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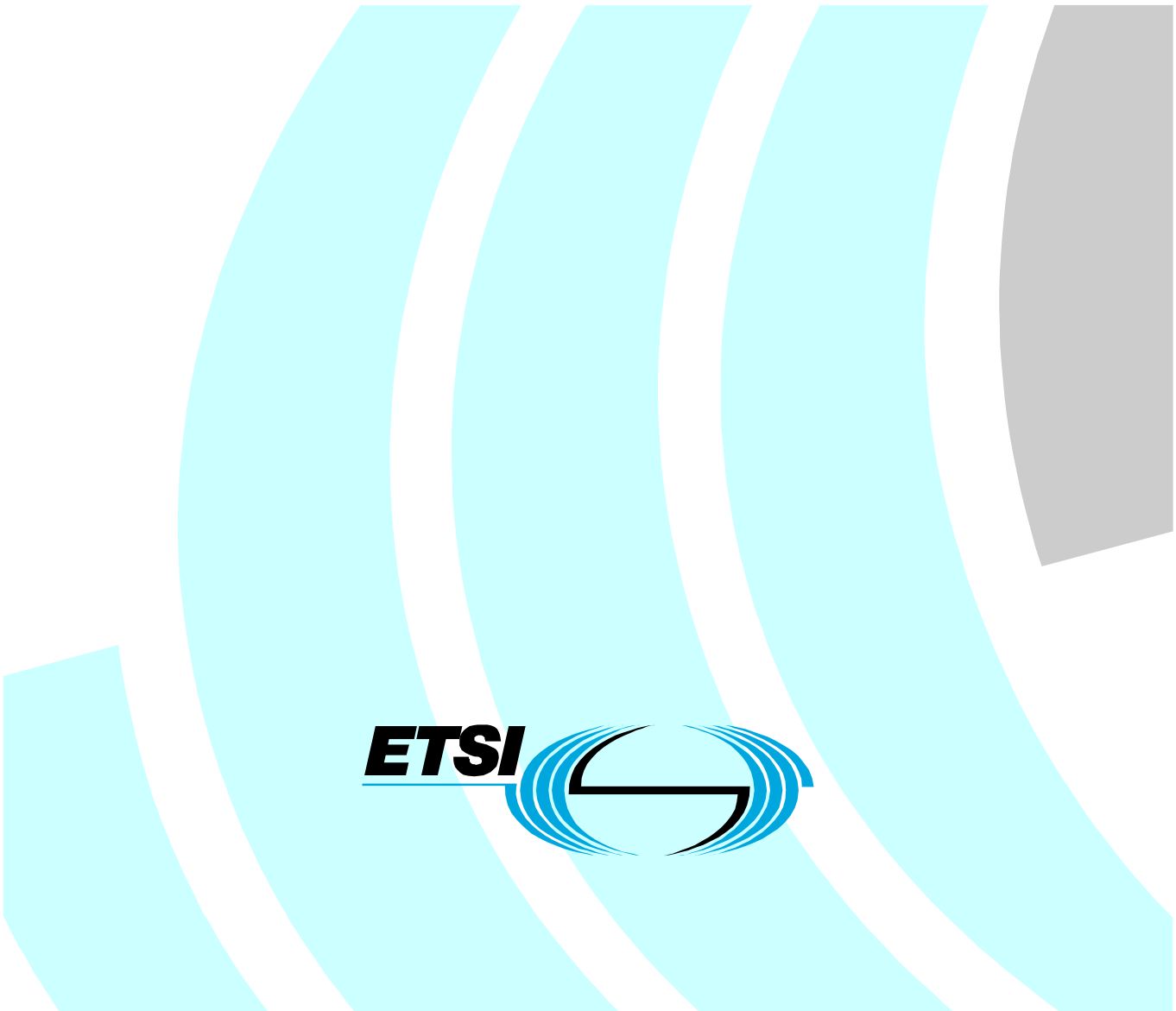
Technical Report

Human Factors (HF); Potential harmonized UI elements for mobile terminals and services



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Contents

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Foreword

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

Introduction

As of writing this in 2002, a thousand million users subscribe to mobile communication services. Personal communication has developed at a frantic pace, mostly over the past decade. This is especially true for mobile telephony and communication over the Internet, as mobile telecommunication devices and services are becoming the largest consumer product segment in the world. Telecommunication, converging with information processing, intersecting with mobility and Internet, is leading to the development of new, interactive, applications and services, offering global access.

The availability of common, basic interactive elements increases the transfer of learning between devices and services and improves the overall usability of the entire interactive mobile environment. Such a transfer becomes even more important in a world of ubiquitous devices and services. Simplifying the learning procedure for end-users will allow for reuse of basic knowledge between different terminal devices and services and lead to a faster and easier adoption of new technologies, fully benefiting the end user without restricting the manufacturer's wish to use user interfaces based on a corporate look-and-feel and the overall user experience as a competitive edge.

