order not to confuse the user.

Terminology guidelines

5.4.2.a Write in a simple and comprehensible way, use everyday language instead of technical terms and avoid jargon.

5.4.2.b When a new term is introduced, use a word that can be used without a long explanation.

5.4.2.c Technical terms in English may be accepted and well-known in some languages, but not in others.

5.4.2.d Avoid inventing company-internal terms, use instead terminology that are industry standard [1].

5.4.2.e There should be a consistency between all user information and the user interface (this also includes all marketing material).

5.5 Illustrations

Illustrations are a very important way of showing how a terminal functions. Some users prefer words, others understand pictures better. Some actions are easier to show graphically (e.g. how to insert the SIM card), others in words (e.g. how to explain how to send a text message). Illustrations are used to explain basic instructions (e.g. with a mobile phone how to charge, insert the SIM card, what the different buttons are used for). There is, however, a limit as to what can be expressed with illustrations only: very complex instructions (e.g. how to synchronize a mobile phone with a PC) can be illustrated, but not replace the text with the instruction. It is for this reason that a user guide for a complex terminal such as a mobile terminal relying exclusively on illustrations, is hardly a realistic option.

An attractive design will encourage more users to read the printed user guides.

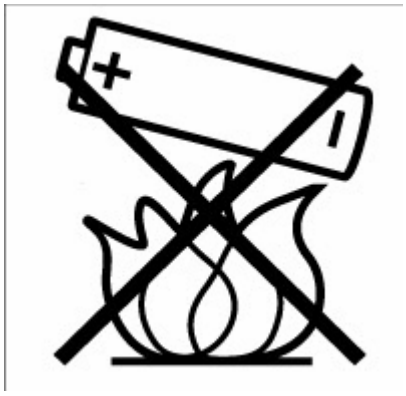


Figure 2: Good example of an illustration

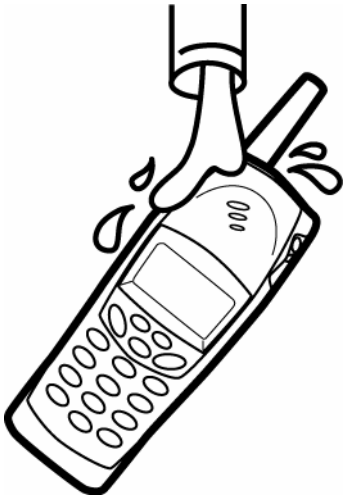


Figure 3: Bad example of an illustration (can be misunderstood as the mobile terminal should be washed). This illustration would need an explanatory text or an over-crossing.

There are some general guidelines for illustrations aiming at producing illustrations that make it easier for the user to perceive, distinguish and understand what the illustration is trying to express. An experienced illustrator will know how to draw them in a pedagogic way. Nevertheless, illustrations are often misunderstood for being simply decorative and the pedagogic value is forgotten [20].

Today, many users have problems with reading complex and long texts. In addition, low literacy problems are still a problem in many countries and societies. At the same time, pictures play a larger role and especially younger people are very good at reading them. Developing user guides should take this into account and try to balance how the information is presented.

- Optimize the correspondence between text and graphic without using text within the graphic.
- Emphasize important actions in pictures. It is important that the user is guided where to look in an illustration, especially if the user it not used to looking at technical illustrations.
- Emphasize important actions by using colours, shadings or line thickness.
- Ensure the illustrations convey clearly that an action should be performed or that it should not be performed (e.g. in case of warnings, see figure 3 as a bad example).
- Reduce complexity (shown details) as far as possible. Only show what is important for the user to be able to perform/understand an action.
- Be consistent in the layout and in the way of explaining an action - the user will then learn how to look for an action and "read" the illustrations the right way.
- Use clear numbering to show task sequences (show all sequences, do not ignore one step because it seems clear that every one has to do this).
- Use icons for information, not for make-up.
- Be consistent in thickness of the lines and the angle of parts shown - the simper and clearer lay-out is, the easier the user will know how to follow an action.
- Use colour, icons, frames, arrows, etc. in a consistent way (use the same colours throughout the description), and be aware that complex illustrations with too many components may appear blurry and make it hard for the user to see what is important.
- Make sure that details/lines shown are clear enough even if the picture is reduced for print (see figure 2). Sometimes it is better to take away some details (e.g. the numbers on the keypad, if they are not the object that is explained - otherwise the reader will be annoyed that he/she cannot see all details clearly).
- Support pictures with text when needed. Complex explanations need words to explain an action, just as some actions are clearer with a picture.
- Reflect the corporate identity in illustrations.
- Use, wherever possible, standardized icons and symbols (see e.g. [6], [11], [12], [18], and [19]).

Illustrations guidelines

5.5.a If icons are used, make sure that they can be used in all countries and are understood the right way. Icons should be a help for the user and not another thing they do not understand (see also [18] and [19]).

5.5.b Make sure the illustration is used to communicate information, i.e. pedagogic, and not only a decorative part (if this is not intended).

5.5.c Simplify, and always take away unnecessary details which only hamper the understanding of the illustration.

5.5.d Avoid the use of the colours red and green together (as the colour-blind will not be able to distinguish the differences).

5.5.e Conduct regular usability studies on how illustrations are understood.

5.5.f Whenever possible, use standardized icons and symbols.

5.5.g It is recommended to include an extra panel page (to fold out the first or last page of the paper user guide) with an overview of the terminal.

5.6 Localization, translation management and validation

5.6.1 Localization

Localization refers to the provision of product and user-guide variants for different markets taking into account local linguistic and cultural differences. This presents a special challenge as the ICT market is a global market and most manufacturers try to market their products globally. In many countries, the localization of consumer products is required by regulation. In addition, a reasonable degree of localization is recommended as users expect to be informed about their product in their own language.

As the costs for localizing products and services are considerable, most manufacturers and service providers restrict their localization efforts to offering different language versions of the user interface (in particular in the menus) and of the user guides. The use of icon-based menus (currently state of the art at least on the main menu level) is an attempt to internationalise aspects of the user interface. Other relevant aspects such as the use of colours or referent objects depicted in icons are usually not varied, even though they are likely to carry different connotations in different cultures. One of the main challenges related to localizing user guides is that as user guides are being completed fairly late in the development process, the localization efforts of user guides comes after completion of master draft, i.e. at a very late stage. Since all last-minute changes to the master also have to be made to all language variants, correct and complete language variants are only available in later editions.

Some relevant aspects of localization include:

- dialect variants of particular languages (e.g. Dutch in the Netherlands and in Belgium (Flemish), German in Switzerland, Austria and in Germany);
- the fact that languages that are written from left to write, must change their order of illustrations when translated into a language that is written right to left;
- visual content (illustrations, icons, pictures, images) may need to be adopted for local cultures;
- use of formal addressing: in some cultures, it is appropriate to address the user in the user interface and the user guide using formal language ("Vous", "Sie", "U", etc.), while in others an informal addressing ("Tu", "Du", "Jij", etc.) may be expected (see clause 5.4.1);
- humour expressed in words and images has to be employed with care as some topics may be offensive in some cultures (e.g. depicting animals);

- there are cultural differences concerning perceived sexism (e.g. German requires the use of male and female terms describing a person in order to circumvent sexism - the "useresse and the user" - while some Anglo-Saxon cultures consider this sexist and require both males and females to be addressed with the male term only);
- english terms might be accepted in some languages, but not in others.

Localization guidelines

5.6.1.a Consider the target languages when producing the source text (as well as illustrations). Be aware of dialect variants, the adaptation of visual content to local cultures, formal and informal addressing, and the use of English-language terms.

5.6.1.b Avoid using humour, jargon and too informal language in the source language, as this can be easily misunderstood.

5.6.2 Translation management

Most ICT products are produced for a global market and are be translated into many languages. As English is the most frequently used foreign language and it is usually easy to find translators who work with translations from English into their native language, the master text is written in English by most producers. The consequence is that many technical communicators do not write in their own first language (even though it is recommended to use technical communicators who write in their own native language). This requires an extra effort to deliver good master texts. It is therefore recommended to have a well structured workflow, with an editor who works with standardization of the language and proofreading and to have close contact with the translators (or translation firm). An important step is to provide a style guide for the technical communicators.

This requires that common writing rules have to be agreed upon and style guides have to be written and used, both in the source and in the target language. It is also important to be aware of common mistakes. An organization should constantly improve the language competence of its staff and continuous contact with native speakers, relevant literature with new usage of the terminology and access to good dictionaries should be maintained. The style guides should address:

- tone;
- style;
- nativism;
- grammar;
- pronouns;
- prepositions;
- capitalization;
- punctuation; and
- general use of expressions.

Additional useful recommendations on how to write in English as a non-native speaker can be found in [33].

Translation management guidelines

5.6.2.a Wherever possible, use technical communicators who write in their own native language, and translators who translate into their own native language.

5.6.2.b Non-native speakers need continuous support when writing user guides.

5.6.2.c To minimize mistakes as much as possible, it is recommended to use as many standard phrases/texts as possible (that have been revised and approved earlier).

5.6.2.d Translators need to be trained in using the word processing tools and the user guide templates; they also need to understand how the product is to be used, ideally by being provided with a prototype terminal or a software prototype. An explanation of how a new product differs from its predecessor may be sufficient.

5.6.2.e The localization process should ensure that the font sets supported by the printing equipment supports all diacritical marks (i.e. special characters) of the target language.

5.6.2.f Differences among languages regarding the total number of characters required for a particular text have to be taken into account in the process (i.e. when a text is translated from English to German or Finnish, the number of pages will increase with 20 %).

5.6.2.g Translators should be provided with terminology databases and style guides.

5.6.2.h Translations should be validated prior to shipping and evaluations of localized user guides with end users (e.g. usability tests or focus groups) should be conducted at regular intervals.

5.6.2.i Follow company language style guides for consistency.

5.6.2.j Use fonts that can be easily localized.

5.6.2.k Avoid file formats that create problems for languages not based on a Latin script. The format used should support Unicode (or a similar standard) and work smoothly for bidirectional languages (written from left or right).

5.6.2.l Re-use translations efficiently (this depends on the quality of the source text, good terminology management, unified style and terminology in the target text, good version control of translation managements/content management, regular clean-ups and good CAT tools).

5.6.3 Translation management with optimized source texts and work flows

Writing a text that is going to be translated into a large number of languages should be done with a number of considerations in mind. A close cooperation with all subcontractors is essential to achieve an optimum work-flow. It is recommended to get the input from the translators about how text/illustrations should be delivered. This will ease the process and make the production more efficient. There are some general recommendations to follow:

- editors and language specialists should help the technical communicators to write as optimized and consistent source texts as possible;
- re-use of phrases in the source text that have already been edited and approved;
- language specialists should investigate which cultural and language specific adjustments have to be made to the target language;
- project managers and editors should have a close cooperation with the group of people who manage the translations (often external partners). The constant workflow from source texts to target texts must have a very clear process, as this is crucial to deliver the mobile terminals at time.

Additional recommendations can be found in [34].

Translation management with optimized source texts and work flows guidelines

5.6.3.a Find a sub-contractor early as the problems that arise are often are not easily solved and the lead times are usually too short.

5.6.3.b Sign contracts with sub-contractors, so that it is clear who has the responsibility to deliver what.

5.6.3.c Build up a long-term cooperation with translation partners, this includes writing style guides for target languages, building processes for text delivery (from the technical communicators, to translators, to printers) and to have terminology available for all involved.

5.6.3.d Optimize the source texts (see clause 5.6.2 for details).

5.6.3.e Write the source text as clear and short as possible (short and full sentences, use the active voice, do not use too many preposition and use standard phrases).

5.6.3.f Use illustrations that are language/translation independent.

5.6.3.g Build up a good feedback process for the work between an external translator and the internal experts, to improve the work from one product to the next.

5.6.3.h Tag texts smartly. Some texts should not be translated freely, and these parts of the text should be tagged in a way that makes it easy for the translator to choose the correct translation. Translation tools can be used to re-use text, but also to lock specific tags for translation (e.g. software references).

5.6.4 Translation validation

It is important to ensure that the style and terminology of a translated text/term correspond to the style and terminology used in the local market and within the company. This can be accomplished by having people who know the local markets and the industry, review the translations (and illustrations). The reviewers can give advice and comments on the choice of terminology and the overall translation to the translators. See also clause 12.

Translation validation guidelines

5.6.4.a It is recommended to use native speakers of the language being validated

5.6.4.b The validator is preferably living and working where the language is spoken and has good language skills in the language to be validated (grammar, style and spelling), as well as language skills of the source text (mostly English).

5.6.4.c The validator is recommended to have good knowledge of the mobile phone terminology in the local market and preferably a company employee (and familiar to the company terminology.

5.6.4.d The validator is preferably not involved in any product development team since we want user-friendly, not too technical language.

5.7 Customization

If a service provider offers customized services for a mobile terminal and offers a customized user guide, the services should be very clearly shown to the end user as the manufacturer of the terminal cannot mention this in the generic user guide.

Aspects of the mobile terminal and the associated user guides that can be customized:

- the menu tree;
- service provider-specific service portals;
- terminology;
- logos;
- illustrations of the mobile terminal;
- user interface strings (help texts etc. in the display of the mobile terminal);
- functionality;
- keys;
- icons;
- reference to the service provider's call centres and Web pages;
- services provided by the service provider;
- information about costs and cost-transparency for the services provided;
- colours;
- default content and examples.

Customization guidelines

5.7.a It is recommended that an early dialog with the service provider includes possible changes in the user documentation, such as menu tree, terminology or icons.

