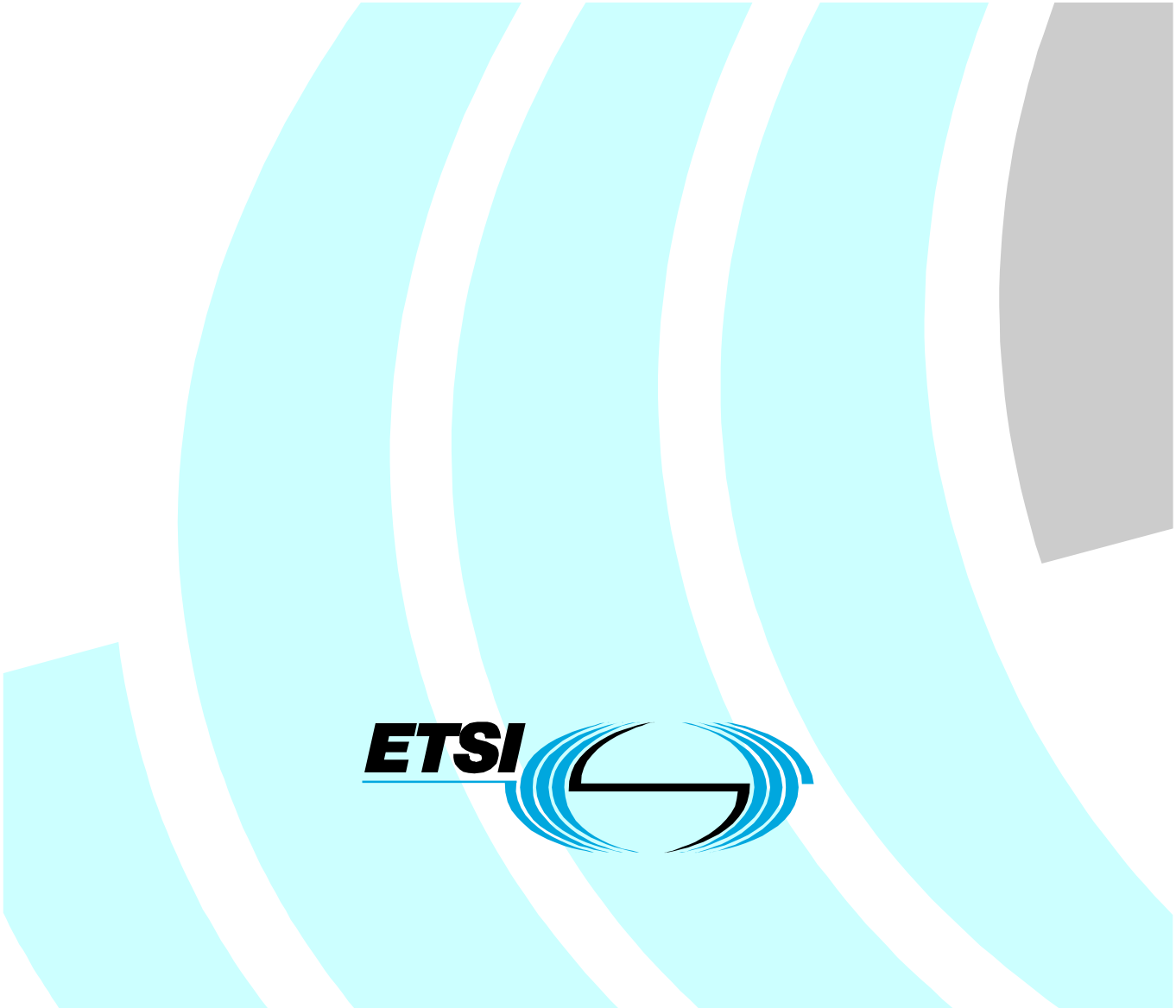
Final draft ETSI EG 202 249 V1.1.1 (2003-08)

ETSI Guide

Universal Communications Identifier (UCI); Guidelines on the usability of UCI based systems



Reference
DEG/HF-00037

Keywords
ID, UCI

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

Individual copies of the present document can be downloaded from:
http://www.etsi.org

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
http://portal.etsi.org/tb/status/status.asp

If you find errors in the present document, send your comment to:
editor@etsi.org

Copyright Notification

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://webapp.etsi.org/IPR/home.asp).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

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.

Introduction

The proposed Universal Communications Identifier or UCI would be associated with all the user's electronic communication services, including email. It is, at the same time, both meaningful and unique and has been defined with continual reference to a precise set of user requirements relating to the management of personal communications. This approach is described in EG 201 940 [1]. To achieve its full potential the UCI needs to operate within an architecture capable of supporting the concept of personal control of communication and this is described in EG 202 067 [2]. TR 103 077 [3] has defined user tasks which will be encountered within a UCI environment and highlighted areas suitable for guidelines.

There have been many attempts made in the past to provide a single identifier covering a range of communications services. None could so far be described as an unqualified success and, almost, without exception, that lack of success has been due in some measure to usability issues. Use of unified identifiers in the past has either been too difficult or so intrusive and time consuming that users perceived insufficient benefit to encourage them to take up these services. New architectures and services will greatly enhance the ability of users to control their communications so that they can determine who can communicate with them and under what conditions. With an increase in the capability to specify customized communications management (incoming and outgoing) comes an inevitable increase in complexity of the user interface to implement and oversee that capability.

Usability is critical to the introduction of any advanced, sophisticated communications system such as a UCI system. Unless usability is considered at all stages of development and implementation there is a real danger that users will perceive no net benefit. If such is the case then there is a real danger of failure.

The present document builds on the work done in EG 201 940 [1], EG 202 067 [2] and TR 103 077 [3] to produce usability guidelines. It has been based on a study of the user tasks described in TR 103 077 [3], and the application of usability best practice. Adoption of these guidelines will mean that the chances of successful implementation and uptake of UCI based communications will be maximized.

1 Scope

The present document provides usability guidelines relating to the development and implementation of UCI systems.

EG 201 940 [1] and EG 202 067 [2] identified the critical importance of the usability issues associated with Universal Communications Identifier (UCI) systems. TR 103 077 [3] has identified usability best practice relating to advanced communication services. It has discussed the implications of applying such best practice to the user tasks necessary for implementation of UCI based services whilst still meeting the relevant User Requirements defined in EG 201 940 [1]. TR 103 077 [3] also defined areas relating to usability which would be suitable for the production of guidelines.

The guidelines are numbered consecutively throughout each clause in order to relate them to the context in which they apply.

The present document also highlights areas in which it is not currently possible to define guidelines. Such instances will be because:

- there is insufficient research or experience relating to a particular usability issue;
- certain technical aspects of UCI system are insufficiently evolved or defined;
- there is a need for focussed consultation with specialized groups of users such as elderly people, people with disabilities, young children and people from non-European cultures;
- simple guidelines may not be able to adequately address the usability issues associated with a complex functionality.

Where guidelines have not been provided, it has sometimes been possible to highlight usability issues that should focus designers' attention on specific areas that are critical to system usability. In dealing with the usability issues, it would be expected that designers should make use of usability design techniques such as:

- focus groups for formalized user requirements capture;
- task analysis;
- user trials.

Use of these techniques is advisable even where the guidelines in the present document are being used.

Ideally, the present document, which defines usability guidelines, should be read in conjunction with TR 103 077 [3] which describes the background to all Guidelines. To avoid the need for constant cross-referencing between the two documents, much relevant text from TR 103 077 [3] has been duplicated in the present document.

The present document will provide information and guidance for:

- terminal and service designers (telecommunications and IT);
- service providers (telecommunication and IT);
- designers of external tools (e.g. calendar, address book) that may be used in a UCI context;
- user groups;
- other Technical Committees within ETSI.

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 201 940: "Human Factors (HF); User identification solutions in converging networks".

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

[3] ETSI TR 103 077: "Universal Communications Identifier (UCI); Maximizing the usability of UCI based systems".

[4] Nielsen, J. (1994b). Heuristic evaluation. In Nielsen, J., and Mack, R.L. (Eds.), Usability Inspection Methods, John Wiley and Sons, New York, NY.

[5] ETSI ETR 170 (1995-01): "Human Factors (HF); Generic user control procedures for telecommunication terminals and services".

[6] ISO 9241-11 (1998): "Ergonomic requirements for office work with visual display terminals (VDTs) - Part 11: Guidance on usability".

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

[8] ITU-T Recommendation E.123 (2001): "Notation for national and international telephone numbers, e-mail addresses and Web addresses".

[9] PAM Specification Document v1.0: Presence and Availability Management Specification from the PAM forum (www.pamforum.org).

[10] ISO 8601: Data elements and interchange formats - Information interchange - Representation of dates and times.

[11] Wireless Village Specifications: WV Presence Attributes TDT and Examples version 1.1 http://www.openmobilealliance.org/wvarchives.html

[12] CEN Workshop Agreement CWA 13987-1 (October 2000): "Smart Card Systems - Interoperable Citizen Services - User Related Information (based on DISTINCT) - Definition of User Related Information".

[13] EN 1332-4 (1999): Identification card systems - Man-Machine Interface - Part 4: Coding of user requirements for people with special needs.

[14] ISO 639-2: "Codes for the representation of names of languages - Part 2: Alpha-3 code".

3 Definitions and abbreviations

3.1 Definitions

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

accessibility: ensuring that all sectors of the community have equal access to communications and online information

address book: entity that contains a number of records describing potential contacts of the UCI user

creation template: template where modifications made to it will not affect any rules, settings or sub-profiles that were previously created from that template

feedback: information presented to users that relates to an action that the user has requested

live template: template where modifications made to it will affect all rules, settings or sub-profiles that are created from that template

log: entity that contains a number of records that describe instances of an activity

NOTE: The log is usually named after the activity that its records describe e.g. an "incoming communications log" contains a list of the communications that a UCI user has received.

notification: information that the system presents to a user to notify them of something that has happened or that is about to happen

Personal User Agent (PUA): functional entity (probably implemented as a software object) with a one-to-one relationship to a specific UCI

NOTE: It stores or has access to information on all of a person's communication services and their service identifiers (e.g. telephone numbers, email addresses, etc.).

PUA base-profile: subset of its PUA profile which contains rules and settings that are always active

PUA profile: total set of rules and settings relating to a specific UCI

PUA sub-profile: named subset of the rules and settings of its PUA profile defined to suit the user in a specific situation

PUA user: person or role to which a UCI, and hence a PUA, is assigned

PUA administrator: person who defines PUA profiles with settings and rules. This could be the same person as the UCI/PUA user

PUA provider: company that provides the PUA and associated services

rule: statement that can be interpreted by the PUA to produce one or more actions

NOTE: The action taken will be dependant on a number of factors including user settings and external events.

Service Agent (SA): functional entity that is linked to a communication service (or network)

NOTE: It would typically be provided by a network or service provider. An SA is the link between the UCI and networks and services. It participates in communication with PUAs, other SAs and its own network/service and would be specially trusted by PUAs following successful registration.

state information: information that the system provides to users to inform them of the current state of some aspect of the system

template: set of rules and settings considered appropriate for commonly encountered uses

NOTE: The use of the template is usually reflected in the name of the template e.g. a "working from home" template contains rules and settings appropriate for typical home-working usage (see also **creation template** and **live template**).

UCI user: See "PUA user" definition.

3.2 Abbreviations

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

AI	Artificial Intelligence
CLI	Calling Line Identity
GSM	Global System for Mobile communication
GPS	Global Positioning System
ID	IDentifier
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ITU	International Telecommunications Union
PSTN	Public Switched Telephone Network
PUA	Personal User Agent
SA	Service Agent
UCI	Universal Communications Identifier

4 Background

Implementation of UCI systems as proposed in [1] and [2] overcomes the many limitations that arise from the use of the current identifiers in today's communications systems. When the UCI is used within a supporting network architecture it will:

- support the fundamental generic user requirements for communication (see annex B);
- identify the user not the terminal or service;
- avoid the need to have many different identifiers for a range of different communications services;
- provide the potential for verifying the true identity of the originator or recipient of a communication;
- remain unchanged when moving to a different service provider or service type;
- provide a common environment for the management and control of all personal communications irrespective of service type (as opposed to a range of different control mechanisms that are service specific);
- allow user profiles to be set up to provide comprehensive management of outgoing and incoming communications.

In a UCI system, every user has at least one UCI each with an associated Personal User Agent (PUA). For every service used, the user has an associated Service Agent (SA). This is described below.

4.1 The Universal Communications Identifier (UCI)

The UCI is a single, unique identifier for a user. It consists of an alphanumeric part, a numeric part and an additional information field (not directly seen by those making or receiving communication). It is only the numeric part of the UCI that is unique and hence it is this that uniquely identifies the user. The UCI would be allocated by a trusted authority and be stable, i.e. it would not change over time even with a change of service provider.

E.g. John Smith[8837460633789]<a6;f1;d234;k78>

Some of the key characteristics of the UCI are:

- it is a unique identifier for a person, role or organization;
- it allows a "user-friendly" name to be used as a label which describes the originator and/or recipient of a communication;

- it allows important additional information to be available to anybody using it such as preferred language, acceptable languages, whether business/personal, label authenticity or alias, etc.;
- it allows the originator or recipient of a communication to claim authenticity for their identifier;
- where it is particularly important to verify the claimed authenticity, additional procedures can be invoked to make sure that it is not another person accidentally or intentionally making use of the UCI;
- it is independent of communications services and networks;
- it is independent of communications service providers.

4.2 The Personal User Agent (PUA)

A PUA is an entity external to the main communication networks and with a one-to-one relationship to a specific UCI. It stores, or has access to, information on all of a user's communication services and their service identifiers (e.g. telephone numbers, email addresses, etc.). The PUA also stores, or has access to, current state and personal preferences information in relation to all communications services. These preferences (or user profile) would consist of access, filtering and redirection rules which could operate on a wide range of factors including:

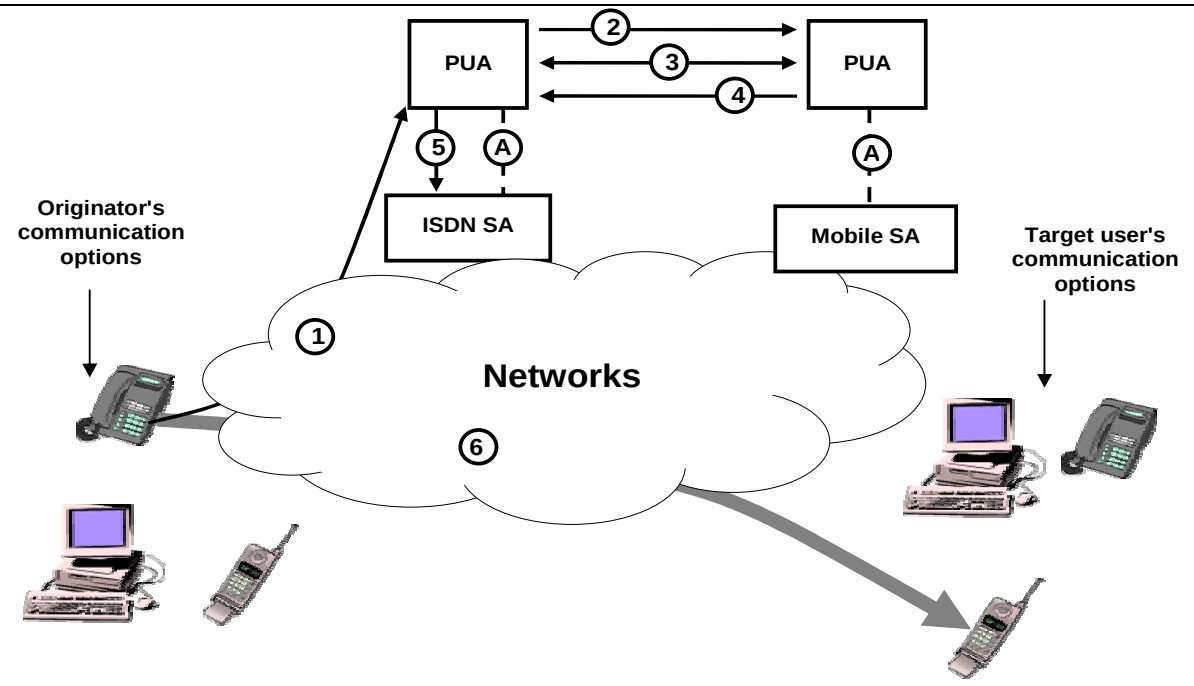
- the identity (UCI) of people attempting to communicate with the user or with whom the user is trying to communicate;
- the date and time when communication is attempted;
- the location of the user;
- the urgency of the communication;
- whether the originator of a communication has a business or a personal status;
- the user's preferences for how they wish to be reached (which services and which terminals) or how they wish to contact others.

The operation of these rules can permit a very high degree of control over the user's communications. EG 201 940 [1] gives some scenarios illustrating the potential power and flexibility of UCI-based communication. Further, more detailed, examples and scenarios are given in EG 202 067 [2].

4.3 The Service Agent (SA)

An SA is an interface between a PUA and a communication service (or network). It would typically be provided by a network or service provider. An SA is the link between the main UCI system and networks and services. It communicates with PUAs, other SAs and its own network/service and would be specially trusted by PUAs following successful registration.

4.4 The UCI in operation



The originator requests a voice call to the target user:

A – Each PUA exchanges information with the SAs of its user's networks/services before, during and after communication attempts take place. The target user's PUA knows that the user's mobile phone is able to receive voice calls.

1 – The originating user enters the UCI of the target user.
2 – The originating PUA makes a request to the PUA of the target user.
3 – The PUAs negotiate communication options if necessary.
4 - The target user's PUA takes account of its user's preferences and proposes the user's mobile phone to receive the call.
5 - The originator's PUA instructs the originator's network to set-up the call.
6 - A voice call between the originator's ISDN phone and the target user's mobile phone is established.

Figure 1: Simplified overview of UCI operation

5 Generic UCI guidelines

5.1 Usability

Usability will be a critical success factor for the user interacting with the PUA. The usability quality standard Usability ISO9241-11 [6] defines usability 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". In the UCI context, "product" can be taken to include every aspect of UCI e.g. the terminal user interface, the applications running on terminals (or the PUA) and the services that the users access. The terms used in the ISO9241-11 [6] definition can be further expanded as:

- Effectiveness: Accuracy and completeness with which users achieve specified goals.
- Efficiency: Resources expended in relation to the accuracy and completeness with which users achieve goals.
- Satisfaction: Freedom from discomfort, and positive attitudes towards the use of the product.
- Context of use: Users, tasks, equipment (hardware, software and materials), and the physical and social environments in which a product is used.

The following clauses highlight issues of particular relevance to UCI, according to Jacob Nielsen's 10 Usability Heuristics [4]. These heuristics are elaborated and related to UCI in TR 103 077 [3].

A more complete and general set of Usability Guidelines can be found in EG 202 116 [7].

5.2 Visibility of system state

5.2.1 Presentation of feedback, notification and state information

When a user performs an action, the user should be provided with feedback that the action has been acknowledged. For example, when a key is activated mechanical or audible feedback may be sufficient to assure the user that the key press has been registered. As this feedback is generally a terminal specific feature, this is not really relevant to UCI guidelines.

However, notifications that the PUA needs to send to the user and information about the current state of the systems with which the user is working do need to be presented to the user. It will be the PUA that will be ultimately responsible for how this information is presented to the user.

Different presentation modes for feedback, notification and state information could be chosen depending on personal preferences, accessibility or terminal capabilities. The user could choose one type of presentation or a combination of different types such as text, icon and sound. The presentation mode that is used could be associated to specific type of terminal or to a PUA sub-profile (e.g. sound or voice presentation is useful when the PUA sub-profile "Driving a car" is active).

Voice, spoken commands or sounds could be suitable, for example, when using a terminal without screen, for blind persons or children who are not yet able to read.

The user should be able to associate icons whenever possible. An icon could be displayed together with the name or instead of the name, which could be useful when a small screen is used.

Guideline 5.1 - Notification about change of system state

- When the UCI system changes state as a result of a user action, the user should be given notification of the state change and any displayed state information should then be updated. In a UCI context, it will often be the PUA that is responsible for providing this notification to the user in the initial phases of the setting up of a communication, with the network taking over this role once the SA has been instructed to make the communication.

Guideline 5.2 - Using an appropriate presentation style

- The form of information presentation, including feedback, notification and state information, relating to the UCI system should be matched to the type and range of presentation capabilities and media available.

Guideline 5.3 - Using multiple modalities for presentation

- In order to accommodate people with a wide range of abilities and disabilities, all information, including feedback notification and state information, should be displayed across more than one human modality whenever possible (e.g. speech and vision). Simultaneous presentation across different modalities both reinforces the communication of the information and also accommodates the user needs when they can temporarily not access one of the display modalities (e.g. using sound as well as display of information will be beneficial to car drivers who are unable to look at the display of a terminal whilst driving).

Guideline 5.4 - Defining levels of notification

- For each different type of state change notification, the user should be able to choose different levels of notification (including being presented with all notifications or being presented with no notifications).

Guideline 5.5 - Defining the format of presentation

- The user should, where possible, be provided with different options on how notifications will be presented to them (e.g. text messages, spoken announcements, tones, icons).

Guideline 5.6 - User suppression of types of state information

- The user should be able to choose to have the display of specific types of continuous state information switched on or off.

Guideline 5.7 - Provision of user interface elements

- A range of user interface elements such as icons and sounds should be provided as standard features of a PUA. In addition, users could be given the option to create and/or import icons and to record and/or import their own sounds.

5.2.2 System response time

Response time is the time taken for the system to respond to the users" inputs or commands. Users will have expectations about these response times according to their perception of what activities are being undertaken by the system and how long such activities should take. Where the actual system response times match user expectations, users will be unlikely to experience difficulties. Where they are given feedback, this feedback need only reassure them that things are progressing ("comfort feedback").