The work will assist the development of a common understanding in the telecommunication industry regarding the benefits provided to end users by basic generic, harmonized solutions. It is our belief that this work will benefit all end users, save manufacturers, operators and service provider's considerable efforts while not limiting the freedom to express corporate UI style guides, identities and look-and-feel.

Furthermore, from the manufacturers', operators' and service providers' point of view, development costs can be reduced, time to volume markets decreased, larger user segments reached more easily and quickly, thereby ensuring quicker uptakes of key technologies.

The eEurope initiatives 2002 and 2005 aim at accelerating the uptake and intensifying the use of digital technologies across Europe by ensuring that all Europeans are given the chance to use them. This is critical for the creation of a most competitive and dynamic economy, exploiting opportunities of the new economy and technologies. In this spirit, the European Ministers for Telecommunications and the Information Society have recently restated their conviction that widespread access to the Internet and to information and communication technologies in the EU is a source of economic growth and social inclusion, quality of life, more and better jobs and opportunities for all citizens, see [2]. Therefore, eEurope should continue to provide a comprehensive strategic overview of initiatives and programmes in the field of the information society within the new framework of a new action plan to supersede eEurope 2002 to last until 2005.

Technological convergence is bringing opportunities for achieving the most widespread open access possible to new services and applications of the Information Society, particularly through interactive digital technologies, for all. The European Union is stepping up efforts in order to fully utilize their full potential in these areas. European leadership in the Information Society will be further strengthened by including the global dimension, as stated in the *e*Europe Action plan 2005, notably in the context of the World Summit on the Information Society.

1 Scope

The present document identifies common, basic tasks and goals of users of mobile telecommunication terminal devices and services. The set of basic, common functions, through which these goals are achieved, are described and analysed in the perspective of possible harmonization of User Interface (UI) elements on the most basic level, without restricting the manufacturer's freedom to specific UI implementations. The present document also examines possibilities and highlights obstacles and limitations of such an approach.

The present document addresses the issues above from the end user's perspective, in order to further simplify and enable basic access to mobile ICT devices and services, for all. It shall be regarded as a pre-study of the possibilities and key areas for further work.

The present document integrates, from the practical perspective, results and recommendations of available ETSI Human Factors Standards, Guides and Technical reports, produced under the eEurope initiative, for deployment. The present document continues the approach taken by ETSI TC HF, developing an ETSI Standard for generic, spoken commands, ES 202 076 [5], an ETSI Standard for the character repertoires, ordering and assignment to the 12-key keypad, [7], an ETSI Guide on design guidelines for ICT products and services in a Design-for-all perspective, [8], a Technical Report on Access to ICT by young people; Issues and Guidelines, [9], and a Technical Report on requirements for assistive technology devices in ICT,[4].

The present document identifies and recommends key areas for further study and guidance on device- and service, manufacturer-, operator- and service provider-independent implementations, covering most basic user actions and belonging functions. Common, basic interactive elements and the familiarity achieved thereby increase the end user transference of learning between devices and services, without restricting the manufacturer's freedom to specific UI implementations.

2 References

For the purposes of this Technical Report (TR), the following references apply:

[1] ETSI ETS 300 907: "Digital cellular telecommunications system (Phase 2+) (GSM); Man-Machine Interface (MMI) of the Mobile Station (MS) (GSM 02.30 version 5.7.1 Release 1996)".

[2] eEurope 2005: "Informal meeting of Ministers for Telecommunications and the Information Society results"; Source: ICT Standards Board Information/ICTSB Secretary, 28 February 2002.

[3] eEurope 2005: "An information society for all Society results"; Action plan presented at the Seville European Council (CEC, COM (2002) 263 Final; June, 2002).

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

[7] ETSI ES 202 130: "Human Factors (HF); User Interfaces; Character repertoires, ordering rules and Assignment to the 12-key Telephone Keypad".

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

[9] ETSI TR 102 133: "Access to ICT by children; Issues and Guidelines" (draft, October, 2002).

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

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

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.**

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)

spoken command: verbal or other auditory dialogue format which enables the user to input commands to control a device or service

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 particular environment

NOTE 1: See ETR 095 [11].

NOTE 2: 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 [10].

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

NOTE: The user may or may not be the person who has subscribed to the provision of the service. Also, the user may or may not be a person with an impairment, e.g. elderly or disabled persons.

user interface: physical interface through which a user communicates with a telecommunications terminal or via a terminal to a telecommunications service

NOTE: The communication is bi-directional in real time and the interface includes both control and display elements.

user requirements: requirements made by users, based on their needs and capabilities, on a telecommunication service (e.g. the UPT 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:

CCBS	Call Completion Busy Subscriber
GPRS	General Packet Radio Service
GSM	Global System for Mobile telecommunication
ICT	Information and Telecommunication Technologies
ISDN	Integrated Services Digital Network
LIF	Location Interoperability Forum