5.7.b If the service provider wants to customize the master user guide or other information, it is recommended to clarify how the material is going to be sent (print files, formats, illustrations etc.) so that no problems arise later on. It is recommended to have a good process for the cooperation.

6 Specific guidelines for paper-based user guides

6.1 General

The most prevalent, traditional, and expected way of explaining a product is still the paper-based user guide. According to internal studies conducted by some major manufacturers of mobile phones, the paper-based user guide is the medium of user education most frequently required by the users (see clause B.3). But even if it is the most frequently produced kind of user education, it still suffers from a somewhat negative reputation, and users typically do not read it carefully enough to benefit from the information offered about the product or service. As a lot of explanatory help and legal issues are published in the paper-based user guide, the manufacturers should aim at making their printed user guides easier to read, more attractive and easy to understand by all customers.

As mentioned above, the long lead time needed for translation (many manufacturers translate their user guides to 40-50 languages) and printing is a problem. It can take up to 20 weeks to produce all printed materials. As the product's software is frozen at a very late stage, this gives the technical communicators very little time to write the user guides and there is no possibility to update the already printed guide.

Manufacturers need to decide on the optimum volume of the printed user guide. A 200-page user guide may cover all problems, but also intimidate the customer. It is of great importance to decide which information to include.

User guides should hide the company-organizational structures, e.g. the user guide for the terminal may be developed by a different team than the user guide for the PC software, and the differences can be seen as inconsistent guidance or terminology. Further, it is often the case that in addition to manufacturer's user guide there is also a separate guide from the operator and/or service provider.

In many cases, it becomes clear after the market introduction of the product, that there are still things that could have been explained better in the user guide: some of the problems users have with a specific feature may only be obvious at a fairly late stage in the product development process. For this reason it is important to evaluate the user guide before and after it is launched (see clause 12) and it is also recommended to collect all "lessons learnt" from new products after launch and implement these changes in future products.

6.1.1 The printing process

As the lead-times for translating and printing the manual are quite long, it is good to solve as many problems as early as possible. Therefore, it is important to contact the printer and to check their capabilities very early in the process.

- Format: Discuss the paper format with the printer. Standard formats are most efficient (A-series: A5, A6, A7). See how many pages are going to be used and decide if the user guide is going to be glued or staple bound.
- Discuss the choice of fonts with the printer, preferably the files are sent in a PDF format with embedded fonts.
- Colour: Create a graphical profile which can be sent to the printers, including colour descriptions and layout. Discuss with the printer if the user guides is going to be printed on different paper quality (the colour can change according to this) and give all printers examples of colour print in both PMS and CMYK as reference. Be aware that that the colours may differ if they are printed in Europe, Asia or the Americas (even if they have the same PMS number).
- Environment: Avoid metallic colours as silver and gold, just as lacquer and laminated surfaces. Preferably, water-based colours should be used.
- Paper: Check with all printers that the paper quality is approved (opacity, whiteness, weight etc.). If a paper format is chosen that uses a maximum of the paper in the printer, the amount of scrap paper is also reduced. Choose a TCF (Total Chlorine Free) paper.

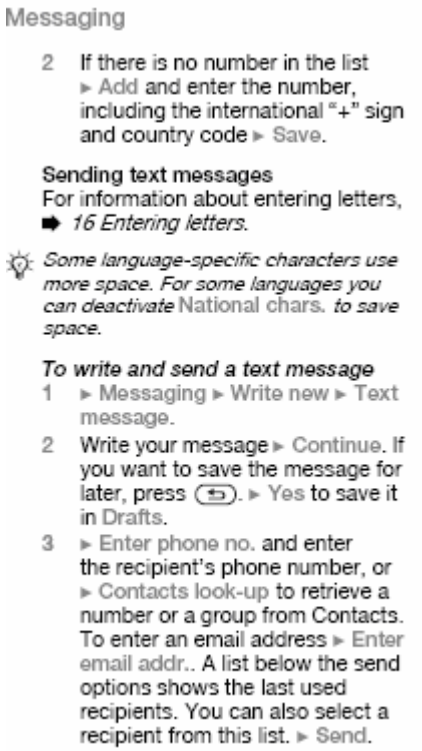
Printing guidelines

6.1.1.a The manufacturer should have close cooperation with the printers to decide different issues as format, paper, colour, etc.

6.1.2 Format and layout

Apart from the practical issues affecting the choice of format, differences in the user friendliness of the available formats also need to be considered. A user guide that is too thick can be intimidating, blurry and hard to follow. A user guide which is too small can cover too little, be hard to read if the fonts are too small and not cover those functions the user wants to learn about. Booklets are the preferred format compared to large folded papers. An internal study reported from one manufacturer on user guide formats documented that users do not seem to appreciate a large folded paper covering all information as it was considered hard to read and hard to handle. It is difficult to specify what a user-friendly format is - it all depends on how fonts, font-size, lay-out, size of the user guide, illustrations etc. work together. It is, therefore, always recommended to use specialists with experience and appropriate education to develop new user guide formats. It is also recommended to conduct usability studies, both on how new features are explained, and on how special target groups perceive a new concept (see clause 12).

The typeface chosen should be readable and the font size a minimum of 10 pt. and with the accurate line-spacing (see also [20]). It is recommended to provide a PDF-file with a larger font size on the Web for visually impaired people (12 pt.), see also clause 11. Usually a choice of serif font is recommended for longer texts, but it is hard to set a rule. Good readability all depends on good layout and it is therefore recommended always to use well experienced staff with a graphical background to build the templates for writing user guides. The following examples show that the chosen style and layout can differ a lot, but all work well, as long as the layout is consistent all through the document and does not confuse the user.



Messaging

2 If there is no number in the list ▸ Add and enter the number, including the international "+" sign and country code ▸ Save.

Sending text messages
For information about entering letters, ➡ *16 Entering letters.*

Some language-specific characters use more space. For some languages you can deactivate National chars. *to save space.*

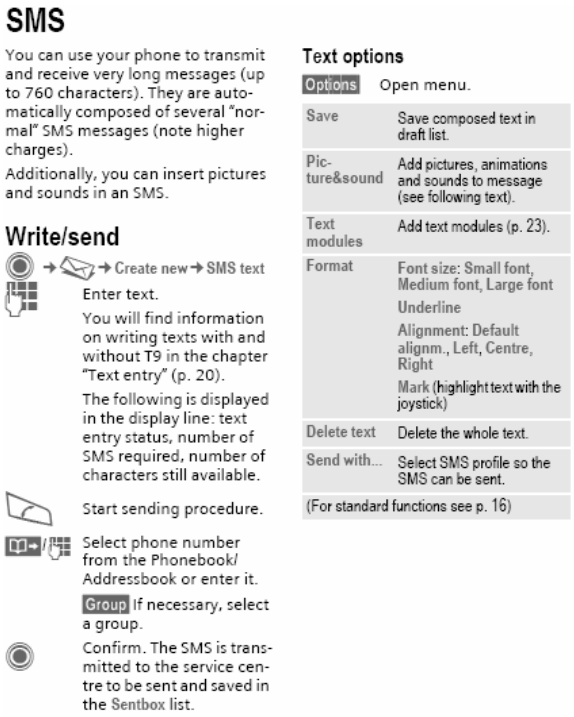
To write and send a text message

1 ▸ Messaging ▸ Write new ▸ Text message.

2 Write your message ▸ Continue. If you want to save the message for later, press (⮌). ▸ Yes to save it in Drafts.

3 ▸ Enter phone no. and enter the recipient's phone number, or ▸ Contacts look-up to retrieve a number or a group from Contacts. To enter an email address ▸ Enter email addr.. A list below the send options shows the last used recipients. You can also select a recipient from this list. ▸ Send.

Figure 4: Layout example 1



SMS

You can use your phone to transmit and receive very long messages (up to 760 characters). They are automatically composed of several "normal" SMS messages (note higher charges).

Additionally, you can insert pictures and sounds in an SMS.

Write/send

→ → Create new → SMS text

Enter text.

You will find information on writing texts with and without T9 in the chapter "Text entry" (p. 20).

The following is displayed in the display line: text entry status, number of SMS required, number of characters still available.

Start sending procedure.

Select phone number from the Phonebook/ Addressbook or enter it.

Group If necessary, select a group.

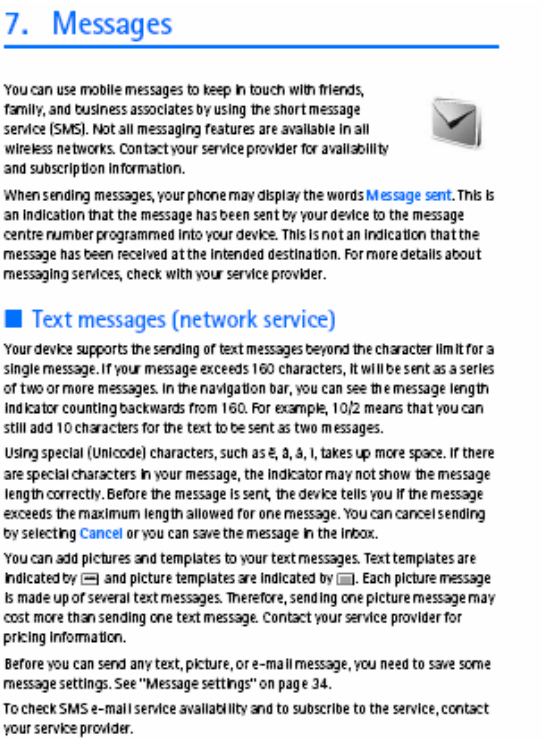
Confirm. The SMS is transmitted to the service centre to be sent and saved in the Sentbox list.

Text options

Options	Open menu.
Save	Save composed text in draft list.
Pic-ture&sound	Add pictures, animations and sounds to message (see following text).
Text modules	Add text modules (p. 23).
Format	Font size: Small font, Medium font, Large font Underline Alignment: Default alignm., Left, Centre, Right Mark (highlight text with the joystick)
Delete text	Delete the whole text.
Send with...	Select SMS profile so the SMS can be sent.

(For standard functions see p. 16)

Figure 5: Layout example 2



7. Messages

You can use mobile messages to keep in touch with friends, family, and business associates by using the short message service (SMS). Not all messaging features are available in all wireless networks. Contact your service provider for availability and subscription information.

When sending messages, your phone may display the words Message sent. This is an indication that the message has been sent by your device to the message centre number programmed into your device. This is not an indication that the message has been received at the intended destination. For more details about messaging services, check with your service provider.

Text messages (network service)

Your device supports the sending of text messages beyond the character limit for a single message. If your message exceeds 160 characters, it will be sent as a series of two or more messages. In the navigation bar, you can see the message length indicator counting backwards from 160. For example, 10/2 means that you can still add 10 characters for the text to be sent as two messages.

Using special (Unicode) characters, such as ē, ā, á, ǐ, takes up more space. If there are special characters in your message, the indicator may not show the message length correctly. Before the message is sent, the device tells you if the message exceeds the maximum length allowed for one message. You can cancel sending by selecting Cancel or you can save the message in the Inbox.

You can add pictures and templates to your text messages. Text templates are indicated by and picture templates are indicated by . Each picture message is made up of several text messages. Therefore, sending one picture message may cost more than sending one text message. Contact your service provider for pricing information.

Before you can send any text, picture, or e-mail message, you need to save some message settings. See "Message settings" on page 34.

To check SMS e-mail service availability and to subscribe to the service, contact your service provider.

Figure 6: Layout example 3

To give a consistent impression that does not confuse the user, it is recommended that the same physical format and layout are used for all printed material. This gives the impression of a graphical consistency and common graphical identity. A very bad example would be an A5 printed user guide in black/white, a CD-ROM-sleeve with different fonts and typeface colour print, legal texts in a folded A7 sheet with another typeface and font size, and a number of differently looking leaflets, all in the same box (and then possibly another design of user information on the Web). Altogether this would make it very hard for the user to find the information he/she is looking for.

Format and layout guidelines

6.1.2.a As a user-friendly concept is a combination of good layout and physical format, it is recommended to work with experienced staff and to conduct usability studies how the consumer perceives the user guide.

6.1.2.b When writing a booklet, be aware of the binding of the booklet, so that all the text will still be readable.

6.1.2.c If a font size is smaller than 10 pt is chosen, it is recommended that a printout with a larger font is made available (for older users and/or people with visual impairments).

6.1.2.d A large print version of the user guide can be offered (e.g. via postcard included with the product) for people who have difficulties with reading small font sizes (see also clause 11.3).

6.2 Formal structure

As mentioned in clause 5.3.3 the structure of the information can be either menu-based or function-based. The choice of structure depends on how the user interface of the mobile terminal arranges the available functionality. It is recommended that the structure and information navigation within the user guide is clear to the user at an early stage (e.g. index, thumbnails, table of contents, colours). The information structure can be built up as following, e.g.:

- Heading 1: includes the main function described (e.g. phone book, messaging, synchronizing);
- Heading 2: includes the actions (e.g. how to save a phone number, send a message);
- Heading 3: followed by a direct instruction;
- Numbered lists: instructions;
- Italics: use for warnings only;
- Body text: explaining an action.

A clear structure will help the manufacturer to keep consistency and a clear layout, which is crucial for the user to understand the paper user guide.