Where the system response times exceed the users" expectations (or are very long), consideration will need to be given to provision of a form of feedback that reassures the user. The above implies that it would be valuable to set correct expectations in users where tasks may involve long delays.

Table 1 is based on EG 202 116 [7] and illustrates a range of possible system response times in UCI systems. The times will be influenced by many factors including country based variations (e.g. the post dialling delay in some countries is considerably longer than that experienced in others and will influence the expectations of people from different countries accordingly). The times shown relate solely to those delays that are due to UCI specific activities and do not include the delays that occur in networks (e.g. post dialling delay).

Guideline 5.8 - System response times

System designers should, where possible, ensure that the system response times shown in table 1 are not exceeded.

Table 1: Recommended response times for UCI systems

User activity/task	Time	Telecommunications examples
Reaction to key actuation	up to 0,1s	Audible or tactile confirmation of successful key actuation. Displaying an entered character on a visual display. Switching on a loudspeaker, microphone. Switching through a connection.
Display of short and simple guidance information that can be taken at a glance	up to 0,5 s	User prompts. Error messages. Reception of a system's ready state, e.g. dial tone on lifting handset. Information on single or two line displays, e.g. display texts for telephone applications. Paging through a list or menu on a line display. Paging through an address book or notepad. Calling up a menu, displaying the following menu.
Display of large amount of complex information that needs to be read	up to 1,0 s	Calling up a complex operating field or dialogue box. Displaying part of a PUA profile in graphical form.
Simple operations	up to 2,0 s	Activating a service or program with a function key, menu item or icon. Ringing tone and busy tone after dialling. State interrogation, e.g. services on an ISDN feature telephone. Reaction after insertion of a smart card.
Complex operations	up to 5,0 s	Login/registration at a terminal. PUA checking an amended profile for conflicts.
Ongoing processes involving 3rd parties	up to 15,0 s	Searching for an unknown UCI. Negotiation of a conference call with potential participant's PUAs. Translation of text of an email. Automatic layout processing performed on long messages (more than 10 pages), e.g. dictionary-based syntax checks, fax to email conversion, word searches, search and replace operations.

Guideline 5.9 - Notification about delays

- During the phase from the user initiating an action to the completion of the requested action, the PUA is responsible for the provision of feedback and notifications to the user. Wherever possible, it is desirable for the PUA to give additional notifications until the action is completed (although in some circumstances the PUA may not have the information to provide these notifications e.g. it may not be aware of all notifications provided by networks). There are at least three variants of how notification should be provided:
  - Where delays are within normal user expectations, non-specific "comfort feedback" can be provided.
  - When the delay is greater than the normal expectation (or it is very long), the user will expect to be given more specific information about the delay (e.g. the cause of the delay and/or the likely length of the delay).
  - Where there are clearly defined intermediate steps between the action request and its completion (e.g. during a lengthy PUA to PUA negotiation - "offering voice call", "voicemail suggested", "voicemail accepted"), the user should be provided with notification that the system is actively handling the user's request by identifying the current step.

5.3 Match between a UCI system and the real world

5.3.1 Deciding on a model

In presenting feedback and state information to users and in providing methods for users to control the underlying systems, the language and graphics used will reflect some form of model which should reflect the user's model of the underlying tasks. For UCI there are two major groups of tasks:

- communicating - e.g. the making and receiving of communications;
- managing communications - e.g. the setting of communication preferences and rules.

Previous research has shown that the vast majority of users have very limited and inaccurate models of how basic telephony works (see p. 10 in ETR 170) [5]. It is probable that users' models for other forms of communication such as email are also very inadequate representations of the real task domains. As users have limited experience of managing their existing communications and because the methods for managing communications varies significantly according to the type of communications and networks/applications the existence of some common model for the management of communications activities is even less likely to exist.

It is necessary to design PUAs taking account of the context of use e.g. types of user, tasks, equipment and the physical and social environments. A PUA Administrator managing multiple users will need a great deal more information to control the behaviour of a group of several users than the individual with simple communication management needs. This implies that it will not be possible to have a single user interface that will encompass the needs of the full range of UCI users and the full range of the different tasks associated with UCI systems.

5.3.2 User interface models and metaphors

With existing communications systems, users have poor models of how systems will behave. There is no reason to believe that the situation will be inherently better for UCI systems. Because of this there is a need for the system to present, through its user interface, a model that will allow the user to perform the necessary tasks. The design of the user interface can then be used to help to build and reinforce the appropriate models in users' minds. The use of metaphor, where objects and activities in the task domain are represented by objects and activities in some more familiar domain, is a common way to help users to understand unfamiliar task domains. The most commonly experienced user interface metaphor in IT is the "desktop metaphor" where the binary files and directories are represented as icons that look like paper "documents" and "folders" that are used in the physical world to contain such documents. This metaphor was targeted at document manipulation and does not always easily extend to other types of task. With the increasing diversity and sophistication of the tasks that users are now having to perform, the "assistant" metaphor is becoming much more widely used.

Guideline 5.10 - Using an appropriate model

- As many users will not have a clear understanding of the technical systems that they are using, it will be necessary to try to give them an appropriate frame of reference by presenting them with an understandable model. In many of the UCI tasks, the model of the PUA being an "assistant" or secretary that aids the user in their tasks would be a very appropriate model. Such a model has already been used in mobile telephone services as a way of presenting a group of services such as voicemail, voice dialling, etc. to the user.

5.3.3 Using the user's vocabulary

As UCI has a global scope, the user interfaces will need to be localized for the language of the different national groups of users. However, whatever language is used, it is important to use a vocabulary within that language which is familiar and acceptable to the user. Only then will it be possible to effectively describe the various concepts that are needed to control the UCI environment in terms that are meaningful to the user.

E.g. Inexperienced users may be confused by the term "URL" but understand "Web Address".

Different groups of users may require the same concepts described in different terms according to their experience and understanding. For example, a PUA Administrator managing multiple users may wish to see the rules that control how a user's communications behave as "rule" objects, whereas the ordinary user may only be aware of these rules in terms of the communication outcomes that are required.

The terminology used in UCI should be consistent between different UCI applications and the vocabulary used should be appropriate to the intended target audience. Technical terms related to PUA management that might be understood by corporate PUA managers might be very inappropriate for the average UCI user. Similarly, "Wizards" should follow real-world conventions, making information appear in a natural and logical order and use words, phrases and concepts familiar to the user, rather than system-oriented terms. Users should not have to wonder whether words, situations, or actions have consistent meetings.

Guideline 5.11 - Using the user's vocabulary

- PUA designers should ensure that it is possible to have different end user views of the basic PUA functionality that are tailored to the knowledge and experience of the specific groups of users. The vocabulary used should be appropriate to the specific group of users.

Guideline 5.12 - User terms, symbols and icons

- A set of user terms, symbols and icons, covering at least the set of key UCI concepts listed in annex C should be defined. User terms for at least the major European languages should be standardized.

Guideline 5.13 - Consistent usage of the user terms, symbols and icons

- All applications and services involved in UCI-based communications should use the same user terms, symbols and icons to describe the defined key UCI concepts (including consistent use of the terms listed in annex C).

Guideline 5.14 - Consistent behaviour related to the user terms, symbols and icons

- All applications and services involved in UCI-based communication should exhibit the same behaviour in relation to the key UCI concepts represented by the user terms, symbols and icons (including at least those listed in annex C).

5.3.4 Complexity

The system should be easy to use and not confuse the user with unnecessary complexity.

Guideline 5.15 - Limiting the set of user selectable options

- The set of user selectable options that are initially presented to a user should be limited in order not to make the task look too complex and thus confuse the user. A mechanism should be provided to give the user access to the complete set of options and system commands when the user so desires.

Guideline 5.16 - Limiting the amount of non-essential information

- Information that is not essential for user to perform their tasks should be restricted. A mechanism should be provided to give the user access to further information when the user so desires.

5.3.5 Proximity of control

Users are most likely to focus on those things that are close to them and which they clearly understand. Many of the concepts of PUA control relate to potential communications that may happen some time in the future and are related to communications services that are remote and abstract. Past experience with systems such as UPT has shown that users do not easily remember to focus on these abstract network based behaviours (e.g. UPT users who register at a visited terminal frequently forget to de-register when they leave the location of that visited terminal).

Users are much more likely to focus on those things that are tangible, visible and simple to comprehend. The control settings of a mobile telephone are an example of an environment in which the focus is on things that are tangible and visible (e.g. settings that users can see displayed on an object that they hold in their hands) and simple to comprehend (e.g. the setting changes made on the mobile phone are directly experienced by changes in things such as the volume or silence of the phone's ringer). Thus it may be possible to link changes in the tangible local environment (e.g. mobile telephone protocols) to activation of certain PUA sub-profiles (e.g. setting a mobile telephone to "silent" or the "meeting" profile would alert the PUA to trigger its "meeting" sub-profile).

Designers should try to establish what users are focused on at any given time and exploit this in the design of interfaces that helps users to manage their PUAs. This can be of particular relevance when considering assisting the user in managing their sub-profiles, as changes of sub-profiles can be linked to activities on which the user is currently focussed.

Guideline 5.17 - Exploiting proximity of control

- As users tend to focus on the tangible local environment (e.g. mobile telephone protocols), designers should try to link this environment to the activation of certain PUA sub-profiles (e.g. setting a mobile telephone to "silent" or the "meeting" profile would alert the PUA to trigger its "meeting" sub-profile).

5.4 User control and freedom

It is important that users always feel that they are in control of the system and not that the system is controlling them. However, this should not be an excuse to get the users to do things that can perfectly well be done by the system - users also need to feel that they are performing the minimum amount of operations to complete a task and not having to do things that the system is perfectly able to do itself. There are many instances where the user will wish to, or need to, exit from some state of the system. Three specific cases are where:

- the user has performed some unintended action (where some form of "undo" facility will be useful);
- the delays in the system will be longer than the user is willing to wait (where an "escape" mechanism will be needed);
- the user has requested (and possibly started to prepare for) a system action and then decides that they do not wish to complete their request (where an "abort" type of function will be required).

Guideline 5.18 - Provision of "Stop" and "Undo" mechanisms

- Users should, wherever technically possible, be provided with:
  - ways to stop the performance of tasks that they no longer wish to complete;
  - ways to reverse operations that they subsequently realize they should not have activated.

5.5 Consistency and standards

5.5.1 Why consistency?

With UCI systems, users may make use of a number of terminals or applications of the same type in different circumstances e.g. a home telephone and a mobile telephone; or an email application at work and a different one at home. Within each particular type of terminal or application users will expect to see significant consistency. So, for example, in an email application users would expect the term for delivering an email to always be the same and not "send" in one application and "post" in another. Similarly, users will expect icons used in applications of the same type to look recognizably similar.

One prerequisite of UCI systems is that the user may wish to control their communications from a number of different types of terminal, accessing communication facilities across a number of different types of access technologies. The implication of this broad range of methods of access and control is that users will be exposed to a very wide range of different types of user interface. Each terminal is likely to have its own inherent user interface style determined by its inherent characteristics e.g. telephone devices are well suited to voice-based interfaces, whereas complex graphical presentation is more appropriate to large-scale graphical displays.

With different terminals and interface styles there is a serious risk that users will have to cope with radically different presentations of the same tasks on the different devices. Users will want to experience the maximum level of predictability and consistency despite the wide range of different potential user interface types. This implies that the underlying way in which the task is performed must have significant similarities even when the form in which the user dialogue is presented to the user may be very different. A solution to this dilemma is the creation of a set of generic control procedures for key tasks that are independent of the form in which the user interface is presented to the user. Consistency of terminology is also an important element of defining generic control procedures.

5.6 Error prevention and handling

Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Although many parts of the present document and future guidelines will present elements that will contribute to an appropriate user interface design, the issue of careful user interface design to eliminate problems occurring is outside the scope of what can be covered in the present document. Further assistance to help in the achievement of good user interface design can be found in EG 202 116 [7].

Where errors cannot be prevented, error messages must aid the user in understanding and recovery. Nielsen [4] states that "error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution". In the UCI domain the nature of the error messages and the type of corrective action proposed will need to be very different when presented to an ordinary UCI user and when presented to a corporate PUA Administrator.

Designers should pay particular attention to error handling and prevention. Potential errors should be identified and either automatically resolved or highlighted to the user for resolution (e.g. proposing an alternative means of communications where the desired communication is not possible (rather than quoting "communication failed")). Common instances where users may need to be notified are if they ask for facilities that are not currently available, if they make requests that result in conflicting system behaviour, or if their requests are ambiguous or incomplete (e.g. identifying potential rule conflicts in the PUA profile).

Guideline 5.19 - Error message presentation

- Error messages should be expressed in plain language (not just numeric/alphanumeric codes), precisely indicate the problem and constructively suggest a solution. Administrators of multiple PUAs, for example, may require more technical and detailed error messages than the ordinary UCI user, but the message should still be clearly expressed. Also these users may require error codes in addition to the explanation for use in system error handling procedures.

5.7 Flexibility and efficiency of use

In order that users can perform their tasks effectively they need flexibility in choosing the most appropriate way in which they can tackle their tasks. The choices that users make may be dependent on a number of factors such as their preferences and abilities or on the environment in which they find themselves when the task needs to be done.

Guideline 5.20 - Providing users with flexible options

- Where possible, users should be provided with a range of options to enable them to perform key tasks. An example of where a number of options can be provided is where a user is given an option of performing an action on a graphical user interface by making selections from the application's menus, by pressing an icon in a toolbar or by performing a 2-key keyboard shortcut.

5.7.1 Shortcut methods

With UCI systems there will be many procedures, such as initiating a communication, that will be very frequently repeated. Such procedures should be simple and straightforward and are obvious candidates for shortcut methods that avoid the user having to avoid having to perform multiple steps.

Guideline 5.21 - The provision of shortcuts

- A wide range of shortcut methods should be employed. Some typical examples include:
  - the exploitation of simple activation actions e.g. lifting a telephone handset can cause a stored digit string to be dialled which establishes contact with the PUA;
  - the provision of default values for every user changeable setting e.g. the default communication service for UCI communications from a telephone may be telephony;
  - the inclusion of accelerators (e.g. multiple key combinations such as Ctrl X for "Cut") may often speed up the interaction for the expert user such that the system can cater to experienced as well as inexperienced users.

5.7.2 Templates

The use of templates should be considered as a way to provide a high degree of flexibility and also to provide an efficient way for users to manage potentially sophisticated PUA behaviour. Templates may be of particular benefit in the initial configuration of PUA profiles for a number of users.

Guideline 5.22 - Use of templates

- Templates should be provided to facilitate the definition of PUA sub-profiles. Consideration should be given to the provision of two classes of template:
  - creation templates, where modifications made to them will not affect any rules, settings or sub-profiles that were previously created from those templates;
  - live templates, where modifications made to them will affect all rules, settings or sub-profiles that are created from those templates. This could be of benefit in a corporate environment where a company wished to make changes to all of its profiles as a result of a corporate change of policy.

5.7.3 Defaults

The provision of commonly acceptable defaults is one method that will allow the user to adopt shortcut methods to perform actions that have many settable parameters associated with them. Examples of such defaults could include the assignment of default communication services to devices and applications so that:

- when a UCI is selected on a mobile phone and a send button is pressed the telephony service is used if the user has not selected an alternative;
- when a message is composed and sent to a UCI from an application, email is chosen as the default service unless the user has specified fax or some other service.

As the choice of default values may in some cases be a very subjective matter, consideration will need to be taken as to when and where the user is able to specify what default value they prefer.

Guideline 5.23 - Availability of defaults

- There will be some settings that it is impossible for the system to be able to recommend (e.g. whether they wish to be contacted with business calls at home), in most other cases default values that the user can choose to accept should be provided.

Guideline 5.24 - Acceptance of defaults

- Users should always be given an option to accept or reject default settings either individually or as named package of settings (e.g. novice user, expert user).

Guideline 5.25 - Restoration of defaults

- Users should be provided with a means to select a "Restore Defaults" option.

5.7.4 Automated housekeeping

After a period of using UCIs, users will develop predictable patterns of use. Also, some of the choices that were made in the initial configuration of the PUA may no longer be as relevant as time progresses. It would be desirable for the PUA to be aware of the patterns of usage and for it to propose strategies to assist the user.

Guideline 5.26 – Automated housekeeping

- Consideration should be given to the provision of a mechanism within the PUA that observes the user's behaviour and proposes strategies that will enhance the user's efficiency. For example:
  - if a user frequently contacts a person by manually entering a UCI or by accessing a record in the communication log, the PUA might propose that the person is added to the address book as a new record;
  - if a user never accesses an address book record, the PUA might ask the user if they wish to remove the record;
  - if a user regularly adopts the same behaviour (e.g. diverting communications from unidentifiable people to a communication store) then the PUA could propose a rule that would automate that behaviour for the user;
  - if a rule in the user's PUA has not been used for a long time, the PUA may suggest that the user might wish to consider deleting the rule in order to improve communication efficiency.

5.8 Minimalist design

Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

Guideline 5.27 - Minimalist design

- The PUA should not present information or ask the user to enter information, which is irrelevant, rarely needed or could be automatically retrieved. Targeting a single application design at too broad a range of user types is likely to lead to much of the information provided and many of the options offered being irrelevant to one or more groups of users. Automatic retrieval of information is another way of avoiding asking the user to provide unnecessary information.

5.9 User support

It is expected that the typical UCI user will neither wish to have, nor be offered, training in basic communication using UCIs. Assistance on dealing with the less common or more complex aspects of UCI usage could be provided by means such as online "Help" systems and third party person-to-person assistance.

In contrast, it is likely and desirable that corporate PUA Administrators would be offered training to perform the wide range of potentially complex tasks associated with the administration of the UCI environment of multiple users. Typically, the support offered would include the provision of comprehensive online and paper manuals.

Ideally a user would be able to approach any system and immediately know how to use it. In practice there will always be a learning curve and the goal is to minimize the learning curve. This can be done by letting the system guide the user on how to perform the necessary tasks.

Guideline 5.28 - Providing appropriate user support

- Users with different experience in using computers will all need to use their UCI and the associated functions of the PUA effectively. It is likely that users will be less experienced at the beginning and might become more experienced after some time and thus their user requirements might vary over time. Three levels of user experiences are identified below together with relevant guidance. These levels might apply to the same user in various different situations, thus requiring a range of alternative user control options to be available:

  - Some users will have no experience in using computers. These users may require the PUA provider to set up the PUA for them and also possibly perform modifications whenever they desire. Such support would allow these users to get the benefits of UCIs/PUAs without having to directly manage PUAs themselves.

  - Other users will have some experience in using computers and they may want to set up the PUA by using a "wizard" (an "intelligent" application). The provision of "Wizards" can provide step-by-step guidance to the user by proposing what actions to take and what information to provide. Such a process might be much more reassuring to novice users than presenting them with complex empty forms to fill in.

  - Users who have significant experience in using computers would require the option to configure their PUA profile to an exact specification (within the standard system constraints).

5.10 Memorability

All parts of UCI systems should be designed to minimize the memory load on the user e.g. the user should not be asked to remember information from one part of a task to a later part of the same task, nor to manually re-enter information that has been previously presented (aurally or visibly) by a part of the UCI systems.

Guideline 5.29 - Memory load

- The design of the system should ensure that the users' memory load is minimized. Techniques that should be employed include:

  - Objects, actions, and options should be visible to the user (aurally or visibly as appropriate). In screen-based interfaces, it should be possible to provide comprehensive visibility of objects, actions and options. In voice based interfaces, only limited visibility of objects, actions and operations will be feasible - by such means as voice menus.

  - Where the range of choices being presented to users is very large, they should be given an option to input information directly rather than being forced to make choices from excessively large sets of options.

  - Every opportunity for automatic retrieval of information from different parts of UCI systems and its use transparently in other parts of the system should be exploited, as this will provide great benefit for reducing users' memory loads.

5.11 Accessibility

All people, including young, elderly and those with disabilities, should be able to initiate and receive communications and inspect and modify their PUA profile. Special devices that can interface with the user's terminals, software or software settings targeted at assisting users who have special needs, or the provision of a service that involves a human assistant are potential means to assist users in performing their tasks.

Guideline 5.30 - Accessibility

- Where there is a mismatch between the user interface of the device, application or service and the abilities of the user, users should be offered additional support and/or an alternative method to perform their tasks.

6 Presentation of the UCI elements

6.1 Background

There is little opportunity with current communications systems to display to the recipient of a communication any information relating to the sender of an incoming communication. The only examples commonly in use are those of CLI in the PSTN and GSM mobiles, and emails. In the first two cases a calling number identifier is delivered to the terminal. This can be displayed as a number or, on most terminals, a local address book enables a "look –up" and consequent name presentation. Such a system is of limited use. The user must make assumptions about who is going to call them before programming the "phonebook" and, even then, if the person in the "phonebook" communicates from a different terminal then the name will not be displayed.

In the case of emails the "meaningfulness" of the "from" indication is dependent on the form chosen by the sender. Again there may be some form address book "look-up", but the same constraints apply. In essence, an email address may tell the receiver who the sender is but it may not.

EG 201 940 [1] discusses the limited capabilities for identifying users in today's communication environment. It describes how the UCI allows the introduction of concepts like authenticity to the delivery and acceptance of communications.

6.2 The UCI system

6.2.1 Labels

Presentation of UCI labels in a UCI system is more powerful than processes currently in use because user-friendly and authentic labels can be passed to the recipient during communication setup. But the impact of this new power and functionality will need to be carefully considered and basic control procedures defined if users are not to become overwhelmed. Users will need to manage the labels that are being received or displayed and make decisions about updating these labels when they change. User involvement should be minimized without removing "control".