MEF	Mobile Entertainment Forum
MeT	Mobile electronic Transactions
MGIF	Mobile Games Interoperability Forum
MIDI	Musical Instruments Digital Interfaces
MMI	Man-Machine Interface
MPEG	Moving Picture Experts Group
MWIF	Mobile Wireless Internet Forum
OMA	Open Mobile Alliance
OTA	Over-The-Air configuration
PIN	Personal Identity Number
P3P	Privacy Preferences Protocol
SMS	Short Message Services
UCI	Universal Communication Identifier
UI	User Interface
UPT	Universal Personal Telecommunication
WAP	Wireless Application Protocol
WAV	Windows WAVe format sound file
XML	eXtensible Mark-up Language

4 Common user needs

In the early 1990s, public telephones still offered the only alternative access to telecommunications outside homes and work places. Today, individual, personal, mobile end user devices accessing a variety of voice and data services are widespread in Europe, while the number of public telephones is decreasing. Thereby, the need for harmonization of public terminals is becoming less important.

There are, however a number of common, basic user needs which call for some harmonization across devices and services, on the user interface level. A most basic need is gaining access and being able to perform the basic interaction in order to place any kind of call and answer or reject a call, regardless of age. Emergency calls from any available device without the necessity to consult a user guide or even having to think about how to achieve this is another important action, often performed under high stress, where failure is not an option.

Other user requirements include the wish not to relearn or redo complex procedures like inputting text on a 12-keypad, setting up and configuring access to network based services, configuring and connecting wireless accessories, adapting procedures to access network based content from different devices in different networks, performing financial transactions or accessing speech controlled applications.

Another important developing user requirement is the continuity of data. This means, personal content such as address books and agendas or configuration data such as access to the mobile Internet should be made easily transferable and compatible in a device-independent way.

With users having an increasing ability to personalize their communication environment, there is a risk that the information required to personalize the product or service may be abused. To ensure that users are confident that their information is not used in ways of which they disapprove, they need standardized ways to both control how and to whom their information is made available. They also need status visibility, e.g. to be warned when there is a risk that information is about to be shared in ways which they may find unacceptable. Users also need confidence that information that they make available cannot be seen as a result of insecure communication links.

Accessibility requirements cannot always be satisfied, for all users. Therefore, it is important to support assistive devices in order to be able to display larger font sizes or provide higher volumes of speech output to those who require it. Similar user requirements are to be found when accessing devices and services with multimodal user interface capabilities that need to be adapted to the user's needs, e.g. a blind person retrieving a written short message or a non-literate child wanting to call their parents by speaking their name instead of entering the digits of their telephone numbers.

Common user needs, including those of children, elderly and disabled, are further addressed in a functional approach in clause 7.

5 Reasons for harmonization of basic UI elements

During recent years, the number of telephone users and that of mobile telephone users have risen dramatically. In Europe, a large part of the population has the basic knowledge of how to use a communication device and service. On the other hand, the complexity of communication devices and the number of features implemented in these devices has reached levels, which could not be expected several years ago. Today, we are running the risk that a large percentage of users will not be able to make use of the full functionality if the user interface for telephone functionality will not be simplified enough to make functions usable by the average user. Enabling all European users to access mobile services can be supported heavily by harmonizing the basic access user interface across devices and services.

Currently, the user of a phone of one specific brand has serious problems when trying to transfer the expertise of using his telephone to a device of a different manufacturer. Harmonization may offer the possibility to either switch between different brands or to enable users to use the telephone of partners and colleagues without being forced to go through another long and possibly frustrating learning curve. Also, continuity of personal data must be provided in order to avoid waste of time and efforts having to manually re-enter information and set-up configurations.

Another important aspect of harmonization is the fact that it can ensure safe access to important generic functionality of communication devices and services. Examples are call acceptance, call rejection, dialling or emergency call set-up. Especially safety critical functionality seems to offer strong candidates for UI harmonization efforts.

From a usability viewpoint, the user interface to basic, generic telephony functionality does *not* offer a competitive advantage for the manufacturers of the devices and services in question. A common access platform to basic telephony functionality would therefore benefit the users without forcing manufacturers to give up any competitive advantages.

Furthermore, even for an individual manufacturer, the usage of clear design rules offers the possibility to detect inconsistencies in the user interface design and, as a consequence, ensure consistent access to complex device - and service functionality. Also, we assume that development costs and times will be influenced in a positive manner.

With a community of users being accustomed to standardized user interface elements on the basic level, the uptake of new features and technologies can be accelerated and can be made much less intrusive. Configuration of access to mobile services could also be simplified, removing user obstacles from a desired quicker uptake of new technologies. Every new feature or technology that adheres to generally accepted, generic and harmonized user interface principles would have a definite advantage over new technologies, which require additional learning effort from end users.

Developing user trust on the basic level is yet another key enabler to the deployment and uptake of more advanced services, such as international GPRS roaming between networks or network and service capability fall-back in a UMTS environment.