It is recommended that printed user guides comprise the following information (see also [20]):

- cover page with the name of the product and the list of languages in which product information is presented;
- edition number of the user guide;
- table of contents;
- care and maintenance of the product including cleaning;
- legal and safety information;
- in case of a mobile terminal, information on how to start up and charge the device and on how to insert the SIM card;
- first steps to use the phone or services (information about which services are handled only by the operator and where to get information about these specific features);
- display of the menu tree if it is suitable for the product or service (changes in the software will require updates of the menu tree presentation at a very late stage);
- schematic overview of the terminal exterior with labelling of the user-interface elements such as the keys;
- all features of the mobile terminal should be mentioned (if they are not fully explained, a reference where to find more information should be provided);
- other components the terminal interacts with (e.g. storage cards and software for synchronization);
- information on where to find more information or to get further help, e.g. through call centres, Web pages, help in the terminal itself (see clause 7);
- how to navigate within the user guide medium itself (index, keys, and search-mode);
- troubleshooting/Top 10 problems;
- index;
- icon glossary;
- technical data;
- glossary.

A formal structure of this kind makes it easier for the readers to find what they are looking for.

Formal structure guidelines

6.2.a It is recommended that one paper user guide covers one product only.

6.2.b When the templates for the lay-out are produced, this should include the information structure, outlining which format is going to describe which kind of information. This makes a clear and comprehensive layout (as the size is limited and the formats differ, it is very easy to make an inconsistent, blurry, and hard-to-read user guides).

6.2.c If a smaller font is chosen (e.g. size 8 to 10) it is recommended to choose a typeface that has a good readability.

6.2.d The paper user guide should have clear navigational help, such as page numbering, colour coding, thumbnails or cut-outs.

6.2.e The user guide should include a cover page with the name of the product, edition number, a table of contents, sections on care and maintenance, legal and safety information, how to use the product, display of the menu tree, overview of the product, information on where to find more information, trouble shooting, an index, an icon glossary, a glossary, and technical data.

6.3 Logical structure and consistency

Consistency is important not only in terms of layout and language, but also the way in which the terminal and its features and functionality are explained. As many functions need the use of several menus, it can be difficult to explain these in a linear way, e.g. if the user wants to send an e-mail with a mobile terminal this is in one menu but to be able to do this he/she must first have the right settings, which are found in another menu. The technical communicators have to be aware of this and describe the respective features accordingly.

If the information structure is not clear, the users will not be able to find the information they are looking for. In addition, many technical terms are hard to understand and the users might be misled as they may expect a different word for a particular function (see clause 5.4.2).

There are different ways of explaining a product and the order in which features are explained can differ a lot, but the first steps on how to start the terminal, to insert the SIM-card, charge the battery and make the first call should always be in the beginning of the user guide.

Many functions are very complicated and need further explanation that possibly cannot be included in the paper user guide. If this information is provided on a CD-ROM or on the Web, the user has to be clearly informed where to find relevant additional information.

Technical communicators frequently work in a technology-oriented environment with colleagues who use technical jargon. Technical communicators should always bear in mind the fact that the user lives in a very different world. It is therefore recommended to have regular validations and usability studies of the user information to keep a good contact with users and be reminded of their information needs.

Logical structure and consistency guidelines

6.3.a Decide on an information structure before writing user information.

6.3.b Technical communicators should bear in mind that the end user may live in an environment that is less technology oriented.

6.4 Multiple user guidance

As user guidance does not necessarily have to be provided fully in one single guide, and as the manufacturers wish to address as many users as possible (including those with low literacy skills, language problems or those who do not like reading user guides), additional short or quick guides are a useful option. These help users in their first steps with the product and provide help with the main features and functions, explaining them in an attractive and easy-to-read way. It can also contain the special features a specific product is marketed for.

If the paper user guide is not sufficient, a larger, supplementary guide could be provided on the Web. This could be a complete and extended version or just specific clauses on special functionality. Functions that are added at a late stage in product development or just before product launch, can be fully explained on the Web but do require extra time for localisation (see clause 8). When changes are made, the time needed for localization must also be taken into account, as some countries require all information in their own official language.

Multiple user guidance guidelines

6.4.a If information is provided in several guides (e.g. one paper user guide, one Quick guide, one on the Web), the user should always receive clear and precise information location instructions.

6.4.b If a shorter guide is provided with the terminal, additional information can be provided on the Web (see clause 6.5 for on legal requirement guidelines).

6.5 Legal and regulatory requirements (on safety and security)

The paper manual is still where most of the legal information has to be published, as the producer can not assume that the user has access to a PC (see clause 8.2). Therefore, there are legal requirements on the minimum of information and explanations on the product that should be included with the product. In many markets, requirements include information on how to use a product, warnings and safety information (how to use the product in a safe way and information about certain dangers, e.g. Specific Absorption Rate (SAR) values or that very loud ring signals can damage the hearing). Another frequent requirement is that the product should cover all the functionality that is described in the user guide. The legal texts should be provided in the local language(s) and be written and presented in an understandable way. Illustrations or icons should be tested to ensure they are well understood.

The legal texts ***may*** have to include ***(this should always be updated with experts on legal issues!)***:

- warranty statements;
- declaration of Conformity;
- all safety instructions (at the beginning of the user guide), warnings, maintenance etc. and NOT only key ones as they will otherwise not be considered to have been given all; and
- all mandatory legal information to be provided with the phone (and not just the key ones).

Legal and regulatory requirement (on safety and security) guidelines

6.5.2.a The legal texts may have to include warranty statements, declaration of conformity, safety instructions. There are a number of local legal requirements that have to be added to the general and it is always the producer's responsibility to enclose these.

6.5.2.b Legal texts should be written in a way, that a large audience should not have any problems in understanding or reading the text.

7 Specific guidelines for terminal-based user guides

7.1 General

One way of helping the user to understand a mobile terminal or an e-service is to provide help within the terminal itself. The advantage of providing help in the mobile terminal is that the users will always have access to it wherever they are. The only restrictions are the limited size of the display and the capacity of the device to store information. As more and more mobile terminals have larger screens with a higher screen resolution, it becomes possible to give the user some instructions also in the terminal.

Support-In-Device (SID) can be used for various purposes:

- help texts /step-by-step guides: to explain a certain function or service (context sensitive or with an index to search for a specific problem);
- demonstrations: a kind of slideshow which shows the user how to perform certain tasks;
- interactive tutorials: step-by-step interactive instructions, often presented by avatars;
- tips: a collection of useful tips that pop up either when asked (pulled) for or displayed automatically (pushed) to the user when using a certain function;
- setup/configuration wizards: a walkthrough of settings, prompting the user to enter information or entering it semi-automatically, e.g. setting the time and language. Usually, users encounter this functionality when they start the phone for the first time (see [2] for wizards used in the context of set-up procedures);
- search help content within the terminal or from the Internet: Information provided in the terminal itself or through a help side on the Internet (see clause 8).

7.2 Applications for providing help

7.2.1 Help texts

Help texts provided to the user in the terminal can be divided into the following categories:

- feature-based help texts: give the user instructions and explanations how to do something;
- feedback texts: tell the user if the action has been performed correctly (e.g. Message sent);
- error texts / user related: if the users have not succeeded with an action, they will be informed that the action has not been done because something went wrong (e.g. wrong settings);
- error texts / software related: these are displayed in case such as software failure, or the terminal running out of memory;
- failure texts: tell the user that an action could not be completed successfully (e.g. a message could not be sent due to network problems, giving the user the advice to try again later);

- icon glossary: a summary of the icons used in the user guide and / or in the terminal with an explanation of their meaning.

The help texts can be shorter texts or step-by-step descriptions that describe how the user should do something (shown in the display, sometimes the user has to scroll down to see the whole text).

As smart phones are becoming more common and 3G/UMTS is becoming widely spread, multitasking will increasingly be possible. The user can read about what to do at the same time as he/she will be able to perform the action.

In the beginning the help text can pop up directly (push). The more used the user gets to the product, it is recommended that the user can turn off these help texts. The help texts can be stored in the phone, on a memory card or provided to the user via the network.

It is important that the help is context sensitive, so that the user will get help right where they are in the menu.

Just as with all other parts of user guidance, consistency in lay-out and terminology is crucial, especially as the space for explanations can be very limited. It is recommended that the user guide is consistent in terminology and not only within one company, but also as an industrial standard. E.g. for the user it is very hard to understand that "My friends" is the same thing as "Instant messaging". It is also recommended that the same terminology should be used in customized products, regardless of the manufacturer.

As some of our users have disabilities, it should ideally be possible to retrieve the information as text, voice and in print. Then users with visual, hearing or cognitive impairments as well as low-literacy users could have the same access to relevant help information as other users to solve their problems and get ad hoc help wherever they are (see also clauses 8.5 and 11).

Help text guidelines

7.2.1.a The help application should act as a user-friendly "good to know" and "nice to have" information source on how to use the phone more effectively.

7.2.1.b The help application should be easy to access to the end-user also after having seen it the first time.

7.2.1.c It should be possible to cancel the help application at all times.

7.2.1.d It should be obvious when the help application ends.

7.2.1.e The help application should not be composed of too many steps.

7.2.1.f The focus on what is going to be demonstrated should be on usefulness and on needs of customer support (most frequent usage problems).

7.2.1.g The help application should provide a search method for help content.

7.2.2 Demonstrations

Some actions can be shown to the user as a demonstration - a sequence of actions, e.g. how to set the menu language and time. To show the user what the display should look like when an action is conducted has a positive impact on learning. The user can follow exactly how to do something, instead of reading about an action and then carry it out.

The users can choose to learn more about the product whenever they want (e.g. while travelling on a train).

7.2.3 Interactive tutorials and avatars

An on-line tutorial is a computer-assisted instruction technique; it is interactive, user controlled and typically multimodal. The new information is introduced on a step-by-step basis.

The user can also get information via avatars (e.g. the characters providing help in office software for PCs). It has been noted that most mature users are quite irritated about this function, but basic and novice users appreciate this kind of help. It is therefore recommended that it should be possible to easily turn of avatar applications.

In information and telecommunications technology (ICT) the term avatar usually stands for the representation of a user in a (three-dimensional) chat room or in games in which an actor ("Ego") takes an appearance chosen by the user to represent him/her. Avatars are also being used to digitally model humans in product and workplace design. Other uses of avatars include the representation of speakers ("talking heads"). More recently, we see avatars taking up new roles beyond the (visual) representation of a person.

A smart avatar frequently takes over the role of a mediator and/or a translator between the desires and needs of the user and the technical possibilities of the mobile telephone and associated services. The avatar explains under normal conditions not only the technical functions and necessary control steps to the user, but implements and applies these directly.

As "personalization" of the terminal has become one of the key values, avatars can play a big role in future terminals. The characters displayed in Figures 7 and 8 can interact with the user in an "emotional" way [30]. They can get bored, tired, happy etc. If the user sends a mail to another user with the help of an avatar, the character may surprise the user by bringing along something picked up from the recipient's avatar (e.g. a hat).

The advantage of these "useless" features is not to be ignored. Many users are reluctant to use high technology, if there is a way to explain the product or service in a more entertaining way, the learning effect will be much bigger.

Despite all advantages, there are some disadvantages should be pointed out. As the more advanced user can be irritated by being patronized by the avatars, it is very important that the avatars can be turned off. The avatars also require a large amount of resources and can be quite slow (which can irritate the user).

Figure 7: Example of an avatar that acts like a tutor

Figure 8: Example of a personalized avatar (the "personality" of which can be selected by the user)

8 Specific guidelines for PC screen-based user guides

8.1 General

This clause refers to PC / laptop screens rather than those of mobile handsets. The principles of writing text apply to the Web just as much as to writing for paper therefore much of the information in clause 5 will apply here. However, there are differences which mean that the paper-based version of a user guide should never be translated directly to the screen. The screen is a different medium from paper and has limitations. On the other hand, a screen also offers opportunities to present information in a novel way. It is modifiable for different users and can be updated easily.

8.2 Advantages and disadvantages of PC screen-based information

More and more people own PCs and are accessing the Internet. In the enlarged European Union (EU25), only 47 % of the individuals aged from 16 years to 74 years used the Internet (as measured during the first quarter of 2004). More men used the Internet than women, and more young people than old, according to [24]. In addition, the number of broadband access lines deployed across the EU rose by over 72 % in the year to mid-2004, to 29.6 million, when the share of the EU population actually using broadband services was 6.5 % (7.6 % in the pre-accession EU 15 Member States). Broadband take-up is growing so fast that the latest data, compiled since the communication was finalized, suggests that 8.8 % of the EU population now has a fixed broadband connection [24]. This offers an opportunity to provide user education to be read from the screen and, indeed, many user guides are currently distributed on CD-ROMs.

Despite the prevalence of distribution of user education in electronic format, it is important to note that the paper manual is still where most of the legal information is published, as the producer can not assume that the user has access to a PC. Therefore, there is a minimum of legal requirements and explanation of the product that always has to be accessible to the user.

One of the more important differences between reading on screen and reading on paper is that readers scan rather than read text. A study [31] documented that 79 % of participants in a study scanned a Web page, against 16 % who read the entire text. There are a number of differences between screen and paper reading which may account for this difference in reading style and efficiency. These include:

- distance between the reading material and the reader;
- angle of the reading material;
- resolution;
- inter-line spacing;
- inter-character spacing;

- justification;
- intermittent vs. continuous light;
- emissive vs. reflected light;
- interference from reflections;
- posture of the reader; and
- aspect ratio.

These differences bring about some advantages and disadvantages for each medium.