The numerical part of a UCI is, to all intents and purposes, constant and will not change with time. The label that is delivered with it, however, is not constant and could even be different for every communication.

A sender of a communication will allow one of the following label types to be delivered to the recipient's PUA:

1) Anonymous - No label delivered, UCI number is not delivered.

2) Alias – A label is delivered, UCI number is delivered, additional info field indicates "not authentic".

3) Authentic – An authentic label is delivered, UCI number is delivered, additional information field indicates "authentic".

The first option does not permit the recipient of the communication to identify the originator, nor does it allow any address book records for the originator to be created. Also it will not be possible for the user to determine that subsequent communications from the anonymous originator are in any way related to earlier communications from the same person. The recipient can therefore receive two different label types (or no label).

Information passed from the recipient's PUA to the recipient's terminal will be determined by the user's preferences and the technical limitations of the terminal.

In their address books, users may have UCIs with one of the above types of user-supplied label or with no user-supplied label. Where users have entered UCI numbers themselves (e.g. from a business card), there will be no owner-supplied UCI label and no additional information field.

This mixture of label types (and no labels) could be difficult to manage and it will be necessary to allow the user the capability of assigning personalized labels to each UCI. These personalized labels are intended for display on all of the user's terminals instead of the label provided with the UCI. They are an addition to and not a replacement for the information in the supplied UCI.

A further complication arises when the sender sends a label different to that currently stored in the recipient's address book. This could be done for a large variety of reasons, name change on marriage, recently acquired nickname, new role in company etc. Clearly recipients will wish to be informed if a received label is different from that stored and to make decisions on whether or not to change address book records.

Guideline 6.1 – Use of personalized labels

- Where a user has created a personalized label for another person's UCI, under normal circumstances this is the label that the user will expect to input, or be presented with, in all interactions with their PUA.

Guideline 6.2 – Awareness of authentic label delivery

- Users should always be made aware whether the label delivered with the communication is authentic or not (e.g. by a visible or aural indication), even when they have chosen presentation of a personalized label instead of the label delivered with communication.

Guideline 6.3 - Display of presented label

- When a communication is received and a personalized label is displayed, the user should be provided with a means to view the label that actually accompanied the communication. This could be by simultaneously displaying both labels or by giving the user a method to request the display of the label that accompanied the communication. The choice of appropriate mechanisms for allowing the received label to be displayed in addition to the personalized label will be dependent on the communication service and on the terminal type.

Guideline 6.4 – Display of new authentic label

- When an authentic label is received and a different authentic label is already stored for this UCI, the user should be notified that the authentic label has changed (e.g. when a person marries and their family name is changed or where a new person takes a role within a company).

Table 2 summarizes the results of guidelines 6.1 to 6.4 as experienced by the UCI user receiving a communication with a label different to that stored by their PUA.

Table 2: Presentation and notification to users as a result of receipt of a new label

SUPPLIED AND CURRENTLY STORED	USER PREFERENCE FOR PRESENTATION	SUPPLIED IN NEW COMMUNICATION	PRESENTED TO USER	NOTIFICATION TO USER
Authentic	Authentic	New Authentic	New Authentic	"New" + "Authentic"
Authentic	Personalized Label	New Authentic	Personalized Label	"New" + "Authentic"
Alias	Alias	Authentic	Alias	"Authentic"
Alias	Personalized Label	Authentic	Personalized Label	"Authentic"
Alias	Alias	New Alias (see note)	New Alias	-
Alias	Personalized Label	New Alias (see note)	Personalized Label	-
Authentic	Authentic	Alias	Authentic	-
Authentic	Personalized Label	Alias	Personalized Label	-
Numeric	Personalized Label	Authentic	Personalized Label	"Authentic"
Numeric	Personalized Label	Alias	Personalized Label	-
NOTE: Some users may change aliases frequently.				

Guideline 6.5 - Record of aliases

- The PUA should keep a record of any aliases associated with stored UCIs. The user should be able to view any or all aliases that are associated with a stored UCI.

6.2.2 UCI Number

Users, as a rule, will have no interest in the UCI number associated with an incoming communication, as the UCI label is most meaningful to users.

Guideline 6.6 - UCI number presentation

- Users will not need to have a UCI number presented to them but should be able to request it.

6.2.3 Additional Information

Additional information field data will be of most use when setting up an outgoing communication and will therefore be available through the address book. Examples of such information would be:

- preferred language;
- services available;
- privacy rating;
- UCI user's picture;
- information related to a user's impairments.

It may be necessary for some additional information field data to be presented to the recipient with the label when an incoming communication is offered because it may impact on a decision to accept the incoming communication or not.

Guideline 6.7 - UCI "additional information" presentation

- Users should be able to specify exactly what additional information field data, associated with an incoming communication, is presented to them before that communication is accepted. This data should be presented to the user irrespective of what terminal is being used. Examples of selected fields will probably include the following:
  - whether the received label is an authentic name or an alias;
  - whether the UCI corporate or personal;
  - additional naming information (e.g. "known by" name).

6.3 The effect of terminal and connection technology

How a user is able to interact with their PUA and with other users will be determined by the capabilities of the terminal and the communication technology in use. The availability of features such as screens and microphones will determine the user's potential ability using certain modalities. The quality of those features will further affect capability (e.g. small or large screens). The user's ability to interact will be further constrained by the ability of the communication channel to support the required interaction. It is impossible to describe all the levels of capability and, in particular, how those capabilities will change in the future. For the moment it may be convenient to consider how current terminals and communication channels effect presentation and group them accordingly.

Below are shown some of the possible terminal types, together with an indication of the relevant characteristics associated with those types.

6.3.1 Terminals

It is recognized that the capabilities and form of terminals will continue to evolve rapidly. Nevertheless, the following descriptions give an indication of key characteristics of some typical and generally recognized types of terminal.

- **PC based communication**
  - unlimited text;
  - high resolution – large area graphics;
  - sound;
  - speech.

  Merits: PCs that are fully equipped with sound, input/output capabilities and allow the greatest range of user tasks to be performed, including the most challenging PUA management tasks.

  Limitations: Portability is limited in some cases.

- **Interactive television**
  - unlimited text;
  - large area graphics;
  - sound;
  - speech.

  Merits: Interactive television provides a graphical output with a lower resolution than a PC but adequate for the display of medium resolution graphics.

  Limitations: Although specialist keyboards are available the normal mode of data entry for interactive televisions is by on-screen cursor selection. This clearly has implications for any control or communication operation requiring a large amount of free text input. Portability is very limited.

- **PDA**
  - limited text;
  - high resolution – small area graphics;
  - limited sound.

  Merits: The terminal is typically associated with one dedicated user removing the need for frequent registrations/de-registrations and personalized ring signals. It is highly portable and with medium resolution (usually full colour) graphics.

  Limitations: Some limitations on display of information. The data entry method of choice for PDAs tends to be using a stylus and a very miniaturized "soft" on screen keyboard or hand written entry. This inevitably limits the efficiency of free text entry.

- **WAP mobile**
  - limited text;
  - limited graphics;
  - sound;
  - speech.

  Merits: The terminal is typically associated with one dedicated user removing the need for frequent registrations/de-registrations and personalized ring signals. The display allows several options to be displayed at the same time.

  Limitations: A WAP mobile can only display limited graphics. Text entry is laborious using the keypad and anything requiring lengthy text should be avoided.

- **Non WAP GSM mobile**
  - very limited text;
  - very limited predefined graphics;
  - sound;
  - speech.

  Merits: The terminal is typically associated with one dedicated user removing the need for frequent registrations/deregistrations and personalized ring signals. The display allows several options to be displayed at the same time.

  Limitations: All menu selections have to be in voice format but the limited display does allow for some visual feedback. Text entry can be laborious using the keypad.

- **Fixed telephone with display**

  - very limited text;
  - sound;
  - speech.

  Merits: The very large number of fixed telephones means that interfaces designed for access from fixed telephones can be very easily accessed from any of the user's terminals or from public terminals. The presence of a display, even of limited capability, allows for the display of things such as CLI, incoming communication UCI label presentation, and continuous state and feedback information.

  Limitations: All menu selections have to be in voice format but the limited display does allow for some visual feedback. Text entry can be laborious using the keypad.

- **Fixed telephone with no display**

  - sound;
  - speech.

  Merits: The very large number of fixed telephones means that interfaces designed for access from fixed telephones can be very easily accessed from any of the user's terminals or from public terminals.

  Limitations: All presentation of information has to be in voice format with the obvious restrictions and limitations that involves. Text entry can be laborious using the keypad.

In order to assess the suitability of different types of terminal, it is useful to describe certain classes of tasks that may be required when using UCIs. Where there are entries in the "Terminal totally unsuitable" column, there may often be a danger that attempts to perform tasks in these circumstances could lead to outcomes that would have undesirable consequences for a user's future communications.

In the following table, the different categories are not mutually exclusive. For example, a "Form-filling" will involve either "Limited text entry"or "Entry of large amounts of text".

Guideline 6.8 - Use of appropriate terminals

- Application and service designers should try to encourage the use of appropriate terminals for appropriate tasks (as summarized in table 3).UCI applications and services should be designed so that users are not required to perform tasks described under the "Terminal totally unsuitable" category.

Table 3: Appropriate terminals for tasks

Task type	Key characteristics	UCI examples	Terminals recommended	Terminals totally unsuitable
Simple selection	The user is asked to select from one of a limited number options (< 10)	Activate a sub-profile	Any	None
Complex selection	The user is asked to select from a large number of options presented in a hierarchy of choices	Browsing an address book	Any terminal with multi line display	Fixed telephone without a display
Assessing the current state of a complex set of options	User must see the full range of information before coming to a judgement	Assessing the behaviour that can be expected from currently active PUA rules	Terminal with a high resolution display	Fixed telephone (with or without display)
Yes/No dialogues	User requires two options to respond to a simple proposition	"Terminate communication?"	Any	None
Simple numeric data entry		Entering a UCI numeric	Any	None
Limited text entry		Entering an SMS message	Any terminal with a display and a keyboard (or the facility to map numeric entry to text)	Fixed telephone (without display)
Entry of large amounts of text		Entering a lengthy email	Any terminal with a display and an alpha keyboard	PDA , interactive TV Mobile or Fixed telephone with display (unless a keyboard is available) Fixed telephone (without display)
Simple form-filling	Prompts where responses are by menu or limited text entry	Creating a new sub-profile from a template	Any terminal with a display and an alpha keyboard (or the facility to map numeric entry to text)	Fixed telephone (without display)
Information retrieval - querying	Formulating a query and receiving a response	UCI search	Any	None
Information retrieval - browsing	Scanning a list or hierarchy of lists	Examine the communication log	Any terminal with a display (very limited browsing on a small display)	Fixed telephone (without display)
Presenting simple terminal embedded graphics		Presenting symbols to describe attributes of an incoming communication (authenticity, corporate etc.)	Any terminal with embedded graphics capability	Any terminal without embedded graphics
Presenting simple terminal graphics		Presenting a company logo received as part of a UCI label	Any terminal with a display capable of displaying simple graphics	Non WAP GSM mobile Fixed telephone (with or without display)
Reading complex graphical displays of information		Presenting a graphical representation of a sub-profile	Any terminal with a display capable of displaying complex graphics (medium to high resolution)	WAP mobile GSM mobile Fixed telephone (with or without display)

Guideline 6.9 - UCI label presentation at any terminal

- The user should be able to request that the UCI label is presented to them before they make a decision on how to handle an incoming communication (irrespective of the terminal capabilities). Rules in the recipient's PUA may determine the circumstances under which the label is offered to the user. In the case of a fixed telephone without a display this would entail an automated voice call delivering the label of the incoming communication. The user could then accept, divert to voice-mail or decline the communication with appropriate keystrokes.

Guideline 6.10 - UCI sub-profile activation from any terminal

- The user should be able to access their PUA from any terminal to allow the user to activate a new sub-profile.

Guideline 6.11 - Feedback about active sub-profile from any terminal

- There should be provision from any terminal for users to ascertain which sub-profile is currently activated by means of appropriate text, symbols, tones or voice announcements. The capability of the display in use at the time will obviously dictate how the user is informed:
  - A PC based terminal will allow continuous feedback of the activated sub-profile.
  - A terminal with a restricted display may require the state information to be overwritten temporarily when other more important information must be delivered.
  - A terminal with no display capability should provide an initial voice announcement or a distinct tone to indicate which sub-profile is activated and then periodic "reminders" to the user.

NOTE: When the output medium is a visible display it is possible to give continuous information on the current system state. However, there may be circumstances when the display of some other information is more important than the state information and the state display may be temporarily or permanently overwritten.

Guideline 6.12 - Address book access and directory search access from any terminal

- Users should be able to access their address books and directory services from any terminal to aid them in initiating communications (subject to the limitations of the terminal and channel that they are using).

Guideline 6.13 - Communication log access from any terminal

- Users should be able to access incoming and outgoing communication logs from any terminal in order to make further communications to the UCI and non-UCI users listed in the logs. The content of the log information presented would be subject to rules defined in each user's PUA profile (e.g. the PUA rules might specify that logs presented when the user is using a basic voice terminal should only list the last 5 voice communications extracted from the main PUA log).

6.3.2 Channel

The effectiveness of a given communication channel is effected by many factors. These include:

- interface device e.g. ISDN TA, Dial-up modem, cable modem;
- services e.g. voice, data;
- service provider interface e.g. server types, storage capabilities;
- communication network e.g. PSTN, ISDN, IP Network.

Factors that will affect usability include:

- whether the communication channel is always available ("always-on") or whether it requires; activating/de-activating (e.g. "dial-up");
- the maximum speed of data communication;
- whether user interface support and storage is local to the terminal or largely provided by a remote server.

The effect of these characteristics of the communication channel will determine whether it is possible to provide features such as:

- selection from long lists;
- the display of graphics;
- long dialogue sequences;

in a usable way.

Recommendation 6.14 - Channel capabilities affect on usability

- The user interface features that users are offered and the way in which they are supported should be consistent with the limitations of the communication channel being used.

7 Management of the PUA profile

7.1 Introduction

For UCI-based communication to achieve its design goals, all communication must be handled in a manner that reflects the UCI user's requirements (see annex B). EG 201 940 [1] has identified the PUA as the entity responsible for taking incoming and outgoing communication requests and handling them in accordance with users' requirements. In order that the PUA can act in accordance with the UCI user's requirements the PUA must:

- have details of the UCI user's communication preferences - expressed in terms of rules and settings;
- have an understanding of the state of the UCI user's current environment - by having knowledge of the "state" of the UCI user's environment (including the state of their various communications services).

The collection of all of these rules and settings are referred to as the PUA profile. In order that users can effectively manage their requirements, the information in their PUA profiles may be sub-divided into sub-profiles that relate to specific situations in which users find themselves (e.g. "at work", "travelling"). To help UCI users setup and manage their PUA profiles effectively, "templates" that contain typical rules and settings can be used to aid the setting-up of profiles and sub-profiles.

Clauses 7.2 to 7.5 describe the PUA profile, rules and settings in more detail.

The usability challenge in relation to the PUA profile is in the effectiveness of its management. Many attempts at semi or fully automated communications management have been made over the last twenty years. The critical factor in almost all cases, and possibly the reason why none has been a complete success, is the lack of attention to the interface between the user and management system. Users have too often seen this interaction with the management system as a time-consuming and intrusive overhead with insufficient benefit for the effort required. If the interaction between user and system fails then the user profile can become "out of sync" with real life circumstances, and the management system can easily become counter productive diverting communications to the wrong location at the wrong time for instance. If this happens the service has failed.

7.2 PUA profile

A PUA profile is the total set of rules and settings relating to a specific UCI.

7.2.1 PUA base-profile

A PUA base-profile is a subset of a PUA profile which contains rules and settings that are always active. For example, a user can decide never to accept anonymous telephone calls. Similarly, a user's physical impairments will not change and therefore should be part of the base-profile.

7.2.2 PUA sub-profile

A PUA sub-profile contains a named subset of the rules and settings of a PUA profile defined to suit the user in a specific situation. For example, if users go to a meeting they can choose a "Meeting" sub-profile, which means that a number of settings and rules that suit a meeting are set (e.g. no real-time voice based communications would be offered).

PUA sub-profiles relate to situations that require fairly predictable but different communications behaviours. Examples of sub-profiles include:

- "at home";
- "driving the car";
- "at a meeting";
- "abroad".

At any given time only one sub-profile may be active. Users may wish to manually activate the sub-profile that they require or PUA rules may specify that the sub-profile should change (or a change should be recommended) when the PUA is notified of external events. For example, PUA rules may specify that the "driving the car" sub-profile is activated if the PUA detects that the UCI user has attached their mobile telephone to the car hands-free unit. An activation of a sub- profile can be initiated either manually by the user or automatically. An example of manual activation is when the user changes the sub- profile from "at home" to "driving the car". An automatic activation could be triggered by:

- time;
- an accessory (e.g. a mobile phone being placed in a desktop charger causing an automatic divert of incoming calls);
- synchronization with an external application (e.g. a calendar application);
- activity within a service (e.g. an instant message was sent from the user's home PC).

Guideline 7.1 - Manual sub-profile activation

- Users should always be provided with a mechanism to activate sub-profiles (thereby de-activating the previously activated sub-profile). The activation mechanism should be available to users irrespective of what terminals they are using.

Guideline 7.2 - Provision of automatic sub-profile activation

- Automatic sub-profile activation mechanisms should be provided to assist users. The operation of these mechanisms should be subject to user defined rules on what prompting they require before changes are made.

Guideline 7.3 - User specification of automatic sub-profile activation mechanisms

- Users should be provided with mechanisms to create and modify the PUA rules that specify the circumstances under which sub-profiles are activated.

Guideline 7.4 - User notification of automatic sub-profile activation

- Users should be provided with appropriate feedback whenever a sub-profile is automatically activated such that they are aware of which new sub-profile has been activated.

NOTE: The appropriate level of feedback given to the user will need to be dependant on issues such as whether:

  - the user is likely to be aware of the activation because of what they did that would cause the activation (e.g. putting a mobile in a desktop charger);
  - the user has explicitly said that they do or do not require feedback on a type of activation;

- the user has explicitly said that they do or do not wish to confirm a proposed activation of a sub-profile;
- it is necessary for users to know which sub-profile is active.

Guideline 7.5 - User notification of sub-profile changes made by a third party

- It should be possible to trace full details of all modifications to the PUA sub-profiles made by a third party (see clause 7.5.2) e.g. *who* made *which* modification and *when*.

7.2.3 PUA profile/sub-profile creation and modification

It is expected that PUA Providers will provide UCI users with a customized PUA profile when they start to use UCIs. Hence, users will not need to specify the details of a PUA profile before using UCIs. Users should be able to create sub-profiles and modify their sub-profiles and base-profiles.

To ensure that users do not spend too much time and effort creating and modifying sub-profiles/base-profiles, a variety of different solutions are needed. PUA provided pre-configured sub-profiles, templates and simple profile modification tools should be considered.

In the case where users have made a series of unwise profile modifications or where some major system errors have occurred, it may be necessary for users to restore an earlier version of their profile/sub-profile. They will need some mechanism to enable them to handle multiple versions of their profile/sub-profile.

Guideline 7.6 - Provision of pre-configured PUA profiles

- New UCI users should be provided with pre-configured PUA profiles that allow them to use UCI without performing complex PUA setup procedures.

Guideline 7.7 - Provision of PUA profile/sub-profile modification mechanisms

- Mechanisms such as pre-configured sub-profiles, templates and simple profile modification tools should be considered to assist users in making meaningful changes to their PUA profiles with little effort. These mechanisms become especially valuable when users need to modify their PUA profiles from terminals with limited capabilities as the user will be unable to perform complex detailed editing tasks using such terminals.

NOTE: In determining how the methods by which modification of PUA profile/sub-profile can be simplified, the following will need to be considered:

- which settings can be assumed to be set to a common value for a given set of users;
- the methods used for the creation and modification of templates;
- the scope of application of a template – from a very detailed and comprehensive template for a very specific purpose to much broader templates that would require more user involvement in their definition;
- the issue of whether, and in what way, changes to templates will affect profiles/sub-profiles that were based on these templates.

Guideline 7.8 - Saving and restoring profiles/sub-profiles

- Support for users handling different versions of their PUA profile setup should be provided. This should include a capability to save and retrieve profile/sub-profile versions.

NOTE: Such a facility might include PUA providers retrieving previous versions of the PUA profile/sub-profiles on the users" behalf.

7.2.4 Offline PUA profile management

Online PUA profile management is, in many respects, ideal as it ensures that the user is viewing and modifying current data. However, for reasons such as slow networks or high communication costs, users may choose to view and modify an offline version of the PUA profile. There are hazards in working with an offline version as the original information may be outdated and changes may occur whilst modifications are being made. Care will be needed to ensure how current the information is. When the PUA profile is updated with off-line information, consideration needs to be given as to how potential inconsistencies are noticed and communicated to users.

Guideline 7.9 - Offline modification of PUA profiles

- Users should be provided with mechanisms to allow them to perform PUA profile management on offline versions of their PUA profile (e.g. a version stored in a terminal with no current communication connection).

Guideline 7.10 - Validity of offline modifications made to PUA profiles

- Users should be provided with warnings about possible problems arising from modifying offline PUA profiles. These warnings should include:
  - indications of how recent the offline version of the PUA profile data is;
  - indications of potential conflicts and/or ambiguities that are detected when the offline PUA profile is synchronized with the PUA profile stored in the PUA;
  - options for the user to confirm, reject or modify any changes that they have made to an offline version of the PUA profile.