The success of basic, harmonized user interface elements to mobile devices and services cannot be assured if they are promulgated only within the European community. This fact has also been identified by the *e*Europe 2005 action plan. It is necessary to include the international dimension and reach international agreement on suggested solutions. Therefore, it will be necessary for the working groups responsible for further work to widen the approach and liase with the relevant standardization bodies and industry fora throughout the world, considering these aspects in a global perspective.

6 Obstacles to and negative consequences of harmonization of basic UI elements

A number of developments in the area of device design and service deployment make it difficult or even impossible to harmonize larger parts of device or service user interfaces.

One important fact is the ever-increasing functionality of today's communication devices. Since it cannot be foreseen which new functions need to be implemented on future devices, any harmonization or standardization of user interface concepts or components can be obsolete in the very near futures. Any harmonization effort, which restricts the implementation of user interfaces for novel functionality, is doomed to fail. Harmonization results must therefore be able to co-exist with these still to-be-developed UI components.

The changing form factor of communication devices and the question if the communication device of the future consists of one basic unit or a multitude of components to be carried around or integrated into clothing, jewellery or accessories, offers other obstacles to harmonization. Every harmonization restricts the designer's freedom to develop new device form factors. Limiting the creativity of user interface designers should not be the result of this harmonization effort.

A variety of mobile services are under development, often offering device-independent access through a variety of user interfaces. This area is also very difficult to cover deeper than on the level of basic access.

From the manufacturer's point of view it is not at all clear that ease of brand switching is desirable. On the contrary, it is clear that good user interface design is an important distinguishing competitive advantage, which can be used to keep satisfied customers loyal to their own brand. It is therefore not in the interest of a manufacturer to accept standardization proposals limiting the ability to make full use of this competitive advantage.

From the operator's and service provider's perspective, there is a strong requirement not to limit or restrict access to mobile services due to device-specifics, such as user interface related incompatibilities.

Finally, any harmonization or standardization effort carries the potential danger of hindering the development of innovative technological solutions which might be beneficial to all users or to groups of users with special requirements such as children, elderly or disabled.

7 User interface elements with harmonization potential

We have identified a non-exhaustive list of areas and issues, where the harmonization of basic UI elements for mobile terminal devices and services may be beneficial to users, without a negative impact on either manufacturers or service providers. These are grouped into three main categories:

1) Basic elements and functions;

2) Configuration for service and application access; and

3) Advanced functionality-related interaction elements.

7.1 Basic elements and functions

The areas below should be regarded as the most basic elements to access mobile ICT devices and services.

7.1.1 International access code

As the access code for the international call format has not been fully harmonized, it may be advantageous for the user to harmonize the input of this access code in communication devices in order to fully overcome this technical gap. One solution is a uniform input method for the "+"-sign which is used as international code in all GSM networks.

Almost all mobile phone manufacturers, with one major exception, use a long- or double-press on the "0" to input the international access code. This seems to be a good starting point for industry-wide harmonization of this feature.

Harmonization in this area could be expended to cover efforts to harmonize control characters for predictive text input, as all these areas are dealing with defining various shortcuts on the keys not used for character input ("#", "0", "1", and "*").

7.1.2 Emergency functionality and services

SOS functionality has been the subject for standardization, e.g. in GSM, where access to emergency calling without a valid user subscription is required by regulations. Also, the number to be dialled for emergency services, 112, has been partly harmonized in the GSM world (mostly in Europe and Australia).

The user procedure to start an emergency call (keys to be pressed, dialogues for user confirmation) has already been subject to harmonization efforts. Especially in this area, a harmonized user interface seems to be important. Everyone has to be able to start an emergency call from every communication device while keeping the number of unnecessary emergency calls at the lowest possible limit. Also, in this area, there is no brand advantage to be gained from implementing non-harmonized user interfaces.

Efforts to harmonize the access to emergency calls should be based on a thorough analysis of the pros and cons of existing solutions.

7.1.3 Symbols, icons and pictograms

For the user without disabilities, icons used in communication devices are mostly for illustration or provision of status related feedback. Exceptions to this rule are found for graphically displayed menus and functions in a number of devices.

While it is impossible to foresee the functionality to be represented by symbols and icons in the future, it is nevertheless important to harmonize the symbols and icons depicting basic communications functionality. There seems to be no added value for manufacturers to use alternate symbols.

For users with cognitive disabilities (e.g. dyslexia), the harmonization of symbols and icons to the largest extent possible is desirable.

Several ETSI documents list symbols and icons in the telephone and service user interface, mostly these documents have non-binding character. While they describe the semantic contents of icons and symbols, they leave the actual implementation (the "style") to the device manufacturers. This seems to be a sensible approach and should be continued in that way. All aspects of display style should not be subject to harmonization rules as they are dependent on the rapidly evolving display technology of mobile phones (colours, resolutions, display accelerators).

Any harmonization should not hinder end users to modifying the appearance of his telephone user interface through the use of UI "skins". Harmonizing the semantic contents of a symbol should be sufficient to make symbols with modified design/style understandable to the average user.