Advantages of screen-based content are:

- content can be updated in real time;
- text can be read in the dark;
- text can be searched for easily;
- text can be varied in size for partially sighted people;
- the reader can be automatically led through text, e.g. by means of links to other parts of the same document or other relevant Web-based documents;
- screen-based documents can be interactive; and
- text can be saved, printed or bookmarked.

Disadvantages of screen-based content are:

- Computers are not always available for use;
- Computers are often slow to start up (not always *instant* access);
- computers are normally in a fixed location;
- prolonged reading can produce eye strain;
- readers scan information rather than read in a linear fashion as they do with paper text; and
- to identify the location of a Web-based document on a complex Web site can be difficult.

8.3 Guidelines for screen-based content

8.3.1 General

One of the first things that have to be said about screen-based guidance is that features (graphics, interactivity, colours, etc.) should not be used just because they can. All aspects of the information, content and style should be there to help the user understand and not be there for entertainment. Using novel features in this way can detract from the information by making it too busy and cluttered. Therefore, simplicity is the key to providing clear, useful information, just as this is the case for paper.

However, there are features which can help the user when information is presented online. For example, when selecting an item from a list (such as contents) the user can then be taken straight to the section pertaining to that item via a hyper-text link. With paper the user is given a reference which they then have to find in a manual. In addition, interactive graphics can be used to great effect on the screen where a procedure can be illustrated much better than using words. The use of variable text size can also help those with special needs (see clauses 8.5 and 11). On the other hand, the opportunity is there to use all available features, such as too many colours, animation, sound etc. just because they are there, but this usually has particularly bad consequences. So the answer then is always to consider the users" needs when considering the use of available features.

As stated earlier, readers of screen contents tend to scan rather than read text. In addition, a full screen full of text is much more cluttered and overwhelming for the reader than a page full of text. Therefore, proper design is even more important when putting a user guide on the Web. In order to overcome some of these issues it is important to use the main components of the Web page: text, space, and graphics, in a useful and meaningful way. However, it is advisable to provide a "print screen" button to easily enable the user to print out relevant sections in a suitable format so they can read from paper. These print outs should contain relevant information only and not the associated control features, e.g. links and margins.

As well as standard Web-based access, more and more people are reading Web-based content from mobile devices. To provide guidance, the W3C initiative provides guidelines for Mobile Web Best Practice [22]. It sets out recommendations together with explanatory information. It is primarily designed for developers and others such as interaction and graphic designers and anyone involved in the mobile value chain. That document complements the guidelines given in the present document.

Screen-based content guidelines

8.3.1.a The additional options available for presenting screen-based content should be used for communicating information and not just for effect.

8.3.1.b Use hypertext wherever possible to break up long pieces of text into multiple pages.

8.3.1.c Use graphics and interaction to enhance the clarity to the guidance.

8.3.1.d Use variable text size to aid users with special needs.

8.3.1.e Appropriate use of headers and different font sizes for structuring should be employed.

8.3.1.f Always provide the user with an easy way to print the screen-based content.

8.3.2 Text

Transferring the paper based guide to the screen can cause problems with text that is too small so it is important to choose a font that is readable on screen. However, this can sometimes be difficult to control on user's computers who may not have the font specified. But, it is possible to use a set of fonts that will determine, on a priority basis, which font to use for display.

It is also important to note that few people read long chunks of text on the screen anyway. Therefore, it is a good idea to enable easy printing of the screen content, perhaps by providing a "Print Text" icon on the screen.

Text guidelines

8.3.2.a Use appropriate fonts for reading from the screen such as the Sans-serif family e.g.: Helvetica, the Serif family, e.g. Times New Roman, and the Monospace family e.g.: Courier.

8.3.2.b Always use colours which are readily available on mass-market PCs.

8.3.2.c Ensure the correct use of colour and colour combinations.

8.3.2.d Ensure the user only prints out the relevant text from the screen and not the control items in the margins.

8.3.3 Space

As stated earlier, too much text on the screen is a disincentive to read, whereas space adds to the organization of text, aids readability, and looks more attractive.

Space guidelines:

8.3.3.a Break the text up into chunks with lots of white space.

8.3.3.b The use of scrolling should be avoided where possible.

8.3.3.c Present information in chunks which represent a single concept, piece of advice, or procedure, and all visible within the window.

8.3.4 Margins

The inclusion of margins in the text is a way of providing space but also provides an area where links to other relevant information can be found, thereby aiding navigation. With a book a reader will have a broad overall geography of the text, beginning middle and end. This is not the case with the Web which does not have the same physical representation.

As an example of text taken from paper and redesigned for the screen, clause 8.3.1 (above) is adapted using the guidelines given here.

Previous | Print Screen

8.3 Guidelines for screen-based content

8.3.1 General

Next | Contents

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Home

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Figure 9: Screen-based version of clause 8.3.1

In the example above (figure 9), good use is made of space, margins, and text layout to provide the general section on screen-based content. Links are also provided to aid navigation and to provide links to information given in the body of the text. If this clause was reproduced on screen directly from the paper layout the screen would be cluttered and navigation would be difficult without the links provided.

Margins guidelines

8.3.4.a Use margins both to increase the amount of white space but also to provide navigation cues.

8.3.4.b Provide links to the previous, next and home pages in the margins.

8.3.5 Graphics and simulation

Pictures should be provided where they help the user to understand the information the author is trying to get across. Images of the terminal and the functions the user is trying to understand can be used on screen. Images like this can often work better than text, but usually work best when provided with text.

In the absence of images, text can use colour and highlighting to emphasize words or phrases. For example, headings maybe in a different colour to the body of the text. Specific colours should also be used for links with a consistent colour being used throughout. But it is important not to use too many colours.

Images can also be animated to simulate user specific procedures or features of a product in use. This can be in the form of a simple animated gif image, a guided tour (see figure 10, [29], animations, or video). Many studies (e.g. [27]) have shown that when first using ICT devices, people often have a user or "Guru" they can turn to when they need help. This is often the first stage in the help process before using a guide. Therefore, simulations, where features and functionality are acted out in an interactive way to show "how" a feature or specific piece of functionality works, are a good substitute to this. Using audio as well as guided tours, animation or video will also enhance the user experience as this provides a much closer fidelity to human interaction (see also clause 9). However, always make it easy for the user to switch the audio off.

"Try out the new Siemens SL55 – simply operate the phone with your mouse:

First, press and hold the on/off/end – key for 2 seconds, open the keyboard and enter a PIN of your choice.

Now, through the menu, you can write and SMS text or MMS multi-media message and insert sounds images and animations."

Figure 10: Guided tour, images can be animated to simulate user-specific procedures or features of a product in use

Care should be taken to offer alternatives to graphics, simulations and colour. Many people are unable to appreciate these due to physical, visual, hearing, and cognitive or neurological disabilities. However, alternative strategies do exist which are mentioned in clause 8.5.

Graphics and simulation guidelines

8.3.5.a Graphics should be used where appropriate for guided tours or animation.

8.3.5.b Use audio together with graphics for a richer user experience.

8.3.5.c Always make it easy to turn the audio off.

8.3.5.d Use bold text and colour to highlight important words and phrases.

8.3.5.e All information should be designed for a minimum configuration PC to ensure access by all users and not just those with high specification PCs.

8.4 Accessibility of screen-based content

As well as the general points above, the presentation of contents from the Internet can be modified in many different ways for people with disabilities. Through work on the Web Accessibility Initiative (WAI) [32], a number of different features have been offered as guidelines. In all there are four principles of accessibility and a number of associated guidelines which are outlined below. These include guidelines for people with physical, visual, hearing, and cognitive or neurological disabilities. It is worth mentioning here also that designing for people with special needs usually enhances the usability of products and services for all.

Screen-based content accessibility guidelines

8.4.a	Provide text alternatives for all non-text content.
8.4.b	Provide synchronized alternatives for multimedia.
8.4.c	Ensure that information, functionality, and structure can be separated from presentation.
8.4.d	Make it easy to distinguish foreground information from background images or sounds.
8.4.e	Make all functionality operable via a keyboard interface.
8.4.f	Allow users to control time limits on their reading or interaction.
8.4.g	Allow users to avoid content that could cause seizures due to photosensitivity.
8.4.h	Provide mechanisms to help users find content, orient themselves within it, and navigate through it.
8.4.j	Help users avoid mistakes and make it easy to correct them.
8.4.i	Make text content readable and understandable.
8.4.k	Make the placement and functionality of content predictable.
8.4.l	Use technologies according to specification.
8.4.m	Ensure that user interfaces are accessible or provide an accessible alternative(s).

8.5 Screen-based user guides presented from portable storage devices

There are a number of technologies which can be used as a vehicle for delivering user education, such as memory sticks, CD-ROMs, and DVDs. CD-ROMs have been around for 20 years and DVDs are now as prevalent with USB memory sticks now mass market and rapidly falling in price. This reduction in cost of all portable storage devices has meant that they are a realistic way of providing information for users, whether this is a user guide or advanced marketing information prior to purchase. In each of these the information is stored locally and is not subject to the variability of the Web, such as speed. In addition, these devices offer interactivity.

There are many similarities between Web-based information and that on portable storage device. They are both viewed on the screen and therefore the limitations of reading from screen still apply and many of the guidelines given in clause 6 are appropriate. However, there are a number of differences which will have an impact on how, and what kind of, information is presented on CD-ROMs and memory sticks. These are now outlined.

The main differences between using portable memory devices and the Internet relate to bandwidth, connectivity, and their ability to be modified.

In terms of bandwidth, the portable device is a medium which allows for more real-time interaction. That is, Web-based material is subject to variability of speed of download, even with the best broadband connection speeds, and has therefore become more text-based than graphical or animated. Because CD-ROMs, for example, are used locally with a PC they have developed into a medium where graphics are highly used together with animation and this is often something that can help in user guidance where the user is shown an example of what to do rather than having to read text. Even the best instructions are avoided by most users who often turn to a person for guidance rather than a user guide. It is with the CD-ROM therefore that the designer should take advantage of the ability to show graphics and animation wherever appropriate.

One of the main limitations for portable storage devices is in relation to people with disabilities. As stated in clause 8.5, the Internet can be designed with a number of different features for people with physical, visual, hearing, and cognitive or neurological disabilities. This is not the case with devices such as CD-ROMs which are relatively more difficult to modify for people with special needs, unless alternative options are built into the CD-ROM at the time of making. This lack of ability to modify portable storage devices also limits their ability to be updated with new information on guidance. To counter their static nature, devices can contain Web links to updates on user guidance as well as other information. This gives them some degree of flexibility. However, care must be taken as Web links often disappear.

Guidelines for screen-based user guides (presented from portable storage devices)

8.5.a Web links should be included with portable storage devices to allow for updates on user guidance.

8.5.b Information should be designed for mass market PCs and not state-of-the-art technology which is owned only by a minority of users.

9 Specific guidelines for audio user guides

9.1 The potential of audio user guides

Audio user guides are a modality of providing user education different from the established and well-known paper-based material. They have a number of advantages:

- audio user guides reach users that do not tend to read printed user guides;
- they offer new ways of learning about the product;
- they are a good way to reach visually-impaired or blind users (in particular for those people who turn blind at a later stage of their life, e.g. as a consequence of diabetes, and who do not learn anymore to read Braille);
- they can be distributed in a number of commercially interesting ways.

There are a number of reasons why some users tend not to spend too much time with the printed user guide that accompanies a new product. Some just do not have the patience to read through the book and use the product straight away. For others, a printed user guide is just not the appropriate medium as they cannot read it, e.g. because of limited reading skills (in the language the user guide is written in) or because of visual impairments.

User education in audio format may reach these and other users offering a new way of learning about the product. Users may listen while they are doing something else (e.g. travelling on a train), or they can focus their visual attention directly on the product while listening, thereby directly trying out a function while it is being explained on the audio guide. This way of interacting with the product may even be perceived as more playful and more interesting than reading a book, thereby attracting those users who otherwise ignore user guides.

While visually-impaired or blind users often learn about new products by sales staff, friends or relatives explaining to them the way a new product is handled, audio guides are a very good way for them to learn about the product independently from others, and at a time they choose.

Last but not least, audio user guides can be distributed in a number of ways that are of little cost to both manufacturer and end user. One obvious distribution medium is a CD-ROM. Given that many products are delivered with CD-ROMs carrying documentation and software, additional audio tracks can often be added at little or no extra cost. As many users are familiar with audio files in MP3 -format, further options of providing audio-based information are the presentation of the audio tracks from the manufacturer's Web site or the possibility for the users to download the files and to listen to them from their own preferred audio devices. Finally, as many mobile ICT devices also offer the functionality of music playback (e.g. of audio files in mp3-format), the audio user guide can be pre-installed on the terminal, to be deleted by the user when no longer needed.

The most significant disadvantage of audio as a medium is related to the linear nature of audio streams making it difficult to get an overview of the material or to browse through it.

9.2 Guidelines for the design of audio user guides

For a number of reasons, an audio user guide is more than a read-out version of the printed user guide. This is because in most cases, the layout and structure of the printed guide requires the text to be translated into a script for verbal presentation.

EXAMPLE 1: The function described in the example in figure 10 cannot be read out directly but needs rephrasing because of the graphical elements and the layout. An appropriate translation of the example would be "In order to reject an in coming call, press the "Reject" soft key visible when the phone is ringing, or press the "End key". (…)".

Visual references are another reason why a printed user guide cannot be simply read out in order to generate an audio user guide. Blind or visually-impaired users who potentially benefit most from well-made audio user guides cannot make use of references to visual aspects of the device. Therefore, components relevant for a feature to be described verbally are best referred to in such a way that makes sense to blind users, too.