7.2.5 Availability

To enable users to maintain full control of their UCI communications, it is important that they are always able to access their PUA. Inability to access their PUA has serious consequences as it potentially prevents the user from initiating communications or amending their PUA profile.

Guideline 7.11 - PUA availability

- Users should be able to access their PUA from any terminal, system or place, either directly or via a third-party PUA management service (see clause 7.5.2).

7.2.6 A familiar PUA profile management environment

The primary usability challenge is to ensure that the PUA profile reflects the user's real world as far as possible. Users will wish to make changes to their PUA profiles wherever they are and whenever they need to do so. This implies that they may need to do the management tasks from a wide range of terminals. The secondary major usability challenge is to ensure that users have a familiar environment however they access the PUA.

Guideline 7.12 - The use of a familiar PUA profile management environment

- Mechanisms that will create a familiar PUA profile management environment across a wide variety of terminals should be provided.

NOTE: The following mechanisms should be considered

- easily selectable sub-profiles which reflect a user's situation at a given time e.g. work, leisure, in car;
- automated updates to the PUA from applications, services and terminals;
- using graphics wherever possible to facilitate the user's understanding of their profile;
- using generic control procedures applicable across all terminals and services.

7.3 Rules

Rules are the means by which users can express their requirements in a way that can be interpreted by the PUA and that can be read and modified by the user.

PUA rules could be unconditional or conditional. An unconditional rule will cause one or more actions to happen (e.g. divert all communications to voicemail) as soon as the rule is activated. However, in the PUA environment, the majority of rules will include one or more conditional statements e.g. "if calls from person A arrive after 10.00pm send them to my voicemail". In this case the actions will occur only if the specified conditions are met. Rules will always involve PUA profile objects, such as time of day or an address book record. Outcomes from the rules are related to functions such as:

- filtering communications;
- diverting communications;
- giving priority to communications;
- activation of PUA sub-profiles;
- deactivation of PUA sub-profiles.

7.3.1 Creation and modification of rules

The rules required by the PUA to adequately describe a user's communication environment could often be very complex. Rules will refer to many types of object including terminals, communications services and people and include conditional statements relating these objects. To ensure that users do not spend too much time and effort creating and modifying many rules, a variety of different approaches to assisting the user are needed. Approaches that could be considered include PUA provided set of pre-defined rules, templates and simple rule-building tools.

Guideline 7.13 - Assisting users to create and modify rules

- Mechanisms to assist users in the task of creating and modifying PUA rules should be provided.

NOTE: The following mechanisms that should be considered as ways of assisting users:

  - PUA provided set of pre-defined rules;
  - templates;
  - simple rule-building tools.

7.3.2 Activation/deactivation of rules

A rule can be active if its PUA sub-profile is activated and be deactivated when the user deactivates the sub-profile (see clause 7.2.2). Rules and settings in the PUA base-profile are permanently active. Users may set rules that need to be automatically activated or deactivated as a result of some change to the state of a terminal or service. Because of the amount of activation and de-activation of rules that will occur without the user explicitly requesting this activation/de-activation, a user may be uncertain which rules are currently active and which are de-activated.

Guideline 7.14 - Examining the activation of rules

- Users should be provided with a mechanism to interrogate the PUA to determine which rules are active and which are not.

7.3.3 Precedence of rules

Users may specify a number of PUA rules, possibly over a long period of time. Where those rules co-exist it will be necessary for the user to, explicitly or implicitly, indicate which of these rules takes precedence over the other.

Guideline 7.15 - Precedence of PUA rules

- Users should be provided with a mechanism to allow them to determine the order of precedence of PUA rules and to enable them to alter that order of precedence.

7.3.4 Rule conflicts and side-effects

When users modify their profiles, there is always a danger that, by misunderstanding or mistake, they will accidentally create conflicts and unexpected side-effects. Examples of some of the potential problems are:

- the change would make the user unreachable;
- the specified action does not define the intended outcome for some circumstances;
- the proposed change will inadvertently negate a previous request (as opposed to an explicit negation request).

Similar conflicts may arise when linked PUAs (see clause 12.3) are involved.

Guideline 7.16 - Rule conflicts and side-effects

- Users should be provided with support from the PUA to help them prevent or solve PUA rule conflicts or side-effects.

NOTE: The PUA could, for example:

- monitor PUA/communication activity to detect abnormal behaviour;
- propose a strategy to correct the problem;
- give users a rollback mechanism to enable them to revert to a situation prior to the occurrence of the problem.

7.3.5 Service/feature interaction

There are an increasing number of services available for users and it is likely that the range of services will continue to grow in the future.

The scope of services that need to be handled is very wide and covers:

- direct UCI related services – e.g. barring of all communications from a specific UCI;
- different basic communications services – e.g. telephony, video, email;
- different technologies underlying the services – e.g. PSTN, GSM;
- supplementary services for the above types of service – e.g. call diversion, call barring;
- 3rd party services running on the above networks e.g. games, news services.

It should be noted that there are some services and supplementary services that may interfere with each other. For example, if users have chosen to divert incoming calls, then they will not be able to activate some call restriction options. Similarly, if users have chosen call restriction, then they will not be able to activate some call divert options.

Users will require the PUA profile manager to allow the definition of profiles that cover different services in an integrated way. This implies control from a single profile manager, not several different and incompatible ones. This will be possible if the interfaces between the PUA profile manager and the services are well defined, standardized and synchronized.

Guideline 7.17 - Integrated handling of services in profiles

- The PUA should provide for the definition of profiles that cover different services in an integrated way. This implies control from a single profile management application, not several different and incompatible ones.

7.3.6 Rule effectiveness

As users become more familiar with UCI, they are likely to acquire a number of rules that were either part of an initial PUA setup configuration, or subsequently added by the users themselves. As users' patterns of communications change over time, these rules may become less relevant or in need of changing (e.g. the groups of people referred to in some of the rules may change over time).

It might prove useful for users to get information on which rules are applied, how often and when. A rule that has never been applied might give an indication that the rule does not reflect the user's intention. Users might, perhaps, decide that they wish to change or correct rules that are not being used or even delete these rules. Deleting unnecessary rules could speed up the time taken to check rules before carrying out various actions.

Guideline 7.18 - Rule usage and effectiveness

- It should be possible for users to identify PUA rules that are unused or not recently used. A mechanism to alert users to such unused or under-used rules should be provided for users to use if they wish to receive such alerts.

7.4 Objects and settings

The outcome of rules in the user's PUA will be dependent on one or more PUA profile objects. These objects will cover many different aspects of UCI communications, including:

- communications objects (communications channels and terminals);
- time;
- accessibility;
- address book records;
- place/activity;
- location;
- PUA profile management user interface settings.

The value of some of these objects (which the user will see as "settings") can be predefined (defaults) and/or set in templates.

Some settings are more or less permanent (defaults) and are preferably defined in a PUA base-profile. Other settings are more suited to a certain situation and it might be relevant to define those settings in the PUA sub-profile corresponding to that kind of situation.

7.4.1 Object descriptions and concepts

In defining the rules in the profile, users will need to describe the various objects involved in the rule definitions. The way in which users conceive many of these objects may be complex. Some of these objects could be described in absolute terms (e.g. Friday 15th February 2002) or in relative terms (e.g. 2 weeks from this Friday). In other cases, there may currently be no generally agreed common standard for expressing such objects (e.g. there is no commonly agreed standard for quality of communication between voice communications and video communications).

Whereas it will be essential to have standardized descriptions of these objects in order that profiles can be migrated from one provider to another, this does not imply that users will need to understand these descriptions.

Guideline 7.19 - Representing objects to users

- The way objects are represented to users should be dependant on the knowledge of the target users and the specific context of use.

NOTE: This implies that user descriptions of objects can therefore differ significantly between different PUAs and even between different contexts of use within the same PUA. However, the formal internal object descriptions will conform to standardized naming conventions, to enable profiles to be migrated between PUAs.

7.4.2 Usability issues associated with objects and settings

- The, often complex, PUA profile needs to be presented to users in a way that enables them to understand its full effect.
- At any given time, users need to be able to understand the effect of the subset of rules (sub-profile) being applied.
- Users need to be able to change rules (sub-profile) to take account of new, different or unforeseen circumstances.
- Users need to understand the implications, subsequent effects, etc. of changes that they make to a sub-profile.

7.5 User roles

7.5.1 UCI/PUA user

The UCI user is the person or role to which the UCI is assigned. The UCI label identifies the UCI user and the additional information field describes characteristics of that user and the associated UCI. The UCI user is also the PUA user. PUA users will typically be able to modify certain aspects of their PUA profile.

7.5.2 PUA administrator

The PUA administrator is the person who defines PUA profiles with settings and rules. The PUA administrator can be the PUA user, which is the normal case for a personal PUA. The PUA administrator can also be someone else, for example when a company administers PUAs for employees or when parents administer the PUAs for their children.

Alternatively users may call upon a third party service to administer their PUA profiles either all of the time, or when the administration task is awkward to perform at the current time. This is useful when a person is using a terminal with limited capabilities or simply is not interested in, or sure about, how to perform modifications. People with disabilities and older people might also find a third party useful for managing PUA profiles.

A PUA administrator in a company would be expected to perform a very wide range of tasks, many of which might be quite complex. It could be expected that people performing such a role would have experience of technical systems and be trained in PUA administration. In contrast many UCI users cannot be expected to have any specific technical knowledge and experience and may only be required to perform quite simple tasks. Given this wide range of variability, it is likely that the tools provided to these PUA administrators could be significantly different.

Certain important PUA profile administration operations will require special privileges. These operations would require users to authenticate themselves.

7.5.3 Usability issues related to roles

The task complexity of managing a PUA will vary greatly between a corporate PUA administrator and a novice UCI user. The level of knowledge and experience will also vary greatly between these groups. For this reason the user interfaces presented to different roles will need to be designed separately to take account of these differences. Examples of factors that will need to be considered are:

- Security/authentication levels will need to be defined for various operations and for access to certain information in the PUA. Making these security/authentication levels easy for users to understand and/or control will need careful planning according to the type of user e.g. the solution chosen for a novice user will be very different to that for a corporate PUA administrator.

- The task complexity of managing a PUA will vary greatly between a corporate PUA administrator and a novice UCI user. The structure of the user interface dialogues and the complexity of the user interface screens are likely to vary significantly between these extremes.

Users may sometimes make use of a corporate administrator or other 3rd party to perform some of their administration tasks. Factors that will need to be taken into account in these circumstances are:

- the ways in which profile setup and modifications are fed back to the user;

- what methods of interaction between the 3rd party and a person requesting changes are appropriate for various tasks.

7.6 Interaction with other systems

Users may have preferred applications for managing various functions associated with PUAs such as address books (see clause 8) and diary managers. It might be desirable for users to be able to use such applications to manage these functions in a UCI environment. If an environment that allowed the user to utilize such applications was provided, it would encourage market competition and provide users with a broad range of useful services at competitive prices. With such an environment, users would be able to select applications that met their needs and suited their interface preferences.

The PUA should hold a complete picture of the user's current situation and the state of their communications environment even where the data is distributed across a number of different systems. It is also important that the user should not need to manually re-enter information entered into one application into another application or into the PUA.

Automatic retrieval of information from other systems and the use of such information transparently by the PUA (e.g. the use of presence information related to the state of terminals and services) should lead to more reliable outcomes for the user and less need for user interaction with the PUA. There may be certain circumstances where user confirmation of changes to the PUA profile resulting from information received from an external system are required (e.g. where the external system is not closely related to normal PUA functions).

From time to time, new facilities will be made available to the user as a result of changes to communications services or to facilities provided by the PUA provider. Users will require to be notified of these new facilities and to have the ability to access them in the same familiar way.

Guideline 7.20 - Use of familiar applications

- Users should, wherever possible, be allowed to utilize familiar applications (e.g. contact and diary managers) to perform certain aspects of PUA management.

Guideline 7.21 - Efficient information entry

- Users should not be required to re-enter information when managing PUA functions, even when this management is distributed across a number of applications. This rule may need to be relaxed in certain circumstances for security reasons (e.g. a user may be asked to re-enter a password in order to enhance security).

Guideline 7.22 - Automatic information acquisition

- Users should not be asked to enter information that can be acquired by the PUA from other sources. In some circumstances users may be required to check and confirm the use of this automatically acquired information.

Guideline 7.23 - Simple integration of new system features

- New system features should be introduced in such a way that the new facilities can be utilized using familiar methods.

7.7 Change of PUA provider

For a variety of reasons (e.g. the provision of a better or cheaper service) users may wish to change their PUA provider. With any such change it would be extremely inconvenient for users to lose the PUA profile rules and settings that they have accumulated over a long period.

When changing PUA provider, users may wish to keep their existing PUA profiles and transfer them to the new PUA provider.

Guideline 7.24 - Consistent PUA profile behaviour

- Where users move their profile to a new PUA provider, the PUA profile should exhibit the same behaviour it exhibited when with the original PUA provider.

7.8 Tools

Every UCI user role will need access to an appropriate range of tools to enable them to carry out the function appropriate to that role. For example ordinary users will need tools to enable them to:

- change the behaviour of their PUA profile;
- look at their communication history;
- search through PUA sub-profiles and rules;

and corporate PUA administrators may need tools to enable them to:

- add or remove users;
- examine fault logs.

Guideline 7.25 - Consistent operations across tools

- Similar operations in different tools should have the same look and feel in the same context e.g. using "delete" on an address book record or on a log record should use similar dialogues when accessed from a mobile phone.

7.9 PUA profiles and the UCI additional information field

The information in PUA profiles and the UCI additional information field might be related in some cases, e.g. accessibility settings or language preferences.

Guideline 7.26 - Consistency between the PUA profile and the UCI additional information field

- There should be a single source for information that appears in both the PUA profile and in the UCI additional information field. This will ensure that any change to this information will be reflected throughout the PUA profile and also in the UCI additional information field in a consistent way.

7.10 Services and terminals

Users will want to define settings and rules related to their communications services and terminals.

Adding, removing or substituting services or terminals will affect existing rules which the PUA uses to manage the user's communications. It may be possible that users will later subscribe to another service (similar to one that they unsubscribed from) and that the user will need a similar rule again. The user may wish to collect those rules in a special part of the rule base for future use. These rules will not be processed until they are modified, if necessary, and reinserted into the active rule base.

If one of the user's communications services or terminals changes in a way that might affect current or future communications, the PUA will need to be aware of such changes. A typical example might be when a user with a mobile telephone roams to an area in which one or more of their services is not supported.

Guideline 7.27 - Implications of adding services or terminals

- The PUA profile should be automatically or easily updated to reflect a situation where the user subscribes to new services or adds new terminals.
- Users should be notified if newly added services or terminals have no rules relating to them and, the PUA could propose default rules where appropriate.

Guideline 7.28 - Implications of removing services or terminals

- Users should be warned when they unsubscribe from services or remove terminals and those services or terminals are referred to in rules. Options could be given to the user to:
  - delete that rule;
  - update the rule;
  - keep the rule for future use.

Guideline 7.29 - Synchronization with service and terminal state/settings

- Information in the PUA profile manager should be synchronized to reflect the changes to the states and settings of the user's services and terminals.

8 Address book management

In this clause, the word "address book" is used to indicate the address book that is part of, or associated with, a PUA, unless otherwise stated.

8.1 The function of the address book

An address book as part of, or associated with, a PUA is a vital part of UCI communication. It is needed:

- to provide a list of contacts with whom the UCI user may wish to communicate;
- to give the PUA a source of information upon which its filtering rules can be based.

8.2 Content of the address book

8.2.1 Minimum content address book records

At a minimum, the address book should contain a list of people with their name and contact information stored against each person. The most important piece of contact information in UCI systems is a record for the contact's UCI. The system capability SC2.9 (Maintaining the functionality of network specific services) in EG 202 067 [2] states that "A UCI based system will not render inaccessible the functionality available with an existing network". In the spirit of this service capability it should be possible to have address book records for contacts that do not have a UCI as people are currently able to do this. Similarly, it should be possible for the UCI user to record non-UCI contact information that they have about a contact (e.g. their telephone number or their email address) even for those contacts that do have UCIs. These two applications of SC2.9 lead to the conclusion that an address book record should, as a minimum, have fields for:

a) name;

b) UCI (including all its parts);

c) an indication of the presence of a UCI (e.g. symbol, icon, or abbreviation);

d) other contact identifiers.

Guideline 8.1 - Support for both UCI and non-UCI address book records

- Address books should be capable of holding records for contacts that have UCIs and for contacts that do not. For this reason, fields for UCI and non-UCI contact information should be provided.

Guideline 8.2 - Indicating the presence of a UCI in address book records

- A visual distinction to indicate the presence of a UCI is required (e.g. symbol, icon, or abbreviation). This could be placed with the other UCI number in a displayed address book record. Such a symbol might be as simple as "UCI" if, indeed, this name becomes established.

8.2.1.1 Services available

A UCI address book record should provide a simple representation of what services are available (as it may help the UCI user to decide the most effective type of communication to request). The most obvious way to do this will be to use universally accepted icons or abbreviations representing each available service.

Information stored in the address book about preferred services could be kept up-to-date by information communicated by the PUA of the owner of the UCI (where such a mechanism is provided).

Guideline 8.3 - Presentation of preferred services in address book records

- If there are preferred services associated with the UCI then these should be made clear by means of appropriate symbols or icons that can be displayed with the UCI. This will be derived from information that the owners of UCIs provide in the additional information field of their UCIs.

8.2.1.2 Charging information

It may be thought necessary to indicate the level of charging which the sender should expect. At the very least it might be necessary to consider how to indicate

- free communication;
- mobile rate;
- premium rate;
- international rate.

The charging that users experience may well also be a function of the communication service that they request. Any information relating to charges will be supplied as part of the additional information field of a UCI.

Guideline 8.4 - Presentation of charging information in address book records

- Information about the charging rate for communication should be imparted by means of a symbol or text placed after the preferred service symbol, icon or abbreviation. This will be derived from information that the owners of UCIs provide in the additional information field of their UCIs.

8.2.2 Additional content of address book records

Address book records may also contain a number of additional attributes (not just restricted to those in the UCI "additional information" field). Some of these attributes may be related to alternative ways of highlighting the address book record. Such attributes could include:

- a voice label;
- a visual image;
- date of last communication;

- associated sounds (e.g. ring signals);
- associated icons (e.g. to indicate membership of the "Family" group);
- text characteristics - colour; text weight (e.g. italic, upper-case);
- assistive technologies (necessary or available).

Guideline 8.5 - Additional content of address book records

- Consideration should be given to the inclusion of fields for additional information. This additional information could include a voice label or a graphic image, as well as a visible version of some of the additional information fields that are stored for UCIs.

8.2.3 Shared address books

There are many circumstances in which two or more people will wish to communicate with the same set of people. Typical examples are members of the same family or employees of the same company. In these circumstances it is very desirable that these people (the shared interest group) can access UCIs contained in a shared address book.

One or more of the people in the shared interest group may be given the rights to add to and modify the records in the shared address book. However, records from the shared address book can be presented to members of the shared interest group as either a separate list of contacts or as contacts that appear as part of their own private set of stored UCIs. Sharing items in a family address book in no way overrides the access privileges assigned to directory records. Some members of a family will not be able to view records belonging to the company address books of other members of the family unless they have been assigned explicit rights to view these records. Sharing of address book records is illustrated in figure 2.

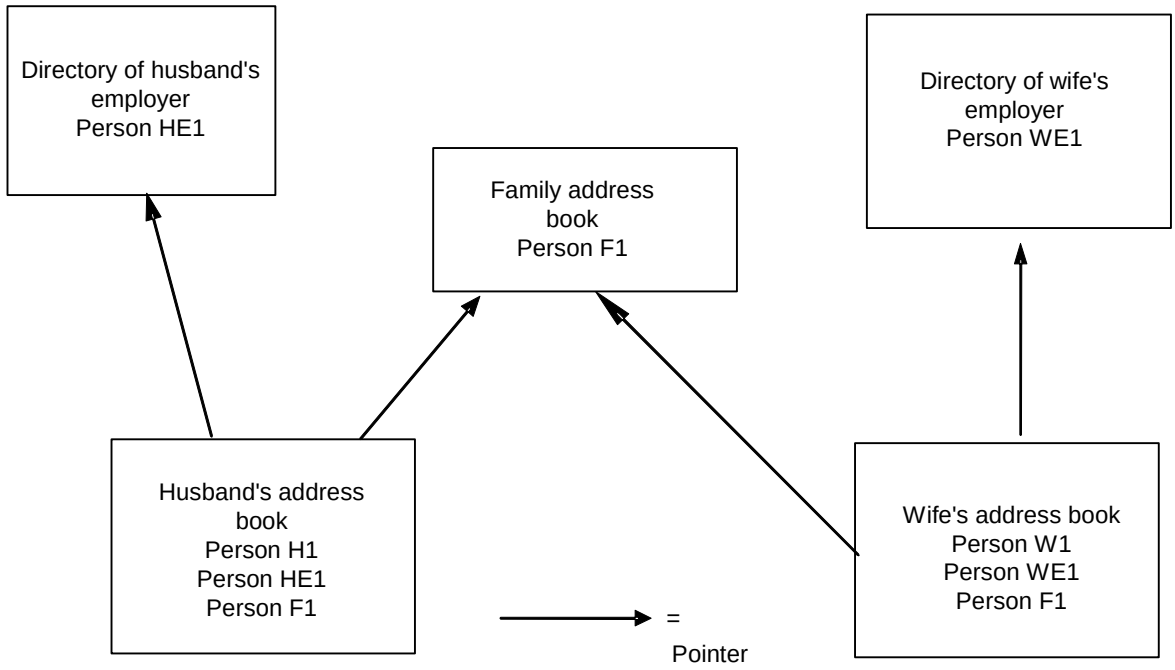


Figure 2: Shared address books

Guideline 8.6 - Shared address books

- The capability to allow a number of users to share one or more common address books as well as their personal address book should be provided.