7.1.4 Earcons

Earcons show properties very similar to icons and symbols. Due to the fact that their use is currently quite restricted it seems to be much easier to reach consensus on earcon harmonization.

To user with limited or no eyesight, earcons are crucial for using telecommunication devices. For these users, harmonization of earcons (across devices AND services) offers important advantages. Another improvement area for these users is harmonized master texts for announcements, typically used in text-to-speech prompts.

One serious problem in this area is the current lack of good and usable earcons, with the exception of phone network tones (busy, ringing, etc.). Functions worth having a standard earcon would include e.g. battery low, PIN code request, locked keyboard out of coverage.

For other earcons, there are no de facto standards in the industry so creative designers and the markets will eventually need to define them.

Sounds should be standardized on the "metaphor level" just like graphical icons. These could then be summarized in a descriptive list. For sounds that means musical notation or recording. MIDI and sampled (WAV) sounds can definitely follow a simple sound standard, and they can elaborate on the quality of the sound, instead of a beep-version of the tone. Any other solution would not be sensible, so standardizing the sound quality is not recommended.

Note that the various sound-related technologies applied in mobile devices are still developing rapidly (buzzers, sound chips) so it may be a bit premature to standardize earcons in very fine detail. E.g. today's WAV or MIDI sounds could probably not follow standards defined for the conventional "beep" sounds. Also, users tend to appreciate the possibility offered to personalization.

7.1.5 Access to basic voice services

For a number of basic voice services, like "Call set-up to the voice mailbox" de facto-standards have evolved during recent years, e.g. most mobile phones accept a long press on "1" as a shortcut to access the mailbox. The effort to harmonize these functions should be minimal and a uniform interface would certainly be beneficial to the average user.

Basic functionality in a handset is probably the most beneficial topic for UI harmonization. Possibilities for defining other industry-wide shortcuts should be identified and analysed. The list can obviously include functions like emergency calling but anything above that requires careful consideration due to potentially differing views by the manufacturers. The keyboard shortcut to call the voice mailbox can probably be easily accepted by most manufacturers but the more intricate functions may be hard to align. The use of softkeys or Yes-No dialogues is out of the harmonization scope, and even the ordering of items in the main menu is an aspect the manufacturers want to control.

Especially for people with visual impairments, who have problems locating the respective function in a menu, these shortcuts are extremely helpful. To achieve a maximum benefit for these users it would be advantageous for the harmonization team to consult with blind UI experts.

A difficulty to find the proper degree of harmonization in this area is that manufacturers may want to create handsets with keypads different from the 12-keypad. It must also remain possible to personalize function access from device states like "Idle Mode" or "In-call-mode".

7.1.6 Basic terminology

Different companies producing communication devices use different words for describing telephone functions and services to their users, both in the user interface of the device itself and in the user guide describing the functionality.

While in some languages there seems to be a commonly accepted set of names for functions, this is not true for other languages (e.g. in German: Makeln, Gesprächswechsel). For other functions there is no good name known (e.g. CCBS is not an easy-to-understand acronym).

An agreed-upon set of function names would ease the use of these functions for the users of communication devices. For this set of function names, it is important that the average user, not only communications experts, understands the words.

As in the cases above, we see no advantage to be gained from not implementing a proposed set of function names. Also, the implementation effort would be fair, if an agreed-upon set of standard terms can be defined. It is conceivable, that, like in the current work of STF 202 [7], the list of words would be language-specific and be harmonized across different manufacturers.

UI terminology is sometimes copyrighted or trademarked by a manufacturer (e.g. the Nokia Navi™ key) and in these cases, the manufacturer would not probably want to harmonize it, as the terminology is used in marketing and brand building.

Operators should be involved in any terminology harmonization effort, as they have the direct connection to the markets, services, and end users.

7.1.7 Text entry and retrieval

Efficient and intuitive text entry and retrieval are one of the basic, key requirements - and stumbling blocks - in the contemporary mobile devices. It would be beneficial to the end users and operators to see efficient, intuitive, and also common solutions to text entry. However, the technologies are continuously evolving, so we must be careful not to stop innovation. The current keypad mappings and predictive text input solutions are still probably far from perfect.

Additional complexity arises through the necessary control functionality for predictive text entry systems. Turning these systems on or off, input of new, unknown word and the selection between prediction alternatives are major obstacles to using these systems for many users. Easy-to-use command shortcuts, harmonized over many different devices, might broaden the possible user group of these predictive text entry systems.

At the moment there is no conclusive evidence of what kind of and how serious problems there are due to the inconsistencies between manufacturers.

The draft ES 202 130 [7] should be taken as the basis for continuous harmonization efforts in this area.

It should be noted that in keypad assignment (and in any other topic in this proposal) there should be a possibility for a manufacturer to "opt out" in case a stronger requirement so dictates to allow for the design of phones with e.g. a QWERTY-keyboard, alternative keypad designs or even without a keypad.