Figure 11: Example text from the user guide of a mobile phone

EXAMPLE 2: The function described in the example in figure 11 can be phrased in such a way that a blind or visually-impaired user can follow the description: "In order to reject an in coming call, press the "Reject" Soft key *on the right soft key position* when the phone is ringing, or press the "End key". (…)". This assumes that the position of the name, position, and function of the respective keys has been described in an introductory clause.

Figure 12: Example text from the user guide of a mobile phone

EXAMPLE 3: The text in figure 12 has to be rephrased in order to be comprehensible for a blind user. This could take the form of "Step 1: In the standby mode, press "Names" on the right soft key. Step 2: Press the Down-key five times till you reach "Options" and press "Select" on the right soft key. Step 3:….".

There are a number of requirements on the recording of the audio guide. At the current stage of text-to-speech technology, many users still prefer a human voice to synthetic speech. In case of human readers, the script should be read by professional speakers who have a clear voice and are experienced with putting the right emphasis on the different parts of a sentence to be read. They should speak the language with the (nationally) received pronunciation and without regional dialect.

The text should be read out with a slow to "normal" speed that allows the user to follow what is being said, possibly even simultaneously applying what is being said on the product. Listening comprehension should neither be compromised by storing the recording using too low a bit rate. While a presentation in stereo is not required, the quality of the presentation should not be much lower than that of FM radio.

Since audio is a linear way of presenting information, navigation within an audio user guide is a critical aspect of the guide's overall quality. To support the user in navigating through the audio user guide, each topic should be presented on a separate track each of which should start by naming the issue / function addressed in that track. A list of all clauses / tracks and a subject index should accompany the audio medium, e.g. as a supplement in the CD-ROM case or a text file in the download directory.

If a CD-ROM contains audio and data (mixed mode CD-ROM), it should be configured in such a way as to start in an appropriate mode, depending on the device it is being used with (i.e. by playing the audio tracks when placed in a CD-ROM player, and with a menu when in placed in the CD-ROM drive of a PC).

For mobile terminals that offer the functionality of playing back audio files, the provision of audio tracks with user guidance is an attractive option for both manufacturers and end users. Ideally, these tracks can be played back in the background so that the user can try out immediately the described functions.

Guidelines for the design of audio user guides

9.2.a Layout and wording of a printed user guide should be prepared in such a way as to facilitate the generation of a script as the basis for an audio user guide. If the general layout is relying on visual arrangements, script-relevant information should be generated at the time of writing and embedded in the text file for further processing of an audio guide.

9.2.b In the verbal script, all visual references should be replaced with descriptions that do not rely on any visual characteristics. Reference to specific menu items should be rephrased in a way to redundantly name the menu item and the number of presses required to get to the menu item ("Press down five times to "Options").

9.2.c Professional speakers who have a clear pronunciation, speak the 'standard" or "received" dialect of the language, and who are experienced in reading out educational material should be used for the production of the audio recordings.

9.2.d During the recording, the text should be read in a slow to normal speed. It should not be read too fast with the intention of saving space on the storage medium.

9.2.e If the audio recordings are delivered or made available using a compression standard such as MP3, the resulting sound quality should be close to FM radio and not be below AM radio.

9.2.f Means of navigation should be provided that allow the users to easily identify the section of the recording they are looking for: each function should be provided on a separate track / .mp3-file and each section should always start by naming the topic that is being dealt with in that section. Track lists and an index should be provided on paper or for download.

9.2.g Mixed-mode CD-ROMs should be designed in such a ways as to start the playback of audio files when inserted into a CD-ROM player and to display a menu or list of the CD-ROM's content when inserted into the drive of a PC.

9.2.h It should be possible to play sound files with audio user guidance in the background to enable the user to apply what is being explained in real time.

10 Specific guidelines for other information sources

10.1 User forums

User forums (or fora) are sources of product-related information usually not controlled by the manufacturer. User or Internet forums are Web-based discussion boards usually dedicated to specific topics ranging from politics to self-help groups. Forums also exist for certain product categories and particular products. They usually offer a knowledge base for frequently addressed issues and a space in which every member of the forum (sometimes also "visiting guests") can post a statement or question and thereby initiating a thread on that issue. These threads represent ongoing message-based discussions between two or several respondents. As these discussion threads are stored over time and can be searched for keywords, members and visitors can often find in the forum's archives discussions pertaining to problems they are currently struggling with. Specific forums exists for senior citizens addressing issues of interest to that age group.

Some forums provide product or service-related solutions faster and cheaper than the manufacturer's or service provider's call centres, often offering work-arounds for specific problems that not even the call centre staff are aware of. Forums are increasingly also used for the propose of learning about other users'' feedback about a specific product prior to buying it, thereby benefiting form other people's experiences with that product.

Usually, manufacturers and service providers do not play an active role in user forums. They may, however, learn a great deal about problems users have with their products and how they deal with them. They can also choose to actively participate in forums for their products; however, they should do so openly clearly indicating their role.

Manufacturers and service providers may also choose to point the users to additional information sources, e.g. Web-based discussion forums dealing with their products.

User forum guidelines

10.1.a Manufacturers and service providers should actively monitor discussion threads in user forums dealing with their products and services in order to learn about problems users struggle with that obviously have not been addressed sufficiently with the user guidance provided with the product.

10.1.b If manufacturers or service providers choose to actively participate in user forums, they should do so openly clearly indicating their role.

10.1.c Manufacturers and service providers may also choose to point the users to additional information sources, e.g. Web-based discussion forums dealing with their products.

10.2 Information about mobile services

Information about the availability and functionality of the mobile service offering has a considerable impact on their uptake and use, both within the home network and when roaming.

Most often, in addition to the manufacturer's user guide, further information and guidance applicable to the network operator's and/or service provider's specific, current environment is, or should be, provided. The guidelines provided in the present document should be applied.

Many issues are related to the setup and configuration of these services. For a set of detailed guidelines covering issues such as service agreements, service offering, configuration, activation, security, pass codes, first use, last use and migration to the next network and/or terminal, see [2]. In addition, some specific guidelines are provided below.

Mobile service information guidelines

10.2.a	Provide information about mobile services and their related, precise functionality, including their cost and customer support services.
10.2.b	Inform and guide the user about the precise functionality, set-up, configuration and reliable use of mobile services, including related safety measures.
10.2.c	Marketing messages should reflect the realistic functionality and related cost issues.
10.2.d	Avoid marketing and advertising to and entering commercial agreements with children, as it is illegal in some countries and socially unacceptable in others.
10.2.e	Identify and explain possible functional limitations and copyright and ownership of content restrictions and terms of use in a way that can be understood by users.
10.2.f	Inform the user of any changes to cost and access information.

11 Specific guidelines for maximized accessibility

11.1 General

Older people and users with physical or cognitive impairments are often challenged when using ICT devices and services. This is partly because these terminals and services are primarily designed for and marketed at younger target groups. Consequently, older and disabled users struggle with aspects of these products like:

- keys that are too small and that contain labels printed in too small a font and with insufficient contrast;
- screen fonts that are too small;
- terms used in the user interface (e.g. in the menu) that are novel or in a foreign language;
- maximum response times allowed for prompts (e.g. in menu interaction) that are too small.

These and other issues are well documented and guidelines exist on how to design ICT terminals and services to be designed for and usable by, if not all, but at least the widest possible range of users (see e.g. [7]). Unfortunately, truly designed-for-all terminals and services are rare, as some of the recommended implementations are considered too costly. Moreover, the uptake and use of products by older or disabled users is less than expected if the products are perceived as stigmatizing by the target users. Issues related to the use and connectivity of assistive devices is covered in [4].

Given this state of affairs, older and disabled users depend even more on suitable user documentation. The current practice, however, excludes these users not only from easy access to the terminal or service, but also from being able to consult user education provided in a suitable format (see clause 4). User guides are also becoming an important source of information for choosing suitable products for elderly or disabled end users.

The provision of user documentation in alternative formats that are accessible by users with single or multiple impairments is not necessarily costly, if integrated in the documentation production process. Additionally, it has the potential of benefiting many users, not just older or handicapped ones.

For the purpose of the guidelines presented below, it is assumed that users wear their personal assistive devices when applicable, e.g. correcting their vision and hearing, when dealing with user education material.

11.2 Older users

Ageing should not necessarily be considered a disability, and many people of the age of 75 and older are leading lives without major physical or cognitive impairments. Many older people, however, suffer from one or typically, a combination of several minor impairments, including:

- visual impairments, including the decrease of visual acuity (e.g. by myopia, hyperopia) and forms of visual opacity (e.g. age-related cataracts);
- hearing impairments, in particular presbycusis, the cumulative effect of aging on hearing (Hearing loss usually begins gradually after the age of sixty, and is usually more noticeable in men than women. Over time, the detection of high-pitched sounds becomes more difficult. Both ears tend to be affected.);
- decrease in motoric skills, in particular in utilizing skeletal muscles effectively for grasping, pressing and other fine motor skills;
- decrease in short-term memory, requiring some older people to put more effort into learning something new, often accompanied by difficulties in retrieving previously learnt material; or
- some degree of slowing down of cognitive skills, causing older people to sometimes require more time to assess a novel situation (i.e. elder users of interactive devices or services may require longer times responding to dialogue prompts than younger users).

These changes do not take place overnight, but develop gradually. Furthermore, elderly people are less likely to be familiar with terms and concepts borrowed from computers and other hi-tech products.

11.3 Visually impaired users

11.3.1 Users with mild to severe visual impairments

The main problem for users with mild to severe visual impairments (i.e. those who are not fully blind) is that the font size of the printed documentation may be insufficient and cannot be read without additional assistive devices like magnifying glasses. User documentation printed in a font size of 12 points or larger would improve the situation for many visually-impaired users, but this can be achieved only in exceptional cases such as products specifically targeted at older users. The reason for this is that large-print versions of user guides are costly and many younger users consider very large print uncomfortable to read.

An acceptable solution may be to make available large-print versions of user guides to those who require them. These can be ordered through or distributed by point-of-sales staff, by mail on request (e.g. by means of a post card included with the product), or by download of a large-print user guide from the manufacturer's or service provider's Web site.

Neither the creation nor the distribution of a large-print version of a user guide is necessarily costly if they are well integrated in the entire documentation production process.

The creation of a large-print version of a user guide can be achieved relatively easily by means of templates that generate a new, large-print version from the master document file, keeping intact references to visual elements and the cross references to other clauses within the guide. The resulting version can be a text-based PDF-file for electronic distribution via the manufacturer's or service provider's Web site or email, or for print (e.g. on A4 sheets) by the manufacturer / service provider and mailing to the end user. An even easier solution is to simply reproduce the small-format original (often in A6 or A5 formats) in a larger format (e.g. A4) thereby keeping the original layout intact and eliminating the need for additional editing.

An important issue is that the target users of large-print versions of a user guide need to be made aware of the availability of the additional versions.

Blind users benefit not only from audio-based user guides (see clause 9), but also from text that can be processed by screen readers (pure American Standard Code for Information Interchange (ASCII) texts, MS-Word, HTML and text-based PDF). The advantage of the screen reader approach is that a screen reader can be used to drive a Braille display (for those who can read Braille) as well as a speech synthesizer (for those who cannot).

Guidelines for users with mild to severe visual impairments

11.3.1.a Design additional large-print versions of the user guide in 12-point font size or larger with an accurate layout.

11.3.1.b Provide appropriate distribution channels for large-print versions of user guides (e.g. point-of-sales staff, mailing request via post card, or download from the manufacturer's or service provider's Web site).

11.3.1.c Make the user target group and other relevant parties (e.g. the staff of advice centres for elderly) aware of the distribution channels for additional large-print versions of the user guide.

11.3.1.d Make available text-based versions of the user guide (e.g. PDF-versions that allow the extraction of texts) for blind users to read with screen readers.

11.3.2 Blind users

As not all blind people can read Braille, the preferred option of providing user education to blind users is to use the acoustic channel, i.e. the provision of audio-based user guides (see clause 9).

Blind users that can read Braille benefit also from:

- user guides printed in Braille;
- the provision of a text-based electronic version of the user guide (not e.g. graphics-based .PDF) for reading with an electronic Braille reader; and
- the provision of text-based information on the manufacturer's or service provider's Web page, to be read with an Braille Web browser.

In all cases, text with extensive visual references ("Press the read button") and graphics without associated text will be of limited help to blind readers. As in the case of audio-based user guides (see clause 9), great care must be placed during the writing of the guides on the elimination, wherever possible, of all visual references and on the introduction of all user-interface elements of the terminal. E.g. if the green "send key" has been initially introduced (e.g. as "the large round key on the left-hand side underneath the display"), it may be acceptable to refer to it later as the "send key" or as the "green key".

Guidelines for blind users

11.3.2.a Provide audio-based user guides for blind users, taking into account the respective guidelines provided in clause 9.

11.3.2.b Make available electronic text-based versions of the user guide (either as files or for reading from a Web site) to blind users.

11.3.2.c Make sure that visual references are, wherever possible, eliminated or dealt with in an appropriate way (in particular by using text tags with graphics), as specified in [10].

11.3.2.d If the interaction supports speaker-independent spoken commands, support [5].