8.2.4 Void

8.2.5 Synchronization of distributed address books

Address books contained in terminals (or on smart cards) might be a subset of those in the PUA(s) in terms of:

- the number of records held;
- the number of fields held per record.

The constraints on what is held in a terminal address book will be determined by limitations of storage format in the terminal (restricted number of records and fields) and by user preferences.

Users should be able to express their personal preferences for what gets stored in the terminals - making a selection of which records and which fields.

When address books in terminals and the PUA address books are synchronized, users will not wish to be disturbed by requests to resolve differences in storage capacity and record sizes.

Guideline 8.7 - Synchronization of distributed address books

- All address lists associated with different terminals and smart cards should be synchronized with a master list held by the PUA.
- Dependent on local storage capacity it should be possible to download any record to a terminal address book from the master address book.

8.3 Operations on address books

It is likely that a number of address book record operations will be provided. The following clauses refer to the most common and relevant operations and assume that all operations are performed online.

Users may, from time to time, modify address book records on offline versions of their address book (e.g. in a mobile telephone address book that is out of signal range). When editing of the address book occurs offline there may be problems of synchronization with the online version. These problems, and the approaches to solving them, will be almost identical to those with offline editing of the PUA profile. Therefore, reference to clause 7.2.4 should be made when addressing issues related to offline editing of address books.

8.3.1 Add to address book

There are a number of different ways in which users may wish to have records added to their address books. These include the following:

- The user may wish to manually add a contact (UCI or non-UCI) to the address book by entering all of the data themselves.
- The UCI of someone the user has just replied to may be added automatically to the address book (sometimes referred to in other UCI documents as "UCI capture") if the user has opted for such a feature.
- The PUA may, as a result of certain user behaviours, offer information suggesting additions to the address book. For example, if a number of communications have been made to or received from a contact that is not in the address book, the PUA may ask whether the UCI user wishes to have that contact added to the address book.
- UCI users will require that the master address book in the PUA is synchronized with all of their terminals (with the PUA information being considered the master version of the data). Where a new contact has been added to a terminal address book, this synchronization should create a new record in the PUA address book. The capabilities, in particular the different storage capacity of each terminal, will need to be taken into account.
- Where the PUA acquires a new UCI, users may wish to be notified and given the opportunity to add this UCI to one or more local terminal address books.

It is expected that all of these methods of adding records to the address book could be quite common. As such, they should be supported in such a way that it is quick and easy for users to make such additions.

Guideline 8.8 - Adding records to address books

- Users need to be given a mechanism to manually add a UCI (or non-UCI contact) to the address book.
- Users will require the ability to set special conditions which will automatically add an identifier into the address book (or flag up the need for a decision on whether to place the identifier into the address book).
- Where records are added automatically, the user will require the capability of personalizing the label received as part of the UCI. This could be necessary because of duplication (two "John Smith" labels) or because the UCI holder is not normally known by that label by the user.

8.3.2 Modify

The modification of address book records is likely to be a frequent operation if these records contain information other than the name and UCI of the contact. Whereas an individual's name is unlikely to change frequently and their UCI would change no more frequently, other information in the address book such as postal addresses or non-UCI communication identifiers could change quite frequently. For this and other reasons, UCI information in an address book record will sometimes be incomplete (e.g. a manually entered record from a business card containing only the numeric element of the UCI) or out-of-date (e.g. a user has changed their name by marriage).

Completion and/or modification of the UCI information can occur as part of the PUA to PUA handshake process that occurs in UCI communication setup.

Attempts to modify address book records that are referred to by PUA rules or that are members of various lists (e.g. a "friends" list) could cause problems in the way that these rules or lists operate.

Guideline 8.9 - Automatic completion and correcting of address book records

- Part of the "handshake" between PUAs should include the identification and updating of incomplete or out-of-date UCI address book data.
- Subject to the user's choices on the amount of feedback that they wish to receive, the user should be kept informed of the changes made.

Guideline 8.10 - Changing address book records

- Attempts to remove or modify address book records that are referred to by PUA rules or that are members of various lists (e.g. a privacy "white list") should be flagged to the user.

8.3.3 Group and arrange

The user may wish to group and arrange address book records. A number of alternative grouping mechanisms may prove acceptable (dependant on the target group of users). These methods include:

- Address book categories – in this method, one or more categories may be assigned as attributes of each contact (e.g. named categories such as "Work", "Friend", "Family").
- Address book sub-sections – in this method the address book is considered as a single entity, but it can contain different sub-sections assigned to different categories (e.g. different address book sub-sections for "Work", "Friends", "Family").
- Different address books – this is a variant of the address book sub-sections above. In this method it should also be possible to have the same contact in more than one of the address books. Although the user may perceive the address books as separate entities, the danger of multiple conflicting contact records for the same contact must be avoided.

Different methods for allowing the user to vary the way in which they control the order of records in the address book(s) should be provided.

Guideline 8.11 – Address book record organization

- Users should be able to view their address book records according to different criteria such as group, alphabetic listing of surname, first names, etc.

8.3.4 Search

Users will have different knowledge and different strategies when searching for contacts in the address book. Search mechanisms that are likely to be helpful for users include:

- a scrolling list;
- name entry:
  - field search;
  - all fields search;
  - specified fields search;
  - whole word or part word searches;
- group search (where the user can enter or select the name of a group).

For searches beyond the scope of the address book, different search strategies will probably be required to searches made on the address book (e.g. more information about the desired contact would be required from the user to make the search sufficiently specific).

Guideline 8.12 - Searching for UCIs across different sources

- Users should be provided with a search mechanism that is consistent across multiple sources (e.g. personal address books, group address books and white pages) and when accessed from different terminal types..

8.3.5 Send

UCI users may wish to send contact records from their address book to other UCI users..

Guideline 8.13 - Sending or updating UCI details

- The facility should be available to send UCI details from the user's address book to others" address books. Where restrictions have been applied to the transfer or broadcasting of the UCI then this should be made apparent to the person attempting to send the UCI and should not be permitted by the PUA.

8.3.6 Move, copy, remove records

In addition to the operations already mentioned, users will need the ability to move, copy and remove records from address books.

Automatic housekeeping operations (see clause 5.7.4) may assist the user in managing the move, copy and removal operations. The PUA might prompt the user about moving a contact from their personal address book to a family address book if it detects that other members of the UCI user's family also frequently contact the person in the UCI user's address book

In looking at these methods, the principle that the user should always have ultimate control should be taken into account (e.g. by allowing the user to turn various prompting options on and off).

8.4 Presentation of UCI in non-electronic form

Inevitably, it will often be necessary to pass on UCIs in non-electronic form. The most obvious examples will be with business cards, letters and paper based advertisements. In addition, individuals will often wish to pass on contact details in verbal or written form for a friend's or acquaintance's paper address book. The use of UCIs on business cards and advertisements (and paper address books) offers the possibility of a less "cluttered" presentation, as only one identifier has to be given. It also removes confusion about what service to use under what circumstances. One downside could be that the UCI number may be unstructured and contain no inherent location or tariff information (unlike an E164 telephone number). Another problem is that the recipient of the paper based UCI could have no idea over what service (or services) communication is possible. For instance, if the recipient has no fax machine, any attempt to use the UCI for sending a fax would probably result in the use of email and therefore it could be less immediate than the sender intended.

There are therefore three issues to be considered:

- How to show that the identifier presented is a UCI.
- How the UCI elements should be presented. Recommendations for the presentation of E164 telephone numbers on paper have been produced by the ITU-T Recommendation E.123 [8]. Any guidelines produced for the presentation of UCI numbers will need to take such recommendations into account.
- Propose what other indications and information should be presented.

8.4.1 Indicating the presence of a UCI

The abbreviations or symbols discussed in to indicate the presence of a UCI.

Guideline 8.14 - Indicating presence of UCI on letters, business cards, etc.

- A. symbol, icon, or abbreviation, should be placed beside the UCI number whenever it is presented in a printed form. Such a symbol might be as simple as "UCI" if, indeed, this name becomes established.

8.4.2 UCI elements for presentation in printed form

A very common way for someone to acquire a UCI is when it is presented on paper (e.g. on a business card, on the heading of a letter or in a directory). The essential piece of information that a person must always acquire from this paper presentation is the UCI number.

Presentation of the "label" element of a UCI is optional (equivalent information might well appear elsewhere on the correspondence). The reader could clearly not ascribe authenticity or non-authenticity to such a label and would have to assume "alias" status.

Presentation of data from the "additional information" element of the UCI is optional. The most common example of the inclusion of such information is likely to be "services available" information which could be presented in a user friendly format (see clause 6.3.3.1).

Guideline 8.15 - Presentation of the UCI number in printed form

- Presentation of the number element of the UCI is essential.

8.4.3 Other information

8.4.3.1 Services available

The recipient of a paper based UCI might benefit from an immediate and simple representation of what services are available (as it may help the originator to decide the most effective type of communication to request). The most obvious way to do this will be to use universally accepted icons or abbreviations representing each available service. The limitation of this approach is that, over time, the range of services presented may diverge from those actually available. Such information relating to services available may or may not also be included in the additional information field. Once stored in an address book, information about services in the additional information field could be kept up-to-date by information communicated by the PUA of the owner of the UCI (where such a mechanism is provided).

Guideline 8.16 - Presentation of preferred services in printed form

- If there are preferred services associated with the printed UCI then these should be made clear by means of appropriate symbols or icons placed beside the UCI number.

8.4.3.2 Charging information

It may be thought necessary to indicate the level of charging which the sender should expect. At the very least it might be necessary to consider how to indicate:

- free communication;
- mobile rate;
- premium rate;
- international rate.

The charging that users experience may well also be a function of the communication service that they request.

Guideline 8.17 - Presentation of charging information in printed form

- If the owner of the UCI wishes to imply a charging rate for communication, then this can be imparted by means of a symbol or text placed after the relevant service symbol, icon or abbreviation.

9 Log management

Users may require a number of different types of logs. These logs may be related to their work (e.g. notification of the amount of time spent communicating with a specific client)., Users may also require logs as a means of tracking a series of communications (e.g. identifying the times and dates when a particular person was contacted).

There is likely to be a mandatory requirement for PUAs to keep a log of all communications made to or by the UCI user as well as a log of all the changes made to the PUA profile. These would also be available to the UCI user who may or may not choose to use them. PUA profile administrators will also require logs that indicate the various events that may need to be tracked (e.g. the changes that PUA users have made to their profiles). Certain logs (e.g. record of PUA profile changes) may have certain restrictions such as the prevention of individual record modification or deletion.

Users will wish to be able to view their communication records and to perform various other operations on their communication logs. One of the most important functions of communications logs is that they form an important source of UCIs for initiating new communications and for populating the address book.

Users will require flexibility with regards to the way in which the log (or an amended version of it) is displayed on each of their terminals. For instance, it may be appropriate that the log presented on a GSM mobile phone includes only voice-based communications. In such a case, a more complete log could be presented if required.

Guideline 9.1 - Selection of logs

- The PUA will always maintain a log of a core set of events (e.g. incoming and outgoing communications). In addition, a PUA will allow a number of other events to be logged. Users should be given options to decide which of these additional events they wish to be logged.

Guideline 9.2 - Selection of log detail

- Each log will have a minimum set of parameters that it will store for each log record. Users should be given options to control how much additional detail each log should contain.

Guideline 9.3 - Control of log display

- Users should be given control of how logs should be displayed, including control of the sorting order (increasing/decreasing) of defined item such as date, service or number/person.

NOTE: Users could also be offered pre-defined settings suitable for different terminal capabilities, which they could subsequently modify.

Guideline 9.4 - Control of log lifetime

- Users should be given control of the lifetime of log data (subject to any possible mandatory requirements). This control could be in terms of the age of the data or in terms of the overall storage space limits to be imposed upon the log data.

Guideline 9.5 - Access to a communication log

- Users should have access to the communication log (or a filtered version of it) from any terminal.

Guideline 9.6 - Using the communication log to check the source of an incoming communication

- Users should be able to view the communication record chronologically and check the UCI of the person that originated or received a communication.

Guideline 9.7 - Using the communication log to identify incoming and outgoing communications

- Users should be able to configure the communication log in order to summarize all communications with a specific UCI holder or from any other communication address.

Guideline 9.8 - Reply to a UCI-based communication

- Users should be able to reply to a UCI-based communication itemized in the log using the same or different type of communication.

Guideline 9.9 - Transfer log records to address book records

- The user should be able to transfer the UCI (or other contact information) of a log record from an incoming or outgoing communication to their master address book.

10 Privacy

10.1 The user requirement

Users require that the level of privacy applied to release of an identifier or of communication access to themselves once that identifier is known, is dependent on the identity of the person or organization attempting to communicate.

10.2 The role of the UCI in customizing privacy

The UCI and its supporting network architecture offer the capability of greatly increased control of privacy for the user, both in terms of search for a UCI and in access to the owner of the UCI once it is known. This is because it enables the recipient of a communication or UCI search request to know who is trying to communicate and to confirm whether it is an AUTHENTIC identity. Because this is known it is then possible move away from the "all or nothing" privacy model commonly used today and described in TR 103 077 [3], clause 9.2.

The following system capabilities are then feasible.

10.2.1 UCI Search

The following options related to search could be made available:

- Those searching for an unknown UCI can be identified by their own UCI, and release of the unknown UCI can be controlled accordingly.

- The searcher can be asked to leave a "virtual calling card" (see explanation in clause 10.8.1).

- Contact with the "searcher" could be established without releasing the recipient's UCI. A temporary/transient UCI could be released which would "hide" the real UCI until the owner chooses to release it.

10.2.2 Incoming communications filter

The UCI and the new system architectures will also enable sophisticated filtering of communications to further customize privacy for users. Examples of filtering are:

- Access restriction could be directly linked to release of the UCI as a result of searches. e.g.:
  - An access time limit or validity date could be applied.
  - Access to the owner of a UCI could be granted only to those UCIs that have been recorded as having been directly supplied with a copy of the owner's UCI (no transferring allowed).
- Access can be dependent on the identity of the sender.
- Access can be time dependent.
- Access can be dependent on the location of the UCI user.
- An access PIN could be supplied for senders who do not have a UCI.
- Access dependant on user status or active sub-profile (e.g. "On holiday").

10.3 Two approaches to control of privacy

Two methods of privacy control are possible:

- Control of UCI release will depend very much on the mechanisms eventually chosen to implement directory search. Control will be easier with a distributed search mechanism and more difficult with a global centralized mechanism.
- Filtering of incoming communications is an integral part of the UCI based architecture and will definitely be fully implemented. In practice both approaches to privacy will probably be available to some degree.

10.3.1 Control of UCI release

Release of the UCI through any UCI search service (centralized or distributed) could be controlled, strictly or otherwise, according to rules defined by its owner. To some extent this means that there will be a high degree of complexity associated with release of the UCI but slightly less complexity associated with the filtering of incoming communications.

In such a controlled privacy environment, the PUA would be aware of who had been allowed access to the UCI and would amend the incoming communication filter accordingly so that those allowed the UCI were allowed to "pass" the filter. There needs to consideration given to distribution of UCIs on business cards or by word of mouth as these methods may provide a means to circumvent controlled methods of UCI release.

10.3.2 Control of incoming communications

The other approach is to place most of the filtering capability at the user's PUA. Thus all filtering complexity is associated with the PUA but with little or no filtering at the UCI search stage. The user has only one filter to manage (at the PUA) but the implication is that the user then has to decide whether to be ex-directory or allow free access to the UCI.

Guideline 10.1 - Receiving communications from people to whom a UCI has been made available

- A facility that broadens incoming communication filters to include all those people to whom a UCI has been made available should be provided (automatic addition to a "white list" - see clause 10.4).

Guideline 10.2 - Receiving communications from people who have previously been contacted by the UCI user

- A facility that broadens incoming communication filters to include all those people who have been contacted by the UCI user should be provided (automatic addition to a "white list" - see clause 10.4).

10.4 A privacy model

Development of a user privacy model could facilitate both the management of a user's own level of privacy and reduce frustration in those trying to gain access. The white/grey/black list approach appears promising:

This model describes three categories (or lists) into which people or organizations attempting to communicate with a user would fit.

a) White list

Anybody on this list is allowed access to the user's identifier and access to the user conditional only on any universally applied access rules (e.g. no non-urgent real time voice communications after 2 300 h).

b) Black list

Anybody on this list is a person or organization that the user definitely does not want to communicate with under any circumstances.

c) Grey list

Access might be allowed but subject to special conditions, the supply of further information and/or filtering in addition to any generic access rules. Within the grey list itself, some people or organizations requiring access might be subject to more stringent requirements than others (e.g. non UCI users).

In essence, privacy control is about the compilation, implementation and management of these three lists. The user interfaces designed to accomplish these tasks will be of critical importance and will be inextricably tied to initiation and management of the user profile.

Guideline 10.3 - Recommended privacy model

- Adoption of the white/grey/black list model (described above) should be considered as a means of facilitating users" understanding of privacy management. Such a model would be applied to instructional material and to user interface design.

10.5 Achieving a desired privacy level

As UCI systems evolve, their architectures will to some extent dictate the complexity of the user interface needed to define, implement and manage privacy. At all stages of that evolution the implications on the user interface need to be considered.

To achieve the desired privacy level each user will need to define relatively complex filtering rules. To make this as easy as possible a new UCI subscriber will, as part of the PUA profile set up process, require options to easily enable them to achieve this (making use of the privacy model described in clause 10.4).

The use of privacy templates provides a mechanism of providing pre-configured privacy options to users that meet their expected needs. Other templates used will also be likely to have an impact on privacy.

Guideline 10.4 - Provision of privacy templates

- UCI users should have access to privacy templates which define conditions for the release of UCIs during searches in addition to management of incoming and outgoing communications.

10.6 Forwarding (UCIs being passed to a third party)

Many users will not want a UCI given to an enquirer to be passed to others. Mechanisms that involve checking with the PUA that belongs to the owner of the UCI before it is released could be developed to prevent this from happening in the majority of cases. The PUA belonging to the owner of the UCI could check whether its normal rules for releasing its UCI are met in deciding whether permission should be granted for the UCI forwarding.

The release and subsequent use of UCIs by non-UCI users will be very difficult to prevent.

Guideline 10.5 - Controlling the transfer of UCIs

Users should be able to stipulate whether a UCI released to one person can be used by another person or not.

10.7 Feedback of privacy information to the enquirer

The level of privacy associated with a UCI should be communicated to the recipient via the additional information field. This would manage expectations of the sender with respect to ease of access, describe what filtering constraints are in place.

Such data could indicate that:

- the UCI given is a transient UCI;
- the UCI given has a time limited time access (expiry date);
- the UCI given cannot be used by anybody else;
- a limited (specified) number of successful communications will be allowed;
- the UCI holder has set a level of privacy (e.g. no real-time communication) which will affect your ability to access him/her. This could be a privacy star rating (e.g. 1 star to 5 stars).

For instance if enquirers get a UCI with a high privacy marking then they know that they are not going to get through real-time. To all intents and purposes a high privacy marking means "don't bother to expect real-time voice connection unless I know you – you will be asked to leave a voice mail". At the other end of the privacy spectrum is a very low marking where users can expect to get through with no privacy restrictions except those that are universally in place (time of day for instance).

Guideline 10.6 - UCI privacy indications

- The additional information field could be used to indicate any restrictions on the UCI relating to privacy to a person about to make a communication.

10.8 UCI searches by "unknown" enquirers

Currently, users can either make their number available through a directory search system or be "ex-directory" or "non-listed" i.e. everybody has access to the identifier or nobody does. Clause 10.3 of TR 103 077 [3] suggested that many users want a degree of privacy that falls between these two extremes. UCI systems allow this increased control over release of the identifier.

In the past it was possible for directory enquiry operators to obtain a name from an enquirer and present this to an unlisted subscriber in order to obtain permission to release the number.

Guideline 10.7 - Filtering requests for a user's UCI

- Some mechanism or mechanisms need(s) to be in place to allow people unknown to the user to gain access to their identifier if that is acceptable to the user. The mechanisms recommended are called virtual calling cards and may either be text or voice based. Both variants should enable the applicant to deliver a brief explanation of why they want to communicate.

10.8.1 The virtual calling card

Some users may not wish to allow any unknown person access to their UCI without prior consultation. Historically, the "calling card" was something that could be given to a third party (e.g. a servant) to make an offer of communication to the third party's employer. Typically such a card would contain nothing but the identification details of the potential caller.

The virtual calling card is a similar concept in an electronic communication environment, which would allow somebody seeking a UCI to leave a notification to an owner of a UCI that their identifier was being sought and possibly some indication of the purpose of the request. Under such circumstances it might be important that no free content information fields (text or voice message) are provided otherwise that would provide a route for an unwanted message.

Therefore the calling card could be based on menu selection (customized by the owner) and would include inquirer's UCI label, number, authenticity certificate etc, reason for communication (old school friend, business opportunity) and other information which the owner required. A less private option could be to leave a field for limited free text or short voice message on the "card".

An initial reply to such a calling card application might include the user's authentic label but a transient UCI number (to maintain privacy until the exact nature of the communication was established) see clause 10.6.6.

Calling cards would be presented to the owner of the UCI by the PUA at the earliest possible time. The user could then authorize release, authorize restricted release or communicate direct with the inquirer (possibly withholding their UCI number).

Guideline 10.8 - Virtual Calling Card content

- Virtual calling cards should contain as a minimum:
  - the UCI label of the enquirer;
  - an indication of whether the label is authentic or not;
  - and should be specified to include either:
    - a free content limited size message field;
    - no message field but a menu selection of reasons for communication.