7.1.8 Assistive device interfaces

User interface harmonization for the young, elderly and disabled users are beneficial. The end users will get devices that support them better in their tasks, achieving their goals while the manufacturers can more readily satisfy regulatory obligations to provide access to all users. ETSI STF 181 has dealt with these issues and stated a set of requirements for these interfaces, found in TR 102 068 [4]. Finally, assistive technology manufacturers will get standardized interfaces and conventions that make it easier for them to attach their technologies, services, and devices with the mobile telephones.

Europe-wide standardization of assistive technology device interfaces across all ICT devices is becoming an increasingly urgent topic and should be dealt with high priority from the standardization bodies.

7.2 Configuration for service and application access

The areas below should be regarded as basic elements to access mobile ICT applications and services.

7.2.1 UIs of services and applications

A large number of applications, many of them being defined at the moment, might be subject to some form of standardization on the user interface level. Differences in using these features in different devices are very often just disturbing to the user. For many manufacturers, their style of controlling these applications is considered as part of their corporate brand building, so the selection of appropriate harmonization areas and the identification of ergonomically optimal solution is a fairly tedious process.

Among these applications with user interfaces, which might be subject to some form of standardization, we have identified the following non-exhaustive list:

- Control of audio and video transmission;
- Data enquiry on standard databases and directory services;
- Mobility services (navigation, localization);
- Messaging;
- Remote services;
- Video monitoring;
- Multimedia and interactive multimedia;
- Personal mobility;
- Group communication.

It is important to have the service providers and the operators included, if trying to achieve any level of harmonization in these application areas.

7.2.2 Configuration procedures

Complex set-up procedures for network access, service logon and availability of WAP and GPRS or Bluetooth accessories interworking could be addressed by a harmonization effort. The problems caused by lower-level standards could be at least partly overcome by offering configuration support solutions that work with most manufacturers' phones. A highly successful implementation is OTA, Over-the-air-configuration, used by most operators to configure certain manufacturers terminal devices with technical and logon information in order to enable access to the mobile Internet. This could be beneficial to extend and would not spoil the brand elements if designed and implemented appropriately. Further, detailed investigation is required.

The procedures should be defined by the respective working groups and SIGs (3GPP, OMA/SyncML, etc.) as they have the most up-to-date understanding of the technology development and releases. ETSI TC HF should only recommend further deployment and assist and guide these groups on UI-relevant issues.

7.2.3 Service and application access, interworking and portability

User trust and reliability of terminals, applications and services working across networks is of paramount importance. During the past few months, an industry-wide initiative has been taken in the Open Mobile Forum, leading to the set-up of the Open Mobile Alliance, OMA. It is primary mission is to make the mobile internet work by ensuring interoperability between the components of telecommunication systems, based on a user requirement driven development.

The work with incorporating the affiliate organizations SyncML, MMS IOT, Wireless Village and LIF is ongoing. A bottom-up analysis has been started for the work items in 3GPP that have or may have a relationship to OMA. Candidates for this second-round inclusion are MGIF, the Mobile Interoperability Forum, MEF, the Mobile Entertainment Forum, MWIF, the Mobile Wireless Internet Forum and Voice XML. Candidate for the third wave are MeT, Mobile e-Commerce Transactions and the Mobile Payment Forum (see annex A).

This recent and quick development should be followed, as it might be the easiest way to ensure basic user requirements are met across networks, applications, terminals and services. For the moment, no specific areas are highlighted but the work must be followed and liaisons established.

7.2.4 Service and application terminology

While Bluetooth and SyncML as wireless data transmission technologies have been standardized, in order to allow the devices of many manufacturers to co-operate, the user interface for set-up Bluetooth connections has not been worked out on the same, fine level of details. Using a common terminology may ease the set-up of communication channels between devices by the average user.

It would be highly beneficial to harmonize the terminology used with these new technologies, as that would quicken the adoption rate. However, the terminology for new applications and technologies should be standardized in the relevant standards bodies such as the OMA/SyncML and Bluetooth Special Interest Groups with support from ETSI TC HF.

7.3 Advanced functionality-related interaction elements

The areas below should be regarded as more advanced for the time being. However, what is regarded as a common, basic level is continuously being shifted upwards, these areas are on their way to becoming common and widespread elements, accessing mobile ICT devices and services.

7.3.1 Structure and vocabulary of spoken commands

The harmonization of the vocabulary of spoken commands for ICT devices and services offers obvious advantages to users. Since it is necessary to learn the vocabulary of spoken commands, switching between two non-harmonized devices would raise the learning effort of each user considerably.

Any harmonization effort should concentrate on language-specific specifications, as it has been done in TC HF (STF 182), see ES 202 076 [5], the very first of its kind in the world, paving the way for further development towards speech interfaces in a multimodal environment.

The burden on manufacturers, operators and service providers, if they decide to support harmonized speech interface elements on the generic command level, is relatively low, as speech recognition based applications and services targeting the larger user community are under deployment.