11.4 Hearing-impaired users

Hearing-impaired and deaf users benefit from mobile terminals and services inter alia by using them as text phones (through SMS / MMS, video messaging or presence services such as instant messaging) or for signing (using mobile video telephony). Severely hearing-impaired or deaf people may be able to read (typically those who turn deaf at a later stage in their live) or may be illiterate (so-called pre-lingually deaf people, often born deaf and, in many cases, learning sign language rather than reading and writing). Deaf people who can read can in most cases make use of the written user education just as well as the hearing population and therefore do not necessarily have additional requirements.

Pre-lingually deaf users who never learnt to read need other channels for learning about a product or service. In most cases, they receive product information via personal instructions, e.g. through their relatives, caregivers or trained point-of-sales staff. A further possibility is to train call-centre staff to deal with the enquiries of deaf users by communicating with them through text services or signing interpreters.

In addition, deaf users who cannot read may benefit from illustrated guidelines of the kind that are also suited for users with cognitive impairments (see clauses 5.5.3 and 11.5).

Guidelines for hearing-impaired users

11.4.1.a Consider briefing call-centre staff and possibly also point-of-sales staff on how to provide user education to deaf user via text services or signing interpreters.

11.4.1.b Consider making available instructions in the form illustrations without text for some essential functions to benefit deaf users and users with cognitive impairments.

11.5 Users with cognitive impairments

In most cases, users with cognitive impairments will not purchase and set up mobile terminals and services themselves, but will get support from others. Nevertheless, a representation of the most important functions of a device or service that does not rely too much or preferably not at all on language may be a great help for these users and possibly also for pre-lingually deaf users (see clause 11.4). One option is to provide the information in the form of illustrations or comics.

Cognitive impairments with a considerable impact on the design and use of user education material include impairments related to the intellect, memory and language.

- intellect: Intellect is the capacity to know, understand and reason. People suffering from cognitive impairments will have, in a way similar to very young children, considerable difficulties concentrating and paying attention to the same task for a longer time.
- memory: People with impaired short-term memory can forget where they are in a sequence of operations. Therefore, user education material should have a simple input interface which does not burden the memory.
- learning: People with learning difficulties may be impacted by an impaired cognitive instrument, attention and concentration deficits or loss of education.

Guidelines for users with cognitive impairments

11.5.a In order to support users with cognitive impairments, it is recommended to provide well structured information, covering terminal and service-specific aspects and dependencies between these, allowing the users to anticipate required next steps.

11.5.b If used, time-outs should be generous or variable and there should be no need to memorize much information to perform a task.

11.5.c Consider making available instructions in the form of illustrations without text (e.g. comics) for some essential functions to benefit deaf users and users with cognitive impairments.

11.6 Young users (children)

Children, a user population defined in the context of the present document as five to twelve years old [8] are becoming an increasingly significant ICT consumer group. They are often expected to use equipment designed for adults, including the corresponding user guides. The usability and accessibility requirements, including those applicable to user education, of this user group are most often not catered for and this may result in problems such as inability to access services, service abuse and on-line vulnerability to exploitation.

ETSI has studied the issues related to young children's access to ICT [8] and developed design guidelines for the design and deployment of ICT products and services used by children [9]. This clause is to a considerable extent based on [8] and [9], adapting the guidelines to user education issues.

When adopting user guides to children's needs, the following aspects should be considered:

- Physical attributes: Children are smaller and weaker than adults.
- Perceptual attributes: Children perceive the world differently because their sense organs are not fully developed.
- Cognitive attributes: Cognitive development progresses through a variety of overlapping stages throughout childhood, linked to the ongoing process of brain maturation.
- Language attributes: Language is a skill that children begin to develop as toddlers, although they can respond to the use of language by others whilst they are still babies. By the time they reach the pre-teen years most children have a working vocabulary of several thousand words, and have good working knowledge of the essential aspects of the grammar of their native language(s). It is not until they enter their pre-teen years that they develop a sense of abstract aspects of vocabulary.

Children comprehend content differently to adults, as the full set of brain functions of an adult brain do not fully develop until the teenage years, and because their life experience does not provide a comprehensive framework of knowledge with which to value new information and experiences. This affects the ability of a child to comprehend the set of meanings and intentions in information content in the following ways.

Because language skills are developing throughout childhood, children do not have as comprehensive a vocabulary as adults, particularly for words that carry subtle semantic nuances that are differences from the more general words. Reading ability tends to start in children around the age of 4 to 6, although the skill level increases until around the ages of 16 to 18, or as long as full time education continues.

The impression of reality as perceived by children changes, as they develop. It is very difficult for a young child, however, to recognize that the information that they received or the experiences that they have had do not necessarily reflect the norms of the society that they are a member of, or reflect the norms of other societies.

Instructions should be designed in easily understandable and succinct text. Children faced by long instructions are likely to not read them and do something else. Wherever possible, illustrations should be provided. Instructions should be provided in small packages, not to overload the child. Direct commands are preferred to indirect commands. Girls are more likely to read instructions than boys. Illustrations and graphics should be used, where possible, to overcome the understanding of language.

Developing user education material for children with disabilities, also covered by the present clause, should take into consideration a variety of important constraints introduced below:

- Cognitive impairments with a considerable impact on the design and use of user education material addressing children includes impairments related to the intellect, memory and language. Children suffering of cognitive impairments will have, in a way similar to very young children, considerable difficulties concentrating and paying attention to the same task for a longer time.
- Children with an impaired short-term memory can forget where they are in a sequence of operations. Therefore, user education material should have a simple input interface which does not burden the memory.
- Children with learning difficulties may be impacted by an impaired cognitive instrument, attention and concentration deficits or loss of education.

- Speech and language can affect a child's ability to communicate and can lead to associated impairments in social skills. Children with severe speech defects will generally use a symbolic communication medium, progressing, where possible, to the use of text-based communication. Synthetic speech generators may carry the solution.
- Language and literacy impairments may arise from the specific mental functions of recognizing and using signs, symbols and other components of language, from lack of practice in using the language as a result of a hearing or speech impairment, or as a result of under-exposure to language for educational or cultural reasons.
- Children with undeveloped language skills or with language impairments may face risks in most everyday circumstances, if they are unable to comprehend written warnings or instructions.
- Children's sensory impairments are those that affect their ability to experience the world around them. The senses with a specific relevance to the present document include impairments related to sight, hearing, touch and balance.
- Physical impairments with an impact on children's use of ICT include impairments relating to dexterity, mobility, strength and endurance, and less significantly to touch and balance.

For a set of detailed guidelines applicable to the use of and design for children's ICT, see [9].

In addition to the recommendations already provided in clauses from 11.1 to 11.5, the following guidelines apply:

Guidelines for young users (children)

11.6.a	When developing user education material for children, their developmental characteristics (as described in [8]) should be taken into consideration.
11.6.b	Adapt the user education content and delivery formats to children's developing language skills and other perceptual attributes, segmented by their age.
11.6.c	Make all user instructions available in the child's preferred language, to ensure understandability.
11.6.d	Ensure that content presented to children is understood and not potentially harmful.
11.6.e	Ensure a consistent level of readability, language and illustrations style level to ensure understandability.
11.6.f	Ensure that the cultural diversity of children is supported in the best possible way with regard to language and other conventional and cultural variations. For further guidance, see [3].
11.6.g	Consider using shorter line lengths for children than for adults.
11.6.h	Avoid using moving or animated text for instructions in order to keep the message readable.
11.6.i	Allow the selection of instructions in different media format alternatives to cater for children with special needs. See clauses from 11.2 to 11.5 for further details.
11.6.j	Provide instructions and support for adults supporting a child, as they may not be ICT literate.

11.7 Common platform for designed-for-all user education

Manufacturers or service providers may wish to outsource the creation and/or provision of user education for elderly and disabled users to third parties. For this reason, a common platform for user instruction documents that enables third-party manufacturers to develop tools for specific versions of user guides for users with special needs is very valuable.

A minimum common platform for this purpose consists of the inclusion of the measures detailed above at the time of user guide creation:

- include conditional text when writing the user guide with the derivation of a script for an audio user guide in mind (e.g. all text containing visual references is expressed with an alternative wording to be used in the audio guide script; this can be done using global replacing and does therefore not require necessarily a lot of re-writing).
- provide all images / graphics with a textual title or descriptions (e.g. in HTML, use the Alt Attribute) to be used in the creation of user guidance for blind users such as audio user guides or Braille print outs.
- create an alternative template for generating large-print (i.e. 12 point or larger) versions of the user guide. Ideally, this is the only major investment necessary for this purpose as the alternative template generates large-print versions of future user-guide source files with little or no additional editing required. Alternatively, create a template that globally increases the page size (e.g. from A6 to A4) thereby increasing legibility for visually-impaired users.
- allow users to extract text-only versions of the electronic version of the user guide (e.g. text-based PDF) for reading with screen readers (on a Braille display or to be read out with synthetic speech).

Implementing these simple measures form the basis for allowing technical communicators or third-party companies to generate alternative formats of the basic user guide at acceptable costs and within an acceptable timeframe.

A more formal approach for providing guidelines on integrating accessibility components within the document management and publishing process (rather than at the end as just a specialized, additional service) is being prepared by CEN/ISSS [21].

Guidelines for a common platform for designed-for-all user education

11.7.a	Consider the generation of alternative formats as a part of the user-guide creation process, applying a consistent framework that supports technical communicators and/or third-party companies in generating audio-based and large-font versions of the guide.
11.7.b	Include conditional text when writing the user guide with the derivation of a script for an audio user guide in mind.
11.7.c	Provide all images / graphics with a textual title or descriptions to be used in the creation of user audio user guides or Braille print outs.
11.7.d	Create an alternative template for generating large-print versions of the user guide and/or a template that globally increases the page size (e.g. from A6 to A4) thereby increasing legibility for visually-impaired users.
11.7.e	Allow users to extract text-only versions of the electronic version of the user guide (e.g. text-based PDF).

12 Specific guidelines for the usability evaluation of user guidance

12.1 Background

12.1.1 General

The aim of any usability evaluation activity is to ensure a minimum or previously defined level of usability of a product or service. Usability evaluation methods include expert walk-throughs, focus groups, experiments, field observation, heuristic evaluation, input logging, logging of issues raised in customer care centres, surveys, interviews, and performance measures. A comprehensive overview of usability evaluation methods for the design of telecommunications systems, services and terminals is given in [18]. The most important and most frequently used usability evaluation method is the usability test. For usability testing, a distinction is being made between formative and summative usability testing.

Formative usability testing supports the development of the design itself. The tests have the general objectives of obtaining evaluations and feedback on the usability of the overall product or individual features and to spot "usability bugs". A summative approach is used at a later stage in product development to measure the (overall) usability of the product or of individual features against an a-priory set criterion (e.g. 80 % of uses who have never used the product before successfully perform a number of defined tasks).

In product development, formative usability is more important as it helps identifying usability problems that can still be solved provided the tests are conducted at an early enough stage. Conducting formative usability testing is common practise in industry as few companies run the risk of learning about usability bugs in their products only after market introduction.

Both types of usability tests are in most cases conducted in usability labs as opposed to in the actual context in which the user utilizes the device. This is because only the lab offers the controlled environment allowing observation and the collection of data. In addition, the occurrence of particular problems may be infrequent, making a continuous observation of the user "in the field" very cost-ineffective.

While most manufacturers and service providers nowadays usability test their products, the systematic testing of the usability of user guides is not very common. The necessity of testing user guides arises from the aim of providing the users with everything they need in order to be able to have a successful interaction and consequently a positive user experience with the product. At the same time, pressures for cost savings raise the question of what is the minimum amount of user education that has to be provided in order to meet this aim.

Questions like the following ones can only be answered through usability evaluation:

- Is the information provided appropriate for (novice) users to successfully set up the terminal or service for first-time use?
- Can (novice) users locate, understand and implement relevant instructions for a problem they encounter using the device or service in the post-purchase or ownership phase of the product life cycle?
- Is the information provided too redundant, is there room for reduction or are the instructions already described in too condensed a format?
- Are basic concepts (e.g. the use of soft keys) already known to a large section of the target population so that they do not need to be explained (or only in secondary sources)?
- Are new technologies and features covered properly in the user guide?
- Are the physical formats of the user guide (e.g. size of the user guide, font size, information structure, readability, etc.) appreciated and can the instructions be understood by the user?
- Does the user guide provide help in typical and repeating problems?

In other words, usability testing with the focus on the user guide looks at how the user guide is being used, whether it delivers the required information, whether it is structurally adequate and delivers the right amount of information in a comprehensible language, i.e. whether it is usable by the (target) user population.

There are established ways of conducting usability tests of products. Suitable methods for usability testing user guides deviate from those in few but important ways which are addressed below.

12.1.2 Usability and accessibility of user guidance

The most widely recognized definition of usability is based on ISO 9241-11 [16], where usability is defined as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". The three components of usability are defined as follows:

- Effectiveness: The accuracy and completeness with which users achieve specified goals.
- Efficiency: The resources expended in relation to the accuracy and completeness with which users achieve goals.
- Satisfaction: The comfort and acceptability of use.

In usability testing, these are operationalized to measure (a) whether the user was successful at all in completing a specific goal (effectiveness), (b) the resources (often measured in time or number of attempts) required for task completion (efficiency), and the comfort and acceptability of the experience for the user and other people affected by the use (satisfaction). For the usability testing of user guides, these measures have to be operationalized in order to cover the usability of the user guide as opposed to the terminal or service itself (see table 4). In practice, the user guide will always be evaluated in conjunction with the related product or service as the isolated test of the user guide alone is little meaningful.