Guideline 10.9 - Delivery of requests for release of a UCI

- Calling cards or any other requests for release of a UCI need to be presented to the user at the earliest possible opportunity.

Guideline 10.10 - Options for UCI release

- The owner of a UCI should be able to respond to UCI search requests in one of the following ways:
  - allow the UCI to be given;
  - not allow the UCI to be given;
  - communicate with enquirer and disclose UCI;
  - allow communication on a one-off basis without disclosing UCI.

Guideline 10.11 - Filtering of requests to release a UCI

- Users should be given a means of filtering requests to release a UCI and a method of prioritizing the way in which they are handled.

10.9 Withholding a UCI

There are many circumstances where users requiring privacy might not wish to release their UCI such as to a new "date" or when getting product information from a company. Children and teenagers will need higher protection when they participate in "chat groups" where the identity and intentions of participants may be suspect.

The provision of transient UCIs could greatly enhance control of privacy. The transient UCI could be offered as the result of a UCI search or sent attached to a communication and would work only for a predetermined number of times or for a specific period. It would enable limited communication without disclosure of the true UCI. But it should still be associated with an authentic label. The transient could be "upgraded" to a true UCI or even deleted at any time.

Guideline 10.12 - Provision of transient UCIs

- PUA Providers could provide a transient UCI service for circumstances where the user is wary of releasing a UCI but still wishes to communicate.

10.10 Differing privacy requirements with different roles

Many users will require that communications from one source are handled differently to those from another. For instance, a user may have a home business as a landscape artist and want to leave leaflets in a local art gallery. Any UCI on these leaflets is essentially "broadcast" and will be difficult to control. One possible solution is the use of a secondary UCI number which would act in a similar way to the postal "PO Box" number or a freephone number.

A secondary number would be controlled and managed by the same PUA. In the example above its use immediately identifies the fact that this is an art business related communication which can then be dealt with accordingly. It provides, at the same time, a level of anonymity and of authentication.

This would solve the problem of having a business card but preserving privacy WITHOUT having to resort to two completely independent UCIs.

Guideline 10.13 - Provision of context specific UCI numbers

- PUA providers should offer UCI users the option of a different UCI numeric associated with a specific communication context (e.g. someone operating a business who does not require a separate business UCI). These context specific numerics would enable a user to segment their communications (e.g. into business and personal). Such a scheme would also provide different and defined levels of privacy dependent on the source and nature of the communication.

NOTE: This option differs from the provision of separate UCIs in that only a single PUA Profile is used for one or more UCI numerics.

11 Security

11.1 Security and UCI

The user expects high security but also easy and fast access to the PUA. But system security and system usability are to some extent inversely related: the more secure the system the less usable it is. For instance to maximize the security of a communication system, users could be required to provide one of a series of "shared secrets" before every transaction. In many circumstances users would find this totally unacceptable. Because of this, it is important that an appropriate level of security is provided for any operation and no more. More security than is necessary increases costs and can contribute to poor system usability. This balance of usability and security will depend on a range of factors that include:

- whether a PUA is a corporate, group, or personal PUA;
- the lifestyle of the person using the UCI.

Most users will have a very unclear understanding of the complexities of security policies. For this reason ordinary users may require assistance when managing their security. In contrast, managers of corporate PUAs may require the ability to take full control over every aspect of UCI security. There may be intermediate requirements such as the need that parents may have to manage aspects of the security of their children's communication. Neither the solutions provided for individuals nor those for corporate PUA managers may be suitable for these cases.

Guideline 11.1 - Balancing usability and security

- It is important that an appropriate level of security is provided and no more. More security than is necessary increases costs and can contribute to poor system usability.

11.2 Security mechanisms

The level of security can be defined by varying the authentication process. Authentication can be controlled in different ways. This can be by:

1) Choice of one or more of a range of alternative authentication schemes, such as:

   - password;
   - PIN code;
   - security token (e.g. random number generating card).

2) Applying restrictions to passwords:

   - lockout, to prevent password attacks by limiting the number of password failures permitted within a period of time;
   - password strength (e.g. password length, password not in dictionary);
   - password expiration (e.g. how often passwords must be changed as well as who may change them).

3) Choice of authentication method, such as:

   - user Authentication provides access privileges on a per user basis;
   - client Authentication allows access from a specific IP address or terminal. The user performs the authentication by successfully meeting an authentication challenge, but it is the client terminal that is granted access;
   - session Authentication can be used to authenticate on a per-session basis. The user is challenged for a proper authentication response;
   - operation Authentication can be used to authenticate on a per-operation basis. The user is challenged for a proper authentication response.

Consideration needs to be given as to how the user can be given adequate feedback relating to the level of security which currently applies. There will also need indication of any security breaches of their PUA.

11.3 Security of communication sessions

To have trust in communications systems, users require an appropriate level of security to be provided. When necessary, users need an assurance of the integrity of the communication and/or the identity of the person they are communicating with.

The integrity of the underlying communications is a function of the communications platform being used. As such UCI cannot influence the level of this security (although the level of this security should be evident to the user). Therefore the present document confines itself to security issues related to identity. Users may require assurance that an incoming communication is from whom it purports to be. Such assurance requires trust in the systems and service providers but also in the universal appliance of security procedures and registration processes.

Users typically wish to know with a reasonable level of confidence who is attempting to communicate with them so that they can make decisions as to whether to accept the offered communication or not. Verification (being as certain as it possible to be) that the communicating party is who they purport to be will usually only be necessary in a minority of cases involving sensitive financial or legal communications.

11.3.1 Registration

There are a number of different ways in which users can be registered with their PUA. Each of these ways has implications for the level of "authenticity" presented to the recipient. Basic different types of registration include:

- Without a "shared secret" e.g. PIN

  Every time a user makes a terminal available (e.g. switches it on) there will need to be a registration process. Registration without a PIN or other shared secret means that the system can infer nothing about the user registering: it could be anybody with access to the terminal. If the label associated with an incoming communication is shown as "authentic" then all the recipient can infer is that the label truly describes the owner of that UCI number but nothing can be inferred about the true identity of the sender.

  Fixed line telephony is a special case of registration as "Switching on" in this case has no relevance.

- With a "shared secret" e.g. PIN

  Users may be required to give a PIN or other shared secret at registration. This is a good indicator that the user registering is the owner of the UCI. But unless registration is required for each and every communication it can never be more than an indicator. For instance, a user could register at a PC and then forget to log off, leaving the terminal for anybody to use. A recipient of an authentic label in this case would know that the label truly represented the owner of the UCI number attempting to communicate and that the there was a good probability of the sender being the owner of the UCI and hence accurately described by the label.

- With a physical token

  Something that the user possesses such as a smart card or a mobile telephone may play a part in user authentication (e.g. inserting a smart card in a card reader or the PUA communicating a transient code to a mobile telephone).

- With biometric data

  Some biometric devices will be used once at registration. In this case the same constraints apply as using a PIN at registration as above.

  Other biometric devices can provide more or less continuous proof of identity whilst the user is using the terminal (e.g. continuous iris recognition or the analysis of the person's voice in a real-time voice communication). An originator/recipient of an authentic label in this case would know that the label precisely identified the person with whom they were setting up communicating.

11.3.2 Verification

Verification is the result of either:

- a request to the recipient's PUA to issue a challenge to the sender to prove that they are who they claim to be; or

- a request to the sender's PUA to issue a challenge to the recipient to prove that they are the user who the communication is directed at.

In the case of biometric data such as iris or retinal scans the "verified" user may not even be aware of this process. In other cases the user will have to perform a special task such as inputting a shared secret, a random number displayed on a personal smart card or initiating a biometric measurement. Where verification has been requested, the recipient can be certain that the authentic label shown accurately describes the sender.

11.3.3 Authenticity

It can be seen in clause 11.4.1 that the concept of an authentic label is far from straightforward and the degree of "authenticity" depends directly on the registration process used. This needs to be communicated to both originator and recipient in some way. One way of accomplishing this is to have variants of the "authentic" flag in the additional information field which reflect the strictness of registration. (e.g. PIN on a shared terminal or retinal scan).

Guideline 11.2 - Communicating the level of authenticity

- Users may wish to know how certain they can be that the person at the other end of a communication is who they claim to be. Users should be presented with an understandable indication of the strictness of registration used by the other party.

11.4 Security of PUA management

The PUA will be the repository of a great deal of sensitive and/or personal information and must be protected by good security mechanisms. PUA security management interfaces need to be designed to take account of both the range of tasks that have to be performed and the level of knowledge and skill of the people using the management interface.

A set of predefined templates can be used for PUA security management. Different templates might be proposed to meet different needs and they could be used for defining privileges and security according to:

- roles;
- security levels;
- services;
- objects;
- operations.

11.4.1 Security assurance

Consideration needs to be given to how the user can be given assurance that there have not been any security breaches of their PUA. One of the simplest methods is to indicate to the user when the PUA was last accessed (which should be the last time the user remembers accessing it). There may, however, be other methods that are more effective that can be used in addition to or instead of this method.

Guideline 11.3 - Security assurance

- The provision of a simple message like "Last login Friday the DD/MM YYYY" may make users feel more secure when logging in to their PUA to modify their PUA profile.

11.4.2 Security Requirements

In general, most users will have a very unclear understanding of security issues. They are therefore likely to need more support in this area than in many other areas.

Guideline 11.4 - Provision of default security settings

- Default security settings should always be provided for new users. User should not have to define individual security settings before they are able to use UCI.

Guideline 11.5 - Templates with security implications

- Where use of a template has security implications, the template should contain default security settings.

Guideline 11.6 - Visibility of security settings

- Users should be able to get an overview of all security settings.

11.4.3 Sharing of information

Users may wish to share information with other UCI users and PUAs. They may also wish to share information with non-UCI sources. A common example is where users may wish to share presence and availability information [9].

Guideline 11.7 - Sharing of information

- Users should be able to decide whether or not to share information and with whom.

12 Communications session control

The primary role of the UCI is as a means to achieve person-to-person communications. Users use their terminal to enter or retrieve a UCI, which their PUA uses to reach the PUA of the recipient in order to initiate the requested communication. It is important that the tasks associated with the initiation and control of communications using UCI is no more difficult than the equivalent tasks performed without using UCIs.

In order that the requirements of the communication sender and receiver (as expressed in their user profiles) can be met, their PUAs may perform capability negotiation. Factors that may be negotiated include terminal and network type, bandwidth, security and QoS. Another thing that could be taken into account are accessibility attributes if either of the parties have specific disabilities. The user with disabilities could choose to define preferred communication in their profile such as audio call, SMS, MMS, email etc.

12.1 Void

12.2 Single PUA

12.2.1 Incoming communications

For incoming communications the user will expect the best indication of the identity of the user to be delivered. Where the incoming communication is from someone that uses a UCI, the identification that will be delivered will be the UCI label (or a label personalized by the recipient). The method by which the identification will be delivered and the nature of that identifications will be dependent on the nature of the terminal and the communication channel.

Users will wish to have a record of incoming communications. They may also wish to refer back to the identity of any person who has previously made an incoming communication. Methods for users to recall the identity from previous communications (e.g. from communications histories and address books) are discussed in clause 9.

Where distinctive alerting schemes are available from the service or terminal by which a user is being contacted, a user may wish to have a different alerting signal associated with different groups of users that are defined in their PUA profile (e.g. the alerting signal for "family members" may be different to that for "friends").

Where, as a result of PUA negotiation, the communication is delivered in a different form to that in which it is sent (e.g. because it has been routed via a translation service such as email to SMS), there are a number of usability issues that may occur:

- the resultant communication may be unfeasibly long - and the UCI user will wish to be warned of this and given options for managing this situation (e.g. being able to read email headers and choosing whether to download the body of selected emails);
- there may be an additional cost incurred - and the UCI user will need to know whether they incur this cost and how much the cost may be.

Users may require that their incoming communications are handled differently according the priority level assigned to each communication.

Guideline 12.1 - Delivery of UCI Label

- For all UCI communications, the UCI label should be delivered to the recipient's PUA.

Guideline 12.2 - Presentation of UCI Label

- When a PUA receives and accepts an incoming UCI communication request, the PUA should ensure that the UCI Label of that communication is presented at the recipient's terminal by the best means available.

Guideline 12.3 - Handling of priorities

- PUAs should be able to read, interpret and respond to priority levels assigned to incoming communications.
- Priority levels assigned to incoming communications should be viewable in incoming communication logs.

Guideline 12.4 - Identifying groups of users

- Different alerting signal associated with different groups of users, as defined in the UCI user's address book PUA profile, should be provided where distinctive alerting schemes (e.g. different types of ringing, tones, or vibrations) are available from the service or terminal by which a user is being contacted.

12.2.2 Outgoing communications

When initiating an outgoing communications, users will expect to be able to communicate with people who own a UCI and those that do not using any available means of communication. They will expect to be correctly identified by the recipient and to have their communication logged by their PUA.

When an outgoing communication is a reply to an earlier communication, users will expect to be able to easily make a reply using the same means of communication. However they would also like to be able to exploit the power of UCI by choosing a different means of reply.

Users will not wish to have their choice of communication method constrained by the limitations of the communication capabilities of the recipient.

Users may wish to assign levels of priority to some of their communications so that these communications are able to be handled in a special way by the recipient PUA. Additionally, these priority markings would allow recipients to see the sender assigned priority when scanning received communication logs. As a minimum, two levels of priority will exist: normal (default) or urgent.

Guideline 12.5 - Characteristics of an outgoing communication

- When an outgoing communication is made, the user should be able to:
  - initiate a communication to anyone, whether or not they have a UCI;
  - use any method of communication supported by the terminal that the user is currently using - with an appropriate default being chosen if the user does not make a selection;
  - have their identity (the UCI label) presented to the recipient of the communication (whether the recipient is a UCI user or not);
  - have a record kept of the communication in their PUA.

Guideline 12.6 - Replying to an incoming communication

- When replying to an incoming communication a user should be able to:
  - easily reply using the same method as the received communication;
  - specify that their reply should be by a different method to the received communication.

Guideline 12.7 - Freedom of choice of communication method

- Users should be able to use any method of communication that is available to them (even if not directly supported by the recipient) e.g. if the sender of the original communication only has fax available and the replier can currently only send emails, the PUA could offer the use of an email-to-fax conversion service.

Guideline 12.8 - Assignment of priority level to a communication

- Users should be able to assign a priority level to their outgoing communications.

12.3 More than one PUA

In varying circumstances (e.g. when a UCI user has both a personal and a company UCI or in a manager secretary arrangement), PUAs will need to co-operate with other PUAs in the management of one person's communications. The PUA administrator will be concerned that the information passed to another PUA does not breach the PUA administrator's nor the PUA user's privacy requirements.

The information conveyed to other PUAs is a function of the rules stored in each PUA. In order that the privacy requirements referred to above can be met, these requirements must be contained in rules in the UCI user's PUA. Where UCI users have UCIs supplied by a company, the PUA administrator of the company will be responsible for determining the content of any rules that relate to corporate privacy requirements and the UCI users will be responsible for rules that relate to their personal privacy requirements.

In the examples that follow in this clause there is a presumption that a user may be multiply registered at the same terminal. Dependant on the method of registration, a user may be automatically registered when the terminal is activated or the user may need to manually register. Activating a terminal may automatically register a user for more than one UCI - dependant on the potential registered terminals recorded in each UCI personal profile. For manual registration, the user may opt to register the terminal in relation to more than one UCI and, hence, to more than one PUA.

12.3.1 Incoming communications

For incoming communications, the PUA that is initially involved will be dependant on the UCI used by the sender (e.g. if the corporate UCI is used the corporate PUA will be the one that is involved). The PUA that is initially involved may also involve another PUA if such an arrangement has been authorized (e.g. the corporate PUA may negotiate with the user's personal PUA).

An incoming communication could be sent to any one of a UCI user's different roles (UCIs) (e.g. to their business UCI if the originator of the communication was calling the UCI user in a business context). Users would ideally like to know in which of their roles they are being contacted before entering into communication with the originator of the communication.

Where some form of distinctive alerting is available from the service by which the user is being contacted (e.g. different types of ringing, tones, or vibrations), users would wish to make use of this in distinguishing between communications sent to the user in different roles. A user could thus have one alerting signal sent to them if the incoming communication was directed to their business UCI and another alerting signal sent if they were being contacted on their personal UCI. The methods by which users would wish to make associations between alerting signals and their different UCIs will be the subject of future guidelines. Where distinctive alerting mechanisms are not available, alternative options for conveying which UCI the communication was directed to will be need to be considered.

If distinctive alerting signals are being used to distinguish between groups of users (see clause 12.2.1) then the use of the same mechanism to distinguish between communications directed to different UCIs might cause complex system interactions and would also be likely to cause confusion for users.

Guideline 12.9 – Indication of PUA offering communication

- Where communications can be offered by more than one PUA users should be made which PUA was involved. This would enable them to make decisions on how to handle the offered communication. The type of indication would be dependent on the terminal being used. For example:

  - a simple fixed telephone could use distinctive ring tones;

  - a PC could display a list of incoming communication attributes including the PUA and the implied "role".

12.3.2 Outgoing communications

When making outgoing communications, the user has to decide in what role they are making the communication. The UCI, and hence the PUA, that is used will depend on which role they choose (e.g. if the user decides that they wish to make a call in their corporate role, they will choose their corporate UCI and hence their corporate PUA). There may be ways related to address book records and communication histories that assist the user in determining which UCI/PUA will be used.

The PUA chosen has implications for:

- the identity delivered to the recipient – in the form of the UCI label;
- the information delivered in the additional information field;
- the profile, relating to outgoing communications, that is used;
- billing (e.g. how much and to whom).

With multiple PUAs, at any one time and for a specific set of conditions (e.g. what terminal is being used) there should be a default UCI/PUA that is used for outgoing communications. Users will need to take action if they wish to use an alternative UCI/PUA to the current default.

Guideline 12.10 – Indication of default PUA for outgoing communications

- To avoid the need for the user to specify the PUA involved for every communication, the system should assume which PUA is to be involved based on a given set of conditions.
- The user should be made aware before every communication, which PUA is involved by default. The form of feedback will be dependent on the terminal in use but could range from a distinctive dial tone for each PUA on a simple telephone to colour coded text/graphics on a PC or PDA.
- It should be possible to override the default PUA for any communication.

12.3.3 Interchange of data between PUAs associated with the same person

In varying circumstances (e.g. when a UCI user has both a personal and a company UCI or in a manager/secretary arrangement), PUAs associated with the same person will need to exchange information. PUA administrators will be concerned that the information passed to another PUA does not breach the PUA administrator's nor the PUA user's privacy requirements.

The information conveyed to other PUAs is controlled by rules stored in each PUA. In order that the privacy requirements referred to above can be met, these privacy requirements must be contained in rules in the UCI user's PUA. Where UCI users have UCIs supplied by a company, the PUA administrator of the company will be responsible for determining the content of any rules that relate to corporate privacy requirements and the UCI users will be responsible for rules that relate to their own personal privacy requirements. Corporate PUA administrators would require that UCI users are unable to create rules that negate or in any other way compromise corporate privacy requirements.

An example of where the privacy requirements need to be expressed is in handling a situation where a company employee is travelling to meet with a representative of another company. The company privacy requirements might be that when exchanging information with 3rd parties:

- the company wishes to suppress details of who its employees are visiting (to avoid giving commercially sensitive information to potential competitors);
- the company wishes to suppress the precise location of their employee (but is happy to indicate that they are "travelling", "out of the office" or "abroad").

Within the UCI user's corporate calendar application a particular visit to visit a client company might be captured in diary entries such as:

- Monday 15th August, 12:30 - 13:30; Drive to London (Heathrow);
- Monday 15th August, 15:30 - 18:35; BA123 London (Heathrow)-Munich;
- Tuesday 16th August, 09:00 - 13:00; Meeting with Anothercom Marketing Director in Munich;
- Tuesday 16th August, 19:20 - 20:25; BA432 Munich-London (Heathrow);
- Tuesday 16th August, 21:00 - 22:00; Drive Home.

The PUA associated with the UCI user's corporate UCI would be allowed full access to the above information.

The company's privacy requirements would prevent the full diary information shown above being passed to a 3rd party such as another PUA. However, the following information, derived from the above diary entries, would meet those privacy requirements:

- Monday 15th August, 12:30 - 18:35; Travelling;
- Monday 15th August, 18:35 - Tuesday 16th August, 18:20; Abroad;
- Tuesday 16th August 18:20 - 22:00; Travelling.

The corporate privacy rules (set by the corporate PUA administrator) might be that the company will allow diary entries in the modified form shown above to be exported to the PUA associated with the individual's own UCI each time there is a change or addition to the UCI user's calendar application.

As the above example shows, translating from entries in the corporate calendar application to entries that could be exported is a non-trivial exercise. The above example shows that the category "travelling" has, in this case, been interpreted as starting at the beginning of the journey to the airport up to the landing time of the aircraft. This interpretation implies a definition of a "travelling" category that will include a time when the individual will be non-contactable (i.e. whilst airborne). Another company might interpret "travelling" to terminate at the time of the aircraft departure. This interpretation would then necessitate either leaving the flight time as being in an indeterminate category or would necessitate its inclusion as part of the "abroad" category. The other complication has been in interpreting times. The calendar entries were made using local times in the home and destination countries (airline flight times always use this convention and this convention will aid the employee whilst abroad). When exported to another person in the UCI user's own country, it will be necessary to convert all times to local times in the UCI user's home country for these times to be of use to the other PUA.