7.3.2 Address book data format and portability

For users switching from one communication device to another, one of the strenuous tasks is the transfer of personal data, e.g. the address book data, to their new device. This process can be enhanced considerably by standardizing the format of data in the address book. With such harmonized data formats, address book contents can be transferred without additional obstacles for the user.

Given that most communication devices are able to synchronize their address book data with computer programs such as Microsoft Outlook and Lotus Notes, there should not be too much opposition to such an undertaking.

The user interface of the address book, editing functionality etc. is explicitly excluded from this harmonization proposal. We assume that these usability related issues are important for manufacturers' brand positioning.

The data formats are quite obvious areas for standardization. The address book itself (like any other application) should be designed so that there is room for market area and culture-specific tailoring. Also, any standard defining data formats must take into account that not all phones will support entire address book entries, but in some cases, only e.g. names and phone numbers. For manufacturers, this ability to tailor is probably more important than a Europe-focused harmonization.

A harmonization candidate is the Address book sorting order that is getting complicated when we e.g. support both Latin and non-Latin languages in the same device. Sorting rules are part of the current STF 202, see ES 202 130 [7]. The results of this work should be taken as a basis for future work, if necessary.

People with disabilities often use special-purpose devices and accessories and could benefit from harmonization. Even assistive devices could share these positive effects.

7.3.3 Organizer data format and portability

As in the clause above, the data used in the organizer functionality of many mobile communication devices can be the target of a harmonization activity. There is no competitive advantage to be gained from offering alternate data formats of an organizer. Again, the user interface design of the organizer should be left to the manufacturers and not be harmonized.

The ability to synchronize data and communicate with others using other platforms is important to all, and failing to do that will only cause harm to the users and the industry. However, this kind of harmonization is not exclusively a UI issue, it may be necessary to liase with standardization forums already addressing the area (e.g. vCard, SyncML, MMS, MPEG, XML, and MeT, most of them in the inclusion process to OMA) and we should not duplicate those efforts. Standardization should also aim at global conventions, not focus on Europe exclusively.

7.3.4 V-cards, business card information

There already are a number of V-card implementations in different mobile phones as well as in PDAs which enable the free exchange of business card information across these devices, using mostly wireless (but also wired) transmission technologies. This quasi-standard defined by the industry could be extended to cover all communication devices and services, with the respective functionality worldwide, not only for European communication devices.

7.3.5 Terminology of network services

The terminology arguments discussed above are valid for the wording used in service implementations (e.g. for WAP browser functionality or SMS words like "Server" and "Service centre" are not well known and understood by users). If users have any problem using one of these systems they will not be able to correct these problems, which results in the inability to set up and make use of these functions. Adherence to a commonly accepted set of function names would probably result in much larger percentage of functions used both in communication devices and in service implementations.

7.3.6 Universal addressing in converging networks

Personal, media-transparent user addressing in converging networks should interwork, seamless to the end user, with terminal devices and network services. Otherwise, parts of a nice concept will be jeopardized due to lack of smooth interworking (e.g. if a user activates a certain "In meeting" behaviour locally, in the terminal, the communication network should be informed and the communication profile of the user set to a similar "In meeting" profile).

Another area where harmonization should be carefully examined is personal identification. The UCI identifier [6] being a life-long and unique user attribute, it could certainly be used as a unique and personal user identifier in other circumstances, e.g. paying a parking fee or registering at a car service centre. TC HF will look into these and similar issues within the frame of the work on "UCI systems to assist disabled, young and elderly people", within the *e*Europe action plan, to be started soon.

7.3.7 Positioning services

Mobile positioning is technically possible already in today's mobile networks. The US Government has recently enacted a law to locate cell phones making emergency calls. Applications and services are currently being deployed, e.g. addressing corporations with fleet management applications and consumers with FriendFinder or Where-is-the-nearest shop/bank/pizzeria alike applications.

Important aspects of such applications are personal integrity and privacy aspects, being able to easily and quickly switch the positioning availability on or off, knowing who is positioning a person as well as personal reliability and confidence issues.

Harmonization could take place in several areas: the availability of positioning services, their accuracy, a user's availability to be positioned, etc. It would not backfire on any terminal manufacturer, operator or service provider and could help a smooth usage pattern.

7.3.8 Service and content presence and connectivity

Users of mobile communication have traditionally had continuous access to a set of well-known, well-configured and always available set of services.

The feature-richness of mobile networks, systems, services and applications is on the increase, enabled by the on-going convergence between traditional voice and data services and the migration from second to third generation mobile networks. A key attribute of this evolution is the non-continuous, location-limited access and availability of certain services. For the time being (2002), e.g. international GPRS roaming between operators is not always offered to roaming users, thereby limiting their access and influencing established communication patterns. This situation will persist and be valid for a number of third generation mobile services until full coverage will be offered, without the need to fall-back access ensured by GSM and GPRS networks.

Another area of importance is ad-hoc services often using local wireless unlicensed access, e.g. a museum guide offered to visitors in a certain area or a parking fee payable with the mobile phone. In such a situation, the connectivity as well as the charging should be clearly indicated.