Table 4: Usability criteria of products and user guides

	Products	User guides
Effectiveness	The accuracy and completeness with which the users achieve a specified goal when using a product (e.g. the user was successful in making a call to a particular number by using the "Missed Calls List" feature of a mobile phone).	The accuracy and completeness with which the users achieve a specified goal when consulting the user guide (e.g. the user was successful in identifying and understanding the "Missed Calls List" feature as described in the user guide, enabling him/her to use the feature successfully).
Efficiency	The resources expended in relation to the accuracy and completeness with which users achieve goals when using a product, e.g. how many attempts and how much time were required (e.g. the user managed to make a call using the "Missed Calls List" feature of a mobile phone at the second attempt after 160 seconds).	The resources expended in relation to the accuracy and completeness with which users achieve goals when consulting the user guide, e.g. how many attempts and how much time were required (e.g. consulting the user guide, the user managed to find and understand the section that explains how a call is made using the "Missed Calls List" feature, the user succeeded after 240 seconds and after referencing the subject index three times).
Satisfaction	The comfort and acceptability of product use, e.g. expressed in a 5-point satisfaction scale (e.g. after using the "Missed Calls List" feature of a phone, the user rates his satisfaction with using this particular feature of the phone with a "2" on the five-point scale.	The comfort and acceptability of user guide use, e.g. expressed in a 5-point satisfaction scale (e.g. after consulting the user guide in order to learn about the "Missed Calls List" feature of a phone, the user rates his satisfaction with using the user guide with a "2" on the five-point scale.

A very important additional aspect of usability testing user guides is the assessment of accessibility aspects. Accessibility has to be considered at various stages of the test design, in particular in the case of test tasks, questionnaire design and subject sample selection.

The main question to be answered in the test is whether the user guides (e.g. paper-based user guides, support in the device, or Web-based information) provide the right information to enable users (represented by the test subjects) to successfully make use of the functionality of the terminal or service (represented by the test tasks). The test method is an operationalization of all factors relevant for this question.

12.2 Methods

12.2.1 General

Common to most usability test methods is the user-based observation. Standardized test tasks to be performed using a test object (e.g. a product) are put to members of a pre-defined sample of test subjects. These test subjects are usually observed while performing the tasks either by an experimenter who takes notes in real time or by capturing the test session with audio-visual equipment for later analysis. After each task and after completing the sequence of tasks, the subjects fill in questionnaires about their experience with using the product for the completion of the tasks. The questionnaires contain standardized items suitable for quantitative analysis with rating scales capturing the usability dimensions effectiveness, efficiency and satisfaction and other parameters of interest. The data are analysed and the results are reported, often with concrete recommendations.

In a usability test of a terminal, the main interest frequently is to assess whether the user interface is enough self explanatory to enable the user to successfully use the device or service without having to consult a user guide or other means of user education, or if it provides sufficient support in problem solving. In tests of this type, the test subject is given a task to be performed using the terminal or service with a user guide present but with the instruction of first trying to solve the task without consulting the user guide and only to use it if unable to continue without it. The experimenters observe the test subject taking notes of whether and when the user guides are being consulted.

In a test of the user guide, the focus is on the quality of the documentation. Hence, the test subject is instructed to read the relevant section of the user guide when asked to perform a particular task, even if he or she is certain that they can solve the task without reading the user guide. They then perform the task on the terminal or service and fill in questionnaires that focus primarily on aspects of the user guides as opposed to the device or service.

In case of international or global products, both the products and the user guides should ideally be tested locally in the different markets.

12.2.2 Test tasks

The choice of test tasks is a very critical aspect of the design of a usability test of user guides. This is because a user guide can hardly ever be tested entirely since the length of a test session is limited (usually not exceeding two hours). Criteria for choosing test tasks are:

- "Warming-up tasks": simple tasks that in most test subjects are likely to be able to perform; examples are to turn on the terminal or to accept an incoming call;
- essential tasks: functions that in real life every user has to be able to cope with, e.g. initial set up of the terminal or service for first-time use;
- new functionality: testing the description of functions that have not been available in previous versions of the terminal or service;
- re-designed sections of the user guide, e.g. after introduction of a new style or format, or if a shortened version is available (in the latter case allowing comparison with results for the original versions to assess whether users understand it equally well).

As test subjects will differ in the speed with which they perform the tasks, not all test subjects will be able to perform all tasks in the allocated time. The order in which tasks are presented is therefore also important: a critical function should not be tested as the last task in the sequence as only part of the subject sample will perform it in the permitted time. As a rule, the task order should be balanced across the subject sample (e.g. the first half of the sample performs task order 1, 2, 3, 4, 5 and 6 while the other half perform task order 6, 5, 4, 3, 2 and 1).

12.2.3 Materials

All materials should be provided in a standardized form, e.g. written instructions ensure that experimenter effects are reduced. Materials to be tested (i.e. the product and the user guide) should be presented in the same format a future user will encounter them when using the product, including localization. All other documentation should be optimized in terms of their presentation to make sure that all test subjects including those with visual impairments can use them without effort.

A typical usability test of a user guide includes the following materials:

- General instructions: these inform the test subjects about the general background of the test, stressing that it is not them who are being tested but the product or user guide. Written format is preferred to reduce experimenter effects.
- Task instructions: these describe the tasks, often embedded in a usage scenario.
- Questionnaires: these are administered after each task and sometimes additionally after the last task. They include items on usability criteria measured with standardized rating scales. In addition, there is usually a questionnaire on the characteristics of the test subject (e.g. age, gender, experience).
- The terminal or service described in the user guide: these should be as close as possible to the final version of the product even though good results can sometimes be achieved with hardware or software prototypes.
- The user guide to be tested: the user guide, too, should be in a close-to-final version. If the final version accompanying the product will be an A5 or A6 booklet, it is not appropriate to test a version printed on A4 sheets.
- Observation leaflets: these are not used by the test subjects but by the experimenters who use them to protocol events occurring during a particular section of the test (e.g. Task 4, "subject goes to subject index, goes to page 27, goes to table of contents, goes to page 19, reads section, performs task successfully, total time required 3:34 min"). Protocol leaflets usually are forms to be filled in by the experimenters and can also capture comments and recommendations uttered by the subjects.
- Audio-visual materials: audio-only or audio-visual recordings for latter in-depth analysis. When employing these, the subjects have to give their consent for the recording at the beginning of the test.

12.2.4 Sample

Meaningful results can rarely be obtained with sample sizes smaller than 20 - 24 test subjects even though in formative testing, problems may become visible after running fewer subjects. Criteria for subject selection include:

- the test subjects should be representative of the product's target populations, i.e. for a test of a user guide for a product targeted at teenagers, the majority of the test subjects should correspond to that age group.
- the test sample should always include users from outside of the products target group as eventually the actual users of the product may differ from the group initially targeted by product marketing (i.e. a mobile phone targeted at business users is bought primarily by young users because they like the industrial design or a particular feature).
- in every usability test, older and / or handicapped users should be represented unless future use of the product by this group is extremely unlikely (e.g. a usability test of a user guide for a low-feature mobile phone is being run with two subjects older than 65 years with visual and auditory impairments typical for this age group).
- individuals should only be invited to a maximum of two tests for a particular product class because otherwise the become "experts" and are not representative anymore of the target population.

12.2.5 Analysis and reporting

The observation and questionnaire data are analysed using appropriate statistical methods. In most cases, descriptive statistics (frequencies and means) are reported, inferential statistics such as T-Tests and Analyses of Variance (ANOVA) are the exception as sample sizes usually are too small for employing these procedures. In addition, the readers of the test reports may not necessarily be trained in interpreting the results of inferential statistical procedures.

The report should present all the necessary information about the test in a concise way. One standard format for reporting usability tests is [17].

Any usability test report should include at least:

- Test purpose and objectives: e.g. test of a new format of a user guide, comparison with previously collected data on the old format, guideline.
- Description of the tested product: e.g. description of the new format, explanation of the ways in which it differs from the previous format.
- Description of the context of the test: e.g. experimental setting, environment, further aspects of the situation in which the test has been conducted: e.g. the test was conducted in the company's usability lab in Week 34, sessions lasted two hours each.
- Description of test tasks and associated use cases: e.g. Task 3: "While shopping, you failed to notice that someone tried to call you. Find out who the caller was and ring him/her up".
- Details about the participants (total sample size, selection criteria, and subgroups, if any): e.g. 24 subjects took part in the test, 12 men and 12 women, average age was 35.7 years with an age range from 16 to 67, etc.
- Description of the test method and test process: e.g. The subjects were welcomed and briefed about the main purpose of the test. They then filled in a questionnaire about their own background. This was followed by the instructions for Task 1.
- According to ISO 9241-11 [16], statistics to the usability factors effectiveness, efficiency and satisfaction should be presented: e.g. tables 2 to 7 show the mean questionnaire results for Tasks 1 to 6.
- Recommendations resulting from the test: description of the ways in which the user guide and/or the product can be improved.

12.3 Usability evaluation and testing with children

Most guidelines provided in this clause, as well as many documents produced on usability testing and evaluation methodologies, apply mostly to adult users (for a review of recommended techniques, see above and [18]).

Not all of these techniques are appropriate for use with children; in particular the child's age, gender, verbal competence and extroversion level can affect which method will work best. In addition, user guides for terminals and services that are intended for children's use need to take into consideration the child's language abilities, their understanding of metaphors and analogies, and the way in which they are likely to navigate through these. In addition, usability findings for adults cannot always be generalized to children, e.g.:

- animation and sound effects are perceived as positive design elements for children, while often a nuisance or obstacle for adult users;
- children rarely scroll pages and interact mainly with information that is visible without scrolling up or down;
- surprisingly, half of the children taking part in a study [28] were willing to read instructions, commonly a last resort for adult users.

Usability testing with children is covered in detail in [9] and issues related to the development of new technologies are addressed in [35]. In the present clause, we provide the most important guidelines we recommend to be integrated in the usability evaluation process of user guidance, based on [9].

Heuristic (or rule-based) expert evaluation is a technique often used for evaluation of ICT products. For this technique, usability experts review parts of or the entire functionality of a device or service, applying a set of well defined rules, based on users" and behaviour, when interacting with the product. As this method is more mature applied to products used by adults, it may be less reliable for children's products (also as it is more difficult for an adult to perform on a level assuming children's perceptual and cognitive abilities).

There are many different techniques which encourage the test participant to talk about what they are doing or thinking during the test session. The techniques can also explore the source of the usability problems. The variations of the techniques include:

- Thinking Aloud, where the subject has to think aloud during the whole session. Children may need prompting to think aloud if they go quiet during the session. This can have a distorting influence on the outcome.
- Active Intervention is similar to think aloud but the experimenter asks the subject questions during the interaction.
- Retrospection consists of undertaking a standard usability evaluation while recording it on video. The test subject then watches the video with the tester and questions are asked during the play back. The disadvantage of this technique is that the test becomes at least twice as long and may be a problem for children who have limited attention spans. The question of legal issues in the use of video with young children needs to be addressed.
- It has been suggested that Co-Discovery, where two child users work collaboratively on the tasks set by the experimenter, can overcome the problem of evaluator intervention. The assumption here is that the children will behave more naturally with another child than with the experimenter being present. Richer data will be gathered about the opinions and expectations of the children. The disadvantage of this technique is that it uses twice as many test subjects.
- A further technique is Peer Tutoring where one child tutors another child. The second child then tutors a third child and so on. The main problem with this technique is that the child who is tutoring can take over the task, and competition can get in the way of co-operation. When considering any co-operation test situation it should be remembered that the way children play changes from parallel to co-operative between the ages of 2 and 5. This also depends upon when the child starts school.

Active Intervention is the method which leads to most verbal statements within a limited time frame and number of subjects with 6 years to 8 years old.

Table 5, based on [9], summarizes recommended methods to be used with children at different ages, together with some key characteristics:

Table 5: Appropriate usability testing methods in relation to a child's age

Method	Age relevance	Comments
Thinking Aloud	Most useful for 8 years to 14 years old.	Children have varying abilities to verbalize.
Active Intervention	Produces best results for 6 years to 8 years old.	Place questions on a piece of paper next to child. A script is required.
Retrospection		Test becomes twice as long and may be a problem with attention span. Legal issues with regard to video use and children.
Co-discovery	Cannot be used for children under 5 as they do not co-operate.	Two children work collaboratively and therefore requires twice as many test subjects.
Peer tutoring		Child who is tutoring may take over the task.
Post task interview	Better than questionnaires for 4 years to 7 years old.	Children may not be able to express their opinions. Ask questions after short tasks due to short attention span.
Post task questionnaire	Can be used for 8 years to 11 years old if is simple.	Only use positive question structure.

12.4 Conclusions and guidelines

Conducting a usability test of a user guide requires roughly the same resources in terms of time and budget as a usability test of the product itself. The methods for the two types of test differ in few but important aspects. Investing in both types of tests is worthwhile as usability tests are the major tool for identifying weak points in the product and the user guide and for ensuring that minimum quality standards in usability are being met.

Guidelines for the usability evaluation of user guidance

12.4.a User guides should be usability tested in order to identify faults in them and to ensure a minimum level of usability.

12.4.b User guides should be tested applying established usability criteria [16] and established test methods ([18] and clause 12.2).

12.4.c When undertaking any involvement of children in usability evaluation or trials, relevant agreements from the parents/carers of the children should be obtained prior to the activity.

12.4.d Usability evaluation and testing methods should be chosen carefully to ensure the best possible age relevance and applicability by other means.