In order for the above complex translations of diary entries to be successfully achieved, it will be necessary for locations (e.g. Munich) to be identified as "abroad" and for the time-zones of these locations to be understood. This implies either very specialized functionality embedded in PUAs or, that the calendar application is designed with possible translation/export in mind. In this latter case, it would be necessary for all meeting locations to be chosen from a list that contained all possible destinations and their location (country) and time-zone information. Where new locations are required, it would be the responsibility of the UCI user or the PUA administrator to provide the relevant information to allow a new entry to be added to this list of destinations. Many calendar applications do already contain such functionality, so it might be possible for PUAs to have rules such as:

- If *country* IS NOT <home-country> THEN *location* = "abroad";
- If *exporting* = "yes" THEN *timebase* = <home-time> ELSE *timebase* = <local-time>;
- If *exporting* = "yes" THEN *visited-person* = NULL ELSE *visited-person* = <visited-person (value)>;

to interpret the calendar entries before exporting.

12.3.4 Usability issues associated with multiple PUAs

- The user needs to know which UCI (i.e. which PUA) the communication was directed to.
- If distinctive alerting mechanisms are used as a mechanism to distinguish between communications from different groups of users (e.g. "family" and "friends") how could the same mechanism be used to distinguish between communications made to the user's different UCIs?
- Where, as a result of PUA negotiation, the communication is delivered in a different form to that in which it is sent (e.g. because it has been routed via a translation service such as email to SMS), there are a number of usability issues that may occur:
  - the resultant communication may be unfeasibly long - and the UCI user will wish to be warned of this and given options for managing this situation (e.g. being able to read email headers and choosing whether to download the body of selected emails);
  - there may be an additional cost incurred - and the UCI user will need to know whether they incur this cost and how much the cost may be.
- The current default UCI/PUA for outgoing communications needs to be communicated to the user (multiple concurrent registrations).

- The user needs to be able to change the default to the required UCI/PUA on any type of terminal.
- The criteria for reversion back from current setting to a default need to be considered for different types of terminal and service.
- Users need to be provided with a method for handling conflicting rules in the multiple PUAs.

13 Other issues

13.1 Internationalization

The problems relating to communications across national boundaries have been well researched and documented. In addition to cross-cultural issues there are pragmatic issues such as taking account of different time zones, languages and terminal character sets.

Current communication systems offer little practical assistance in these areas but a UCI system would enable the sender of a communication to allow for and take account of many of the barriers to successful international communication.

Firstly, the additional information field of the UCI has the potential to describe the language preferences of the owner of the UCI in some detail. Such information is intended to reside in the address books of all potential communicators or to be delivered as the result of a UCI search. Relevant fields proposed so far include:

- preferred spoken language and competence level;
- preferred written language;
- second languages;
- preferred character set;
- surname/given name order in label;
- whether a Latin alphabet is acceptable.

The originator of a communication would be forewarned about the constraints placed on a forthcoming communication and be able to take appropriate action with respect to automatic or manual translation for instance.

Additionally the two PUAs involved in the negotiation prior to a communication being set up will be aware of the time differences existing between originator and recipient and ensure that any resulting mode of communication was appropriate to each party given the time in their respective time zones.

13.1.1 Usability issues relating to Internationalization

- Standards are needed to ensure that appropriate internationalization information can be encoded in a consistent way in the UCI additional information field.
- Applications that use UCIs need to be able to handle the internationalization information encoded in the UCI additional information field. This would include the handling of:
  - different languages;
  - different character sets;
  - culturally specific name ordering;
  - different time zones.

- There will need to be agreed internationalized variants of the names of UCI objects, object attributes and operations so that these can be described differently for different users whilst having a common form that all PUAs will understand.

- Guidelines are required to address internationalization issues.

13.2 Accessibility

UCI systems offer greatly enhanced possibilities of increasing the accessibility of communications to disabled and elderly people. This increased potential comes from the functionality of both the UCI and the PUA.

The UCI includes, in the additional information field, detailed data concerning the capabilities of its owner. As this data is typically embedded in address book records it is available to a potential originator of a communication during set up. As a simple example of this in use, a profoundly deaf UCI user may indicate in the additional information field of their UCI that only text-based communications will be accepted. This will be immediately apparent to the originator who will not waste time trying to set up a voice-based communication.

The most significant effect on accessibility however will derive from the use of the PUA. The PUA belonging to a disabled or elderly user will be programmed to deal with all types of incoming communication and handle them in an appropriate way. For instance an elderly user who is hard of hearing could ensure that, while roaming, an amplification service was always included in the communication path to enable unrestricted use of **any** terminal.

13.2.1 Usability issues relating to Accessibility

- Standards are needed to ensure that appropriate accessibility information can be encoded in a consistent way in the UCI additional information field.

- A user's PUA should be able to respond appropriately according to the user's abilities/impairments. This will necessitate some "understanding" of various abilities and impairments on the part of the PUA. PUA behaviours that are appropriate for common forms of impairment should be available as pre-packed options made available by PUA Providers.

- Guidelines are required to address accessibility issues.

13.3 Charging and Billing

Users may wish to have an indication of the likely charging for any outgoing communications that they make. Users may also wish to understand the cost implications that result from different possible options in their communication handling rules (e.g. if the rule says that calls should be diverted to their mobile phone whilst abroad they should be made aware whether they will bear a share of the cost of incoming communications).

Users may also wish to be aware of other charging and billing issues (e.g. in relation to the use of specialized PUA services).

Guideline 13.1 - Provision of charging and billing information

- Users should be provided with or have access to information on charging and billing related to any UCI-based communication.

13.3.1 Usability issues relating to charging

- Standards are needed to ensure that special charging information (e.g. all calls will be charged at a national local rate or all calls are at a Freephone rate) can be encoded in a consistent way in the UCI additional information field.

- Where a UCI user has chosen to hide their location, a person calling the UCI user may be unaware of potentially greater communication costs. Consideration needs to be given to the UCI user who is being contacted bearing additional costs.

Annex A (informative): Summary of guidelines

A.1 Generic Guidelines

Guideline 5.1 - Notification about change of system state

- When the UCI system changes state as a result of a user action, the user should be given notification of the state change and any displayed state information should then be updated. In a UCI context, it will often be the PUA that is responsible for providing this notification to the user in the initial phases of the setting up of a communication, with the network taking over this role once the SA has been instructed to make the communication.

Guideline 5.2 - Using an appropriate presentation style

- The form of information presentation, including feedback, notification and state information, relating to the UCI system should be matched to the type and range of presentation capabilities and media available.

Guideline 5.3 - Using multiple modalities for presentation

- In order to accommodate people with a wide range of abilities and disabilities, all information, including feedback notification and state information, should be displayed across more than one human modality whenever possible (e.g. speech and vision). Simultaneous presentation across different modalities both reinforces the communication of the information and also accommodates the user needs when they can temporarily not access one of the display modalities (e.g. using sound as well as display of information will be beneficial to car drivers who are unable to look at the display of a terminal whilst driving).

Guideline 5.4 - Defining levels of notification

- For each different type of state change notification, the user should be able to choose different levels of notification (including being presented with all notifications or being presented with no notifications).

Guideline 5.5 - Defining the format of presentation

- The user should, where possible, be provided with different options on how notifications will be presented to them (e.g. text messages, spoken announcements, tones).

Guideline 5.6 - User suppression of types of state information

- The user should be able to choose to have the display of specific types of continuous state information switched on or off.

Guideline 5.7 - Provision of user interface elements

- A range of user interface elements such as icons and sounds should be provided as standard features of a PUA. In addition, users could be given the option to create and/or import icons and to record and/or import their own sounds.

Guideline 5.8 - System response times

- System designers should, where possible, ensure that the system response times shown in table 1 are not exceeded.

Guideline 5.9 - Notification about delays

- During the phase from the user initiating an action to the completion of the requested action, the PUA is responsible for the provision of feedback and notifications to the user. Wherever possible it is desirable for the PUA to give additional notifications until the action is completed (although in some circumstances the PUA may not have the information to provide these notifications e.g. it may not be aware of all notifications provided by networks). There are at least three variants of how notification should be provided:

- Where delays are within normal user expectations, non-specific "comfort feedback" can be provided.
- When the delay is greater than the normal expectation (or it is very long), the user will expect to be given more specific information about the delay (e.g. the cause of the delay and/or the likely length of the delay).
- Where there are clearly defined intermediate steps between the action request and its completion (e.g. during a lengthy PUA to PUA negotiation - "offering voice call", "voicemail suggested", "voicemail accepted"), the user should be provided with notification that the system is actively handling the user's request by identifying the current step.

Guideline 5.10 - Using an appropriate model

- As many users will not have a clear understanding of the technical systems that they are using, it will be necessary to try to give them an appropriate frame of reference by presenting them with an understandable model. In many of the UCI tasks, the model of the PUA being an "assistant" or secretary that aids the user in their tasks would be a very appropriate model. Such a model has already been used in mobile telephone services as a way of presenting a group of services such as voicemail, voice dialling, etc. to the user.

Guideline 5.11 - Using the user's vocabulary

- PUA designers should ensure that it is possible to have different end user views of the basic PUA functionality that are tailored to the knowledge and experience of the specific groups of users. The vocabulary used should be appropriate to the specific group of users.

Guideline 5.12 - User terms, symbols and icons

- A set of user terms, symbols and icons, covering at least the set of key UCI concepts listed in annex C should be defined. User terms for at least the major European languages should be standardized.

Guideline 5.13 - Consistent usage of the user terms, symbols and icons

- All applications and services involved in UCI-based communications should use the same user terms, symbols and icons to describe the defined key UCI concepts (including at least those listed in annex C).

Guideline 5.14 - Consistent behaviour related to the user terms, symbols and icons

- All applications and services involved in UCI-based communication should exhibit the same behaviour in relation to the key UCI concepts represented by the user terms, symbols and icons (including consistent use of terms listed in annex C).

Guideline 5.15 - Limiting the set of user selectable options

- The set of user selectable options that are initially presented to a user should be limited in order not to make the task look too complex and thus confuse the user. A mechanism should be provided to give the user access to the complete set of options and system commands when the user so desires.

Guideline 5.16 - Limiting the amount of non-essential information

- Information that is not essential for user to perform their tasks should be restricted. A mechanism should be provided to give the user access to further information when the user so desires.

Guideline 5.17 - Exploiting proximity of control

- As users tend to focus on the tangible local environment (e.g. mobile telephone protocols), designers should try to link this environment to the activation of certain PUA sub-profiles (e.g. setting a mobile telephone to "silent" or the "meeting" profile would alert the PUA to trigger its "meeting" sub-profile).

Guideline 5.18 - Provision of "Stop" and "Undo" mechanisms

- Users should, wherever technically possible, be provided with:
  - ways to stop the performance of tasks that they no longer wish to complete;
  - ways to reverse operations that they subsequently realize they should not have activated.

Guideline 5.19 - Error message presentation

- Error messages should be expressed in plain language (not just numeric/alphanumeric codes), precisely indicate the problem and constructively suggest a solution. Administrators of multiple PUAs, for example, may require more technical and detailed error messages than the ordinary UCI user, but the message should still be clearly expressed. Also these users may require error codes in addition to the explanation for use in system error handling procedures.

Guideline 5.20 - Providing users with flexible options

Where possible, users should be provided with a range of options to enable them to perform key tasks.

Guideline 5.21 - The provision of shortcuts

- A wide range of shortcut methods should be employed. Some typical examples include:
  - the exploitation of simple activation actions e.g. lifting a telephone handset can cause a stored digit string to be dialled which establishes contact with the PUA;
  - the provision of default values for every user changeable setting e.g. the default communication service for UCI communications from a telephone may be telephony;
  - the inclusion of accelerators (e.g. multiple key combinations such as Ctrl X for "Cut") may often speed up the interaction for the expert user such that the system can cater to experienced as well as inexperienced users.

Guideline 5.22 - Use of templates

- Templates should be provided to facilitate the definition of PUA sub-profiles. Consideration should be given to the provision of two classes of template:
  - "creation" templates, where changes made to a template will not affect sub-profiles that were previously created from that template;
  - "live templates", where a modification to a template would affect all the PUA sub-profiles that had been based upon that template. This could be of benefit in a corporate environment where a company wished to make changes to all of its profiles as a result of a corporate change of policy.

Guideline 5.23 - Availability of defaults

There will be some settings that it is impossible for the system to be able to recommend (e.g. the user's name, whether they wish to be contacted with business calls at home), in most other cases default values that the user can choose to accept should be provided.

Guideline 5.24 - Acceptance of defaults

Users should always be given an option to accept or reject default settings either individually or as named package of settings (e.g. novice user, expert user).

Guideline 5.25 - Restoration of defaults

Users should be provided with a means to select a "Restore Defaults" option.

Guideline 5.26 - Automated housekeeping

- Consideration should be given to the provision of a mechanism within the PUA that observes the user's behaviour and proposes strategies that will enhance the user's efficiency. For example:
  - if a user frequently contacts a person by manually entering a UCI or by accessing a record in the communication log, the PUA might propose that the person is added to the address book as a new record;
  - if a user never accesses an address book record, the PUA might ask the user if they wish to remove the record;

- if a user regularly adopts the same behaviour (e.g. diverting communications from unidentifiable people to a communication store) then the PUA could propose a rule that would automate that behaviour for the user;

- if a rule in the user's PUA has not been used for a long time, the PUA may suggest that the user might wish to consider deleting the rule in order to improve communication efficiency.

Guideline 5.27 - Minimalist design

- The PUA should not present information or ask the user to enter information, which is irrelevant, rarely needed or could be automatically retrieved. Targeting a single application design at too broad a range of user types is likely to lead to much of the information provided and many of the options offered being irrelevant to one or more groups of users. Automatic retrieval of information is another way of avoiding asking the user to provide unnecessary information.

Guideline 5.28 - Providing appropriate user support

- Users with different experience in using computers will all need to use their UCI and the associated functions of the PUA effectively. It is likely that users will be less experienced at the beginning and might become more experienced after some time and thus their user requirements might vary over time. Three levels of user experiences are identified below together with relevant guidance. These levels might apply to the same user in various different situations, thus requiring a range of alternative user control options to be available:

    - Some users will have no experience in using computers. These users may require the PUA provider to set up the PUA for them and also possibly perform modifications whenever they desire. Such support would allow these users to get the benefits of UCIs/PUAs without having to directly manage PUAs themselves.

    - Other users will have some experience in using computers and they may want to set up the PUA by using a "wizard" (an "intelligent" application). The provision of "Wizards" can provide step-by-step guidance to the user by proposing what actions to take and what information to provide. Such a process might be much more reassuring to novice users than presenting them with complex empty forms to fill in.

    - Users who have significant experience in using computers would require the option to configure their PUA profile to an exact specification (within the standard system constraints).

Guideline 5.29 - Memory load

- The design of the system should ensure that the users' memory load is minimized. Techniques that should be employed include:

    - Objects, actions, and options should be visible to the user (aurally or visibly as appropriate). In screen-based interfaces it should be possible to provide comprehensive visibility of objects, actions and options. In voice based interfaces, only limited visibility of objects, actions and operations will be feasible - by such means as voice menus.

    - Where the range of choices being presented to users is very large, they should be given an option to input information directly rather than being forced to make choices from excessively large sets of options.

    - Every opportunity for automatic retrieval of information from different parts of UCI systems and its use transparently in other parts of the system should be exploited as this will provide great benefit for reducing users' memory loads.

Guideline 5.30 - Accessibility

- Where there is a mismatch between the user interface of the device, application or service and the abilities of the user, users should be offered an alternative method to perform their tasks.

A.2 Guidelines relating to presentation of the UCI

Guideline 6.1 - Use of personalized labels

- Where a user has created a personalized label for another person's UCI, under normal circumstances this is the label that the user will expect to input, or be presented with, in all interactions with their PUA.

Guideline 6.2 - Awareness of authentic label delivery

- Users should always be made aware whether the label delivered with the communication is authentic or not (e.g. by a visible or aural indication), even when they have chosen presentation of a personalized label instead of the label delivered with communication.

Guideline 6.3 - Display of presented label

- When a communication is received and a personalized label is displayed, the user should be provided with a means to view the label that actually accompanied the communication. This could be by simultaneously displaying both labels or by giving the user a method to request the display of the label that accompanied the communication. The choice of appropriate mechanisms for allowing the received label to be displayed in addition to the personalized label will be dependent on the communication service and on the terminal type.

Guideline 6.4 - Display of new authentic label

- When an authentic label is received and a different authentic label is already stored for this UCI, the user should be notified that the authentic label has changed (e.g. when a person marries and their family name is changed or where a new person takes a role within a company).

Guideline 6.5 - Record of aliases

- The PUA should keep a record of any aliases associated with stored UCIs. The user should be able to view any or all aliases that are associated with a stored UCI.

Guideline 6.6 - UCI number presentation

- Users will not need to have a UCI number presented to them but should be able to request it.

Guideline 6.7 - UCI "additional information" presentation

- Users should be able to specify exactly what additional information field data, associated with an incoming communication, is presented to them before that communication is accepted. This data should be presented to the user irrespective of what terminal is being used. Examples of selected fields will probably include the following:
  - whether the received label is an authentic name or an alias;
  - whether the UCI corporate or personal;
  - additional naming information (e.g. "known by" name).

Guideline 6.8 - Use of appropriate terminals

- Application and service designers should try to encourage the use of appropriate terminals for appropriate tasks (as summarized in table 3).UCI applications and services should be designed so that users are not required to perform tasks described under the "Terminal totally unsuitable" category.

Guideline 6.9 - UCI label presentation at any terminal

- The user should be able to request that the UCI label is presented to them before they make a decision on how to handle an incoming communication (irrespective of the terminal capabilities). Rules in the recipient's PUA may determine the circumstances under which the label is offered to the user. In the case of a fixed telephone without a display this would entail an automated voice call delivering the label of the incoming communication. The user could then accept, divert to voice-mail or decline the communication with appropriate keystrokes.

Guideline 6.10 - UCI sub-profile activation from any terminal

- The user should be able to access their PUA from any terminal to allow the user to activate a new sub-profile.

Guideline 6.11 - Feedback about active sub-profile from any terminal

- There should be provision from any terminal for users to ascertain which sub-profile is currently activated by means of appropriate text, symbols, tones or voice announcements. The capability of the display in use at the time will obviously dictate how the user is informed:
  - A PC based terminal will allow continuous feedback of the activated sub-profile
  - A terminal with a restricted display may require the state information to be overwritten temporarily when other more important information must be delivered.
  - A terminal with no display capability should provide an initial voice announcement or a distinct tone to indicate which sub-profile is activated and then periodic "reminders" to the user.

Guideline 6.12 - Address book access and directory search access from any terminal

- Users should be able to access their address books and directory services from any terminal to aid them in initiating communications (subject to the limitations of the terminal and channel that they are using).

Guideline 6.13 - Communication log access from any terminal

- Users should be able to access incoming and outgoing communication logs from any terminal in order to make further communications to the UCI and non-UCI users listed in the logs. The content of the log information presented would be subject to rules defined in each user's PUA profile (e.g. the PUA rules might specify that logs presented when the user is using a basic voice terminal should only list the last 5 voice communications extracted from the main PUA log).

Recommendation 6.14 - Channel capabilities affect on usability

- The user interface features that users are offered and the way in which they are supported should be consistent with the limitations of the communication channel being used.

A.3 Guidelines relating to management of the PUA

Guideline 7.1 - Manual sub-profile activation

- Users should always be provided with a mechanism to activate sub-profiles (thereby de-activating the previously activated sub-profile). The activation mechanism should be available to users irrespective of what terminals they are using.

Guideline 7.2 - Provision of automatic sub-profile activation

- Automatic sub-profile activation mechanisms should be provided to assist users. The operation of these mechanisms should be subject to user defined rules on what prompting they require before changes are made.

Guideline 7.3 - User specification of automatic sub-profile activation mechanisms

- Users should be provided with mechanism to create and modify the PUA rules that specify the circumstances under which sub-profiles are activated.

Guideline 7.4 - User notification of automatic sub-profile activation

- Users should be provided with appropriate feedback whenever a sub-profile is automatically activated such that they are aware of which new sub-profile has been activated.

Guideline 7.5 - User notification of sub-profile changes made by a third party

- It should be possible to trace full details of all modifications to the PUA sub-profiles made by a third party (see clause 7.5.2) e.g. *who* made *which* modification and *when*.

Guideline 7.6 - Provision of pre-configured PUA profiles

- New UCI users should be provided with pre-configured PUA profiles that allow them to use UCI without performing complex PUA setup procedures.

Guideline 7.7 - Provision of PUA profile/sub-profile modification mechanisms

- Mechanisms such as pre-configured sub-profiles, templates and simple profile modification tools should be considered to assist users in making meaningful changes to their PUA profiles with little effort. These mechanisms become especially valuable when users need to modify their PUA profiles from terminals with limited capabilities as user will be unable to perform complex detailed editing tasks using such terminals.

Guideline 7.8 - Saving and restoring profiles/sub-profiles

- Support for users handling different versions of their PUA profile setup should be provided. This should include a capability to save and retrieve profile/sub-profile versions.

Guideline 7.9 - Offline modification of PUA profiles

- Users should be provided with mechanisms to allow them to perform PUA profile management on offline versions of their PUA profile (e.g. a version stored in a terminal with no current communication connection).

Guideline 7.10 - Validity of offline modifications made to PUA profiles

- Users should be provided with warnings about possible problems arising from modifying offline PUA profiles. These warnings should include:
  - indications of how recent the offline version of the PUA profile data is;
  - indications of potential conflicts and/or ambiguities that are detected when the offline PUA profile issynchronized with the PUA profile stored in the PUA;
  - options for the user to confirm, reject or modify any changes that they have made to an offline version of the PUA profile.

Guideline 7.11 - PUA availability

- Users should be able to access their PUA from any terminal, system or place, either directly or via a third-party PUA management service (see clause 7.5.2).