It is of paramount importance to make the end user aware of the availability of communication services described above, independently of the manufacturer of the terminal or the operator and service provider used for the moment, in a non-intrusive way. Therefore, the development of a harmonized solution is strongly recommended.

Another area recommended for consideration is the variety of media and information-related content that can be reached from mobile telecommunication devices, downloaded and later locally retrieved in the terminal with or without limitations (e.g. ring signals and background images). This also includes downloadable media content offered as streamed video (e.g. the goals from yesterday's football game).

Such content can be blocked for further distribution (e.g. .DRM type of files), in order to prevent copying for free ("travelling content"). In order to clearly display the status and key attributes of such content to the user, harmonization efforts would be beneficial.

7.3.9 User data privacy, security and safety

With users having an increasing ability to personalize their communication environment, there is a risk that the information required to personalize the product or service may be abused. To ensure that users are confident that their information is not used in ways of which they disapprove, they need standardized ways to both control how and to whom their information is made available. They also need status visibility, e.g. to be warned when there is a risk that information is about to be shared in ways which they may find unacceptable. Users also need confidence that information that they make available cannot be seen as a result of insecure communication links.

In the World Wide Web world the control of privacy of user information is addressed in the work on the Privacy Preferences Protocol (P3P) initiative. Also a padlock is shown to users to indicate the security of transmitted information (where SSL security is being applied). Ways in which the control and display of information privacy and security can be achieved in the broader context of a mobile communications environment should be examined.

Another issue arises when mobile telecommunication terminal devices are used in flight mode, on airplanes or hospitals, in order to access personal information and data, without the radio parts being turned on. There is a strong need of indicating this to the flight personnel in a harmonized way, in order to avoid misunderstandings and negative reactions.

8 Conclusions and recommendations

The availability of common, basic interactive elements increases the user transfer of learning between devices and services and improves the overall usability of the entire interactive mobile environment. Such a transfer becomes even more important in a world of ubiquitous mobile telecommunication devices and services.

Simplifying the learning procedure for end-users will allow the reuse of basic knowledge between different terminal devices and services and lead to a faster and easier adoption of new technologies. From the manufacturers' and service providers' point of view, this implies that development costs can be reduced, time to volume markets decreased, larger user segments reached more easily and quickly, thereby ensuring quicker uptakes of key technologies and access to all users, without restricting their competitive edge made possible by the user experience and specific UI implementations offered.

To work out details and reach agreement upon possible harmonized UI elements for mobile ICT terminal devices and services is a possible and important task, which cannot be achieved during the standard product definition cycle of ICT manufacturers.

It is recommended that an ETSI Guide (EG) should be developed as soon as possible, containing the informative elements to widen and simplify end user access to mobile information and communication devices and services. Such an effort must be carried out in very close collaboration with the main players and should aim at achieving solutions based on broad consensus and best practices. Information collection, identification of the key issues and consensus building in such a process must begin early and not end before results are well penetrated to the international community including conferences, workshops, symposia, major trade fairs and other events.

The success of basic, harmonized user interface elements to mobile devices and services cannot be assured if they are promulgated only within the European community. This fact has also been identified by the *e*Europe 2005 action plan. It is necessary to include the international dimension and reach international agreement on suggested solutions. Therefore, it will be necessary for the working groups responsible for further work to widen the approach and liase with the relevant standardization bodies and industry fora throughout the world, considering these aspects in a global perspective.

Any future work should, despite other possible areas, consider and address the three main and 21 sub-areas identified and analysed in the present document. Primary focus should be on the possibility of working out harmonized solutions for basic call handling and safety-critical functionality, configuration and access to network-based functionality and services, most common and basic areas, to the benefit of all users.

The results of work performed by ETSI TC HF through other STFs under the *e*Europe Initiative should be considered and included.

Annex A:
Standardization stakeholders

Below, a non-exhaustive short list of standardization bodies and fora of relevance to this work is provided. Note that while this is being written, some have already been merged into OMA.

- ETSI, www.etsi.org
- ECMA, www.ecma.org
- CEN/CENELEC, http://www.cenelec.org/BASIS/celis/free/project/SF
- 3GPP, www.3gpp.org
- WWRF, www.wireless-world-research.org
- Bluetooth, www.bluetooth.com
- SyncML Forum, www.syncml.com
- Electronic Payment Forum, www.epm.org
- EMS/MMS Interoperability Group
- LIF, Location Interoperability Forum, http://www.locationforum.org/
- WAP Forum, www.wapforum.org
- OMA (into which many of the above are merged), www.oma.org
- DECT Forum**,** www.dectweb.com/dectforum
- GSM Association, www.gsmworld.com
- Mobile Data Association**,** www.mda-mobiledata.org:
- Mobile Data Initiative, www.gsmdata.com
- Mobile GPRS, www.mobilegprs.com
- Telecomms Technical Issues, www.tapc.org.uk
- UMTS Forum, www.umts-forum.org
- Wireless Data Forum, www.wireless.org

History

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