Annex A (normative): Guideline listing

In table Annex A, all guidelines presented in previous clauses of the present document are collected and listed (no new guidelines are introduced), in order to assist the use of the present document as a checklist. The guidelines carry an indication about the clause they can be found in, for further details.

These guidelines should be regarded as a minimum, common, basic set of guidelines, applicable to the development, presentation, and evaluation of user education such as paper-based user guides or digital help systems for mobile terminals and services.

Intended users of the present document are user experience and interaction design professionals, developers of mobile terminals, services and applications, mobile network and system providers, terminal approvers, standard writers, product managers and developers. Other stakeholders who may benefit from its use include service and application providers, virtual operators and others.

The focus of the guidelines provided in the present document is on public mobile network terminals and services but they are mostly also applicable to other technologies, e.g. cordless or IP-based (unlicensed) telephony and Wi-Fi.

The guidelines provided have been developed by experts with considerable expertise in technical communication and have been discussed and agreed with key players of the ICT industry in a consensus-oriented way. They have also been presented at various conferences and dedicated requirement collection and consensus building workshops.

They will improve the user experience of the user education, if considered and supported in designs, specifications and implementations. However, it should be noted that the guidelines provided in the present document should only be regarded as enabling, not guaranteeing, the creation of user education material meeting the above discussed goals.

Generic guidelines

Annex B (informative): User needs and segmentation

B.1 User needs and influencing factors

Providing users with the most suitable user education guidance enables the best possible use and is therefore part of the overall user experience. As a consequence, when user education material is developed, the developers need to be aware of the:

- main user characteristics;
- support need the users may have; and
- contexts in which the users apply the support material.

User needs for user education are influenced by numerous factors. Technology-related factors that influence the usage of documentation include the complexity, the sensitivity or fragility of the product, and the level of self-explanatory concepts. The perceived level of complexity decreases with an increased user product awareness and experience of use:

- the more complex the product, the greater the need for user guidance. User guidance becomes more relevant with devices that require a considerable amount of setup and configuration (e.g. an SLR camera or a VCD) or complex technology handling (e.g. a camcorder or home appliance networks).
- conversely, there is less need for user education with ICT products and services that require no (or very limited) setup and configuration to be performed and/or are used for straightforward, basic functions.

The more afraid a user is of "breaking" something, the greater the need for user education. This is closely related to aspects of complexity (e.g. when opening the battery cover of a mobile telephone, the handling of a memory card or the fit of physical connectors).

There are considerable individual and cultural differences in how people use education material. Individual attitudes to user guides stretch from ignoring them completely to reading them cover to cover, before touching the product for the fist time.

Cultural differences have an impact: there is evidence (from company-internal studies) suggesting that in some cultures (e.g. Germany), people are more likely to read (at least parts of) a user guide than in other cultures (e.g. Italy). In some cultures (e.g. China), reading a user guide is considered a weakness (even though they are actually read but it isn"t necessarily admitted), in others (e.g. India), the natural preferred instantiation of user education is the salesperson, and the product or service is used for the first time in the presence of friends or family. For further multicultural aspects and guidelines, see [3].

The challenge is to motivate users to spend some time with the user education material provided with their product, and to let them discover the various opportunities provided by the product or service. The use of documentation depends on the following parameters:

- users knowledge of the product category;
- familiarity with technical devices;
- the personal environment;
- willingness to explore a product;
- experiences with user education; and
- attitudes towards user education material.

B.2 User segmentation

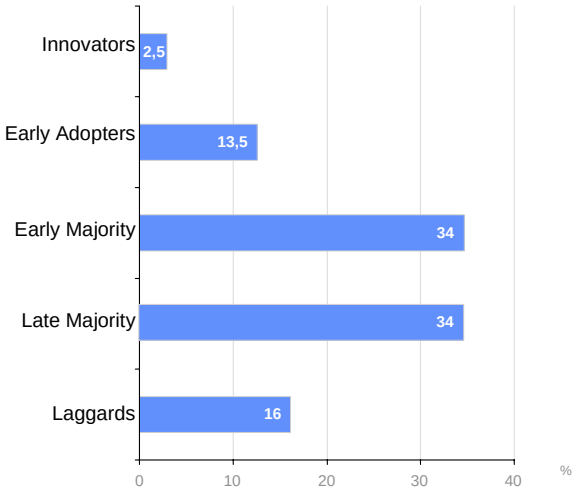
In order to provide optimal user education and optimized supportive tools, it is necessary to understand the user needs, abilities and requirements before designing for it. In the following clauses, we first look at ways to describe and identify the target users, before proposing certain methods for how to segment and study them.

One way to identify and understand the users is to start from individuals and then generalize learnings to wider audience (e.g. Personas method or Contextual inquiry). The other approach is to study the larger user categories and identify typical user characteristics. The three dominant ways to categorize users are based on:

- Level of expertise: novice, casual, and expert users.
- Technology adoption and product buying behaviour: Early and late adopters.
- Segmentation in accordance with well defined concepts, e.g. lifestyle segmentation.

The most applied user categorization defines **novice, casual and expert users,** which predicts the ability to understand how to use new products and services. This categorization describes user's experience with the specific user interface, knowledge of the task domain, and experiences about ICT in general. A novice user has no (or only minimal) experience with the task domain and the system. A casual user is a person who is using the system intermittently rather than having the frequent use that an expert user has. Learning curves are different for novice and expert users. User education optimized for novice users is typically easier to understand but less efficient. User education focusing on expert users may be harder to understand but more efficient.

Rogers [38] presents a categorization based on **technology adoption**: innovators, early adopters, early majority, late majority, and laggards, each playing a different role in the development of technology. In the early days of a technology or product, the innovators and technology enthusiasts drive the market and shape the need for user education. In the later days, the pragmatists and conservatives dominate with the need for convenience and solutions, including user education. The innovators and early adopters are only a small percentage of the market. The big market is with the pragmatists and the conservatives (Figure B.1).



Based on the innovation adoption curve of Rogers (1995)

Figure B.1: New technology adoption style

Innovators and early adopters are driven by the challenge of the new technology. Either they are visionaries and enthusiasts who are willing to accept the risk associated with the new technology for the benefits of its promise, or the urgency of their needs makes the use of the technology mandatory.

"I like to buy the latest technology but only after considering which is best", admit the early majority group. The late majority rather said that: "I like to buy products that have proven technology rather than simply the latest technology".

Early and late majority groups are pragmatic and conservative, preferring to watch and learn from the experience of early adopters and see why and how the new technology creates value, and are willing to wait and search for a good price.

The last part of the users is laggards: "I only buy new technology when it has become standard and there is no alternative". They really are the sceptics toward new technologies. They avoid change and only do it when there is no other choice.

The user education should address the various needs of those different users. The motivation and need to apply user education material has great variation between these groups.

In **lifestyle segmentation**, detailed or deep knowledge is uncovered about users" real-life usage patterns. ICT development can be technology-driven, productivity-driven or appeal-driven. Many current consumer products can clearly be seen as appeal-driven rather than technology- or productivity-driven. For example, digital watches are not often sold based on the technology or functions of the product, but the product marketing tries to approach different consumer segments by emphasizing, for example, quality, trends, price, brand, lifestyle, emotions or personalization. Also mobile terminal industry has entered appeal-driven product development, where the products are developed and marketed to consumer segments. Marketing literature defines central variables for user segmentation, including:

- demographic aspects: age, gender, occupation, income, education, family size, literacy;
- geographic aspects: region, city/metro size, density, climate;
- psychographic aspects: lifestyle, personality;
- behavioural aspects: benefits, user status, usage rate, occasions;
- socio-economic aspects: income levels, social class;
- product usage aspects: consumption levels (e.g. heavy, medium, light, non-users); and
- benefit aspects: what factors weigh in selecting a product.

People think, act, and are active makers of their physical and social reality. Relationships between people, organizations and technology are not fixed but are constantly changing. Hence, people and knowledge about people changes in the long term, in contrast to knowledge about material and data. For example, mobile phones have changed communication patterns, even lifestyle and communication culture of larger groups. People learn new attitudes and behaviours by observing others' actions and the consequences of their actions. Hence, the lifestyle segmentation based knowledge, especially in the fast developing area of mobile communication, expires fast and requires constant updating.

In some cases, such as in the introduction of an innovation of new technology, it is useful to look at very special user groups to find out user education needs. It is often the case that users of existing technologies and services are functionally fixed and therefore find it difficult to use knew features and functionality – not able to think outside the box.

It seems extremely difficult to determine the demands of tomorrow's markets via traditional market research methods. Lead user methods takes a different approach as it is not based on current users but lead users. Lead users are those who present strong needs which will become generalized in the marketplace months or years in the future. Lead users also profit strongly from innovations that provide a solution to those needs. The lack of functional fixation makes lead users very appealing to product development – lead users do not base their views on existing products but on their needs. Examples of lead users include:

- people with special abilities or disabilities;
- people with special professions, interests, skills or hobbies;
- professionals with a clear perception of their work situation and wide and detailed ICT knowledge; and
- groups of people with common interests, such as bird watching or golf.

B.3 Studying users

Assumptions about users should be based on detailed knowledge that can be gathered through:

- field studies;
- market research;
- usability testing (see clause 12); or
- user needs analysis.

The role of context is important in the development of user education, and should be an integral part of the user studies. Due to the nature of mobile terminals and services, the needs for support and education emerge in all possible contexts, such as:

- selecting a new product/service in the shop or at home;
- unpacking a product or configuring a service;
- trying out a new function;
- when a device or service malfunctions;
- when the user is out of mobile system coverage

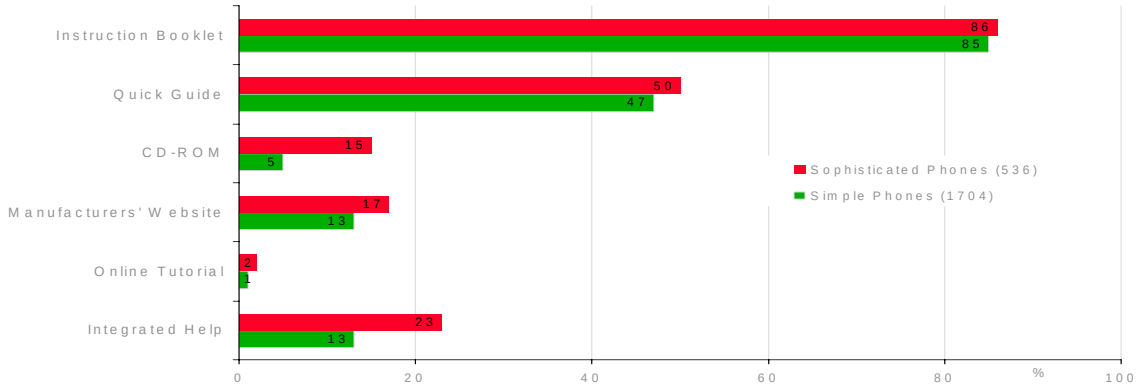
The context defines which support element is available for the user and which element the user decides to use. The context can be physical, technical or social.

Printed education, such as printed user guides, is not carried along and hence not available most of the time. Support in the terminal cannot be used in cases when the device is broken or lost. Online education (on the Internet) is accessible easily through public or private computers, but difficult to use when accessed via mobile terminals, due to bandwidth and screen size limitations, performance and cost factors. Call-centre support is available in most contexts, but in many cases they are associated with long waiting times may be too expensive to use from abroad.

User education is needed to explain the capabilities of the terminal or services offered, as well as for solving problems. Users are often asking simple questions and selecting straightforward strategies for dealing with problem situations, such as [23]:

- when a function is not known, well presented and easily accessible, users will not use it;
- when the "frequently asked questions" is not found or does not provide an answer, users will call the call centre;
- when users do not understand "ADSL" or "GPRS", they will not subscribe to it.

User education is available from several sources and may lead to conflicting or fuzzy instructions, as operators and terminal manufacturers may provide not fully compatible instructions. User education can be provided through different media, all of which have their strengths and weaknesses, and also different purposes (see clause 4.3 and table 1). If well designed, user education can meet the user's needs in the specific context. However, studies indicate that users prefer printed documentation, as illustrated in Figure B.2.



Nokia (2004)

Figure B.2: Usage of instructions by mobile terminal

A majority of users read only selected chapters, to learn about new functions or services (e.g. camera or e-mail). A small minority browse or read the user guide in more detail, as they find it fun getting to know the product in more detail.

Irrespective of actual usage, the documentation is usually carefully kept. It provides a feeling of security in case something needs to be looked up (after all)the search for accessories, guarantees and service numbers. The users consider the documentation an integral part of the product as it is a sign of quality. Documentation is kept where people know how to find it (usually there is one place for all documentation).

As a summary about the habits of the users on the overall usage of user education material, the following can be said:

- instructions delivered with the package are in fact used by practically everyone, but not necessarily in the beginning of the product lifecycle or as intended by the manufacturer or service provider;
- in terms of overall use of instructions, paper documentation is by far the principal form;
- user education on electronic formats (such as CD-ROM, manufacturer's Website, integrated help and online tutorials) play a subordinate role;
- there is a somewhat higher acceptance for electronic formats among "Innovators", users with Internet access (especially high speed) and the users of more advanced products;
- the acceptance for a manufacturer's Web site is somewhat higher among younger users than among older users; and
- the usage of electronic formats in developing markets is not significantly different from its usage in developed markets.

History

Document history			
V1.1.1	August 2006	Membership Approval Procedure	MV 20061020: 2006-08-22 to 2006-10-20