Guideline 7.12 - The use of a familiar PUA profile management environment

- Mechanisms that will create a familiar PUA profile management environment across a wide variety of terminals should be provided.

Guideline 7.13 - Assisting users to create and modify rules

- Mechanisms to assist users in the task of creating and modifying PUA rules should be provided.

Guideline 7.14 - Examining the activation of rules

- Users should be provided with a mechanism to interrogate the PUA to determine which rules are active and which are not.

Guideline 7.15 - Precedence of PUA rules

- Users should be provided with a mechanism to allow them to determine the order of precedence of PUA rules and to enable them to alter that order of precedence.

Guideline 7.16 - Rule conflicts and side-effects

- Users should be provided with support from the PUA to help them prevent or solve PUA rule conflicts or side-effects.

Guideline 7.17 - Integrated handling of services in profiles

- The PUA should provide for the definition of profiles that cover different services in an integrated way. This implies control from a single profile management application, not several different and incompatible ones.

Guideline 7.18 - Rule usage and effectiveness

- It should be possible for users to identify PUA rules that are unused or little used. A mechanism to alert users to such unused or under-used rules should be provided for users to use if they wish to receive such alerts.

Guideline 7.19 – Representing objects to users

- The way objects are represented to users should be dependent on the knowledge of the target users and the specific context of use.

Guideline 7.20 – Use of familiar applications

- Users should, wherever possible, be allowed to utilize familiar applications (e.g. contact and diary managers) to perform certain aspects of PUA management.

Guideline 7.21 - Efficient information entry

- Users should, not be required to re-enter information when managing PUA functions, even when this management is distributed across a number of applications. This rule may need to be relaxed in certain circumstances for security reasons (e.g. a user may be asked to re-enter a password in order to enhance security).

Guideline 7.22 - Automatic information acquisition

- Users should, not be asked to enter information that can be acquired by the PUA from other sources. In some circumstances users may be required to check and confirm the use of this automatically acquired information.

Guideline 7.23 - Simple integration of new system features

- New system features should be introduced in such a way that the new facilities can be utilized using familiar methods.

Guideline 7.24 - Consistent PUA profile behaviour

- Where users move their profile to a new PUA provider, the PUA profile should exhibit the same behaviour it exhibited when with the original PUA provider.

Guideline 7.25 - Consistent operations across tools

- Similar operations in different tools should have the same look and feel in the same context e.g. using "delete" on an address book record or on a log record should use similar dialogues when accessed from a mobile phone.

Guideline 7.26 - Consistency between the PUA profile and the UCI additional information field

- There should be a single source for information that appears in both the PUA profile and in the UCI additional information field. This will ensure that any change to this information will be reflected throughout the PUA profile and also in the UCI additional information field in a consistent way.

Guideline 7.27 – Implications of adding services or terminals

- The PUA profile should be automatically or easily updated to reflect a situation where the user subscribes to new services or adds new terminals.

- Users should be notified if newly added services or terminals have no rules relating to them and, the PUA could propose default rules where appropriate.

Guideline 7.28 - Implications of removing services or terminals

- Users should be warned when they unsubscribe from services or remove terminals and those services or terminals are referred to in rules. Options could be given to the user to:
  - delete that rule;
  - update the rule;
  - keep the rule for future use.

Guideline 7.29 - Synchronization with service and terminal state/settings

- Information in the PUA profile manager should be synchronized to reflect the changes to the states and settings of the user's services and terminals.

A.4 Guidelines relating to address book provision

Guideline 8.1 – Support for both UCI and non-UCI address book records

- Address books should be capable of holding records for contacts that have UCIs and for contacts that do not. For this reason, fields for UCI and non-UCI contact information should be provided.

Guideline 8.2 - Indicating the presence of a UCI in address book records

- A visual distinction to indicate the presence of a UCI is required (e.g. symbol, icon, or abbreviation). This could be placed with the other UCI number in a displayed address book record. Such a symbol might be as simple as "UCI" if, indeed, this name becomes established.

Guideline 8.3 - Presentation of preferred services in address book records

- If there are preferred services associated with the UCI then these should be made clear by means of appropriate symbols or icons that can be displayed with the UCI. This will be derived from information that owners of UCIs provide in the additional information field of their UCIs.

Guideline 8.4 - Presentation of charging information in address book records

- Information about the charging rate for communication, should be imparted by means of a symbol or text placed after the preferred service symbol, icon or abbreviation. This will be derived from information that the owners of UCIs provide in the additional information field of their UCIs.

Guideline 8.5 - Additional content of address book records

- Consideration should be given to the inclusion of fields for additional information. This additional information could include a voice label or a graphic image, as well as a visible version of some of the additional information fields that are stored for UCIs.

Guideline 8.6 - Shared address books

- The capability to allow a number of users to share one or more common address books as well as their personal address book should be provided.

Guideline 8.7 – Synchronization of distributed address books

- All address lists associated with different terminals and smart cards should be synchronized with a master list held by the PUA.
- Dependent on local storage capacity it should be possible to download any record to a terminal address book from the master address book.

Guideline 8.8 – Adding records to address books

- Users need to be given a mechanism to manually add a UCI (or non-UCI contact) to the address book.
- Users will require the ability to set special conditions which will automatically add an identifier into the address book (or flag up the need for a decision on whether to place the identifier into the address book).
- Where records are added automatically, the user will require the capability of personalizing the label received as part of the UCI. This could be necessary because of duplication (two "John Smith" labels) or because the UCI holder is not normally known by that label by the user.

Guideline 8.9 – Automatic completion and correcting of address book records

- Part of the "handshake" between PUAs should include the identification and updating of incomplete or out-of-date UCI address book data.
- Subject to the user's choices on the amount of feedback that they wish to receive, the user should be kept informed of the changes made.

Guideline 8.10 – Changing address book records

- Attempts to remove or modify address book records that are referred to by PUA rules or that are members of various lists (e.g. a privacy "white list") should be flagged to the user.

Guideline 8.11 – Address book record organization

- Users should be able to view their address book records according to different criteria such as group, alphabetic listing of surname, first names etc.

Guideline 8.12 – Searching for UCIs across different sources

- Users should be provided with a search mechanism that is consistent across multiple sources (e.g. personal address books, group address books and white pages) and when accessed from different terminal types.

Guideline 8.13 – Sending or updating UCI details

- The facility should be available to send UCI details from the user's address book to others" address books. Where restrictions have been applied to the transfer or broadcasting of the UCI then this should be made apparent to the person attempting to send the UCI and should not be permitted by the PUA.

Guideline 8.14 - Indicating presence of UCI on letters, business cards, etc.

- A. symbol, icon, or abbreviation, should be placed beside the UCI number whenever it is presented in a printed form. Such a symbol might be as simple as "UCI" if, indeed, this name becomes established.

Guideline 8.15 - Presentation of the UCI number in printed form

- Presentation of the number element of the UCI is essential.

Guideline 8.16 - Presentation of preferred services in printed form

- If there are preferred services associated with the printed UCI then these should be made clear by means of appropriate symbols or icons placed beside the UCI number.

Guideline 8.17 - Presentation of charging information in printed form

- If the owner of the UCI wishes to imply a charging rate for communication, then this can be imparted by means of a symbol or text placed after the relevant service symbol, icon or abbreviation.

A.5 Guidelines relating to communication logs

Guideline 9.1 - Selection of logs

- The PUA will always maintain a log of certain events (e.g. incoming and outgoing communications). In addition, a PUA will allow a number of other events to be logged. Users should be given options to decide which of these additional events they wish to be logged.

Guideline 9.2 - Selection of log detail

- Each log will have a minimum set of parameters that it will store for each log record. Users should be given options to control how much additional detail each log should contain.

Guideline 9.3 - Control of log display

- Users should be given control of how logs should be displayed, including control of the sorting order (increasing/decreasing) of defined item such as date, service or number/person.

Guideline 9.4 - Control of log lifetime

- Users should be given control of the lifetime of log data. This control could be in terms of the age of the data or in terms of the overall storage space limits to be imposed upon the log data.

Guideline 9.5 - Access to a communication log

- Users should have access to the communication log (or a filtered version of it) from any terminal.

Guideline 9.6 - Using the communication log to check the source of an incoming communication

- Users should be able to view the communication record chronologically and check the UCI of the person that originated or received a communication.

Guideline 9.7 - Using the communication log to identify incoming and outgoing communications

- Users should be able to configure the communication log in order to summarize all communications with a specific UCI holder or from any other communication address.

Guideline 9.8 - Reply to a UCI-based communication

- Users should be able to reply to a UCI-based communication itemized in the log using the same or different type of communication.

Guideline 9.9 - Transfer log records to address book records

- The user should be able to transfer the UCI (or other contact information) of a log record from an incoming or outgoing communication to their master address book.

A.6 Guidelines relating to privacy

Guideline 10.1 - Receiving communications from people to whom a UCI has been made available

- A facility that broadens incoming communication filters to include all those people to whom a UCI has been made available should be provided (automatic addition to a "white list" – see clause 10.4).

Guideline 10.2 - Receiving communications from people who have previously been contacted by the UCI user

- A facility that broadens incoming communication filters to include all those people who have been contacted by the UCI user should be provided (automatic addition to a "white list" – see clause 10.4).

Guideline 10.3 - Recommended privacy model

- Adoption of the white/grey/black list model (described above) should be considered as a means of facilitating users" understanding of privacy management. Such a model would be applied to instructional material and to user interface design.

Guideline 10.4 - Provision of privacy templates

- UCI users should have access to privacy templates which define conditions for the release of UCIs during searches in addition to management of incoming and outgoing communications.

Guideline 10.5 - Controlling the transfer of UCIs

- Users should be able to stipulate whether a UCI released to one person can be used by another person or not.

Guideline 10.6 - UCI privacy indications

- The additional information field could be used to indicate any restrictions on the UCI relating to privacy to a person about to make a communication.

Guideline 10.7 - Filtering requests for a user's UCI

- Some mechanism or mechanisms need(s) to be in place to allow people unknown to the user to gain access to their identifier if that is acceptable to the user. The mechanisms recommended are called virtual calling cards and may either be text or voice based. Both variants should enable the applicant to deliver a brief explanation of why they want to communicate.

Guideline 10.8 - Virtual Calling Card content

- Virtual calling cards should contain as a minimum:
  - the UCI label of the enquirer;
  - an indication of whether the label is authentic or not;
  - and should be specified to include either:
    - a free content limited size message field;
    - no message field but a menu selection of reasons for communication.

Guideline 10.9 – Delivery of requests for the release of a UCI

- Calling cards or any other requests for release of a UCI need to be presented to the user at the earliest possible opportunity.

Guideline 10.10 – Options for UCI release

- The UCI owner should be able to respond to UCI search requests in one of the following ways:
  - allow the UCI to be given;
  - not allow the UCI to be given;
  - communicate with enquirer and disclose UCI;
  - allow communication on a one-off basis without disclosing UCI.

Guideline 10.11 - Filtering of requests to release a UCI

- Users should be given a means of filtering requests to release a UCI and a method of prioritizing the way in which they are handled.

Guideline 10.12 - Provision of transient UCIs

- PUA Providers could provide a transient UCI service for circumstances where the user is wary of releasing a UCI but still wishes to communicate.

Guideline 10.13 - Provision of context specific UCI numbers

- PUA providers should offer UCI users the option of a different UCI numeric associated with a specific communication context (e.g. someone operating a business who does not require a separate business UCI). These context specific numerics would enable a user to segment their communications (e.g. into business and personal). Such a scheme would also provide different and defined levels of privacy dependent on the source and nature of the communication.

A.7 Guidelines relating to security

Guideline 11.1 - Balancing usability and security

- It is important that an appropriate level of security is provided and no more. More security than is necessary increases costs and can contribute to poor system usability.

Guideline 11.2 - Communicating the level of authenticity

- Users may wish to know how certain they can be that the person at the other end of a communication is who they claim to be. Users should be presented with an understandable indication of the strictness of registration used by the other party.

Guideline 11.3 - Security assurance

- The provision of a simple message like "Last login Friday the DD/MM YYYY" may make users feel more secure when logging in to their PUA to modify their PUA profile.

Guideline 11.4 - Provision of default security settings

- Default security settings should always be provided for new users. User should not have to define individual security settings before they are able to use UCI.

Guideline 11.5 - Templates with security implications

- Where use of a template has security implications, the template should contain default security settings.

Guideline 11.6 - Visibility of security settings

- Users should be able to get an overview of all security settings.

Guideline 11.7 - Sharing of information

- Users should be able to decide whether or not to share information and with whom.

A.8 Guidelines relating to communications session control

Guideline 12.1 - Delivery of UCI Label

- For all UCI communications, the UCI label should be delivered to the recipient's PUA.

Guideline 12.2 - Presentation of UCI Label

- When a PUA receives and accepts an incoming UCI communication request, the PUA should ensure that the UCI Label of that communication is presented at the recipient's terminal by the best means available.

Guideline 12.3 - Handling of priorities

- PUAs should be able to read, interpret and respond to priority levels assigned to incoming communications.
- Priority levels assigned to incoming communications should be viewable in incoming communication logs.

Guideline 12.4 - Identifying groups of users

- Different alerting signal associated with different groups of users, as defined in the UCI user's address book PUA profile, should be provided where distinctive alerting schemes (e.g. different types of ringing, tones, or vibrations) are available from the service or terminal by which a user is being contacted.

Guideline 12.5 - Characteristics of an outgoing communication

- When an outgoing communication is made, the user should be able to:
  - initiate a communication to anyone, whether or not they have a UCI;
  - use any method of communication supported by the terminal that the user is currently using - with an appropriate default being chosen if the user does not make a selection;
  - have their identity (the UCI label) presented to the recipient of the communication (whether the recipient is a UCI user or not);
  - have a record kept of the communication in their PUA.

Guideline 12.6 - Replying to an incoming communication

- When replying to an incoming communication a user should be able to:
  - easily reply using the same method as the received communication;
  - specify that their reply should be by a different method to the received communication.

Guideline 12.7 - Freedom of choice of communication method

- Users should be able to use any method of communication that is available to them (even if not directly supported by the recipient) e.g. if the sender of the original communication only has fax available and the replier can currently only send emails, the PUA could offer the use of an email-to-fax conversion service.

Guideline 12.8 - Assignment of priorities

- Users should be able to assign a priority level to their outgoing communications.

Guideline 12.9 - Identification of PUA offering communication

- Where communications can be offered by more than one PUA users should be made which PUA was involved. This would enable them to make decisions on how to handle the offered communication. The type of indication would be dependent on the terminal being used. For example:
  - a simple fixed telephone could use distinctive ring tones;
  - a PC could display a list of incoming communication attributes including the PUA and the implied "role".

Guideline 12.10 - Default PUA

- To avoid the need for the user to specify the PUA involved for each and every communication, the system should assume which PUA is to involved based on a given set of condition.
- The user should be made aware before every communication, which PUA is involved by default. The form of feedback will be dependent on the terminal in use but could range from a distinctive dial tone for each PUA on a simple telephone to colour coded text/graphics on a PC or PDA.
- It should be possible to override the default PUA for any communication.

A.9 Guidelines relating to other issues

Guideline 13.1 - Provision of charging and billing information

- Users should be provided with or have access to information on charging and billing related to any UCI-based communication.

Annex B (informative): Generic user requirements for communications systems

B.1 Notes relating to the user requirements

B.1.1 Origin of the user requirements

The requirements in this annex are those originally defined in EG 201 940 [1], with minor updates and clarifications. Guidelines in the present document support this set of user requirements.

B.1.2 Assumptions concerning the Universal Communications Identifier

Throughout this annex an assumption has been made that whenever a Universal Communications Identifier (UCI) is referred to, it will be as defined in EG 201 940 [1].

B.1.3 Dependencies and conflicts

It should be noted that some of these user requirements may wholly or in part conflict with other requirements; some support other requirements and some are dependent on other requirements.

B.2 The user requirements

This annex summarizes the generic user requirements of a modern, ideal communications system. For a more detailed analysis of these requirements and for a description of the system capabilities necessary to support such requirements see EG 202 067 [2]

B.2.1 Unifying the control of communications

Users, currently, can be faced with many options when wishing to setup, receive and manage their communications. Typically people may possess a fixed telephone, a mobile telephone, a PC with a home email address, another PC at work, an email address and a fax machine. Each terminal, application and service will have a different identifier, and method of setting up, receiving and managing communications. Each will also have different levels of control (e.g. a user can send an email labelled "urgent" but not make a telephone call similarly labelled) and different methods of storing communication history.

An effective and efficient multi-modal communications system would have a choice of terminals, a single universal identifier and a common method of setting up, receiving and managing communications.

User requirement No UR 1.1
Users require a unified method of, and support for, setting up, receiving and managing communications that is, as far as possible, independent of the terminal(s), application(s) and service(s) used. This would include provision of a single universal identifier covering all services and network types.

B.2.2 Seamless communication across networks and services

The independent development of different networks and services and their historical segregation has tended to make inter-network communication difficult if not impossible. Applications do exist to enable a user to send, for example, an email to a fax machine but typically it involves the user in significant effort. It is currently simpler for an originator to "experiment" until communication is established on one of the available networks than attempt to set up inter-network/inter-service communication.

User requirement No UR 1.2
Users require seamless communication across networks and services.

B.2.3 Increasing the options available to the originator

At the present time, an originator has little control over outgoing communications other than by choice of terminal. In future, the originator may want to specify the level of service required for a particular communication, specify what is to happen if the desired communication cannot be established or assign a priority. As the number of possible options increases, the complexity for the user may increase. The user will need to be allowed to choose their own balance between increasing the options that they control and reducing the complexity that a large number of choices can create.

User requirement No UR 1.3
The originator of a communication requires the ability to indicate to the system particular requirements relating to the outgoing communication.

B.2.4 Increasing the options available to the recipient

With the increasing number of communication options available to users it is becoming important to manage incoming communications effectively. In particular, a user may wish to divert incoming communications from one terminal to another depending on their own geographical location or the time/date. The recipient may also wish for the re-routing of communications to depend on the urgency of the call, who it is from or some other attribute. Geographically determined re-routing of communications could be automated to varying degrees using GSM, GPS, AI techniques, polling, or other forms of presence detection.

User requirement No UR 1.4
The recipient requires the ability to control incoming communications

B.2.5 Dealing with communications conflicts between originator and recipient

If the originator has specified particular attributes or conditions for a communication and the recipient has specified communication management criteria which conflict with those, then the system entities which represent originator and recipient within the network(s) should negotiate a mutually acceptable solution.

User requirement No UR 1.5
Users require that conflicts between the communication requirements of the originator and the recipient should be resolved, where possible, without their intervention.

B.2.6 Maintaining backward compatibility

Future architectures will provide users with increased control over the sending and receiving of communications. Taking full advantage of this increased functionality will almost certainly require sophisticated user interfaces. However, for the foreseeable future, a large number of terminals (principally telephones) will have limited or no ability to input alpha characters. It is important that these users are still able to use communications systems based on the new architectures, albeit with decreased functionality.

User requirement No UR 1.6 - Maintaining backward compatibility
Users may wish to use basic input devices such as a 12-button numeric keypad to obtain a basic level of service, even when using future architectures.

B.2.7 Trust in the system

Trust in a communications system is clearly dependent on many issues other than technical ones. A user's trust in a communications system will be influenced not only by the security mechanisms within the system but by political and psychological factors as well.

However, trust can be maximized by providing "appropriate" levels of security. A typical user may not be concerned about the integrity of 95 % of their communications and supplying checks and verifications on these would be inefficient with respect to system performance and frustrating for the user. But for the remaining 5 % the user may require these features and needs to have confidence that in these cases appropriate security is in place.

User requirement No UR 1.8 - Trust in the system
To have trust in a communications system, users require an appropriate level of security to be provided and when necessary an assurance of the integrity of the communication and the identity of the person they are communicating with.

B.2.8 Appropriate level of privacy

Privacy is defined as the ability of the user to choose who knows their UCI and under what circumstances and from whom they can accept incoming communications. Users will wish to have the freedom to determine who is able to gain access to their UCI (via such mechanisms as UCI searches). They will also wish to have full control over who is able to communicate with them, when and by what means.

User requirement No UR1.9 - Appropriate level of privacy
Users will require different levels of privacy dependant on their individual needs.

Annex C (informative): UCI objects

C.1 Introduction

Users need to refer to and also create, modify and delete a number of objects when defining their PUA profiles. This annex describes classes of objects that users may need to be aware of.

C.2 Scope

This annex describes objects of interest to users. Additional information on format, values and comments are also included where necessary. This annex is intended to give relevant example information about objects used in the PUA. The attributes shown and their values are given as examples and may be different in the final standardized form of UCI. The example information provided might be useful input for future standardization work.

Attribute values that are mentioned in the object tables below are described in English in the present document. In practice, they have an internal representation and the value is displayed in the user's preferred language.

The present document does not cover any normative details such as:

- ASN.1 syntax definition.
- Access rights and authentication.
- What is optional and what is mandatory.

C.3 Object attributes and operations

C.3.1 General attributes

The following attributes exists for most objects defined in this annex:

Attribute	Description	Comment
Name	String	Name of the object
Voice/sound label		The user can record a sound or spoken word and associate it with the name or use it instead of the text name. This can be useful when using spoken commands, when using a terminal without a screen or for blind or partially sighted persons.
Icon		The user can select an icon that can be displayed together with the name or instead of the name. This can be useful when a small screen is being used.
Colour		The user can select a colour for displaying the name.
Comment	Free text	The user can write a comment that can be useful later for understanding or remembering the use of the object.

C.3.2 General Operations

The following operations exist for most objects defined in this annex:

- create new;
- view;
- modify;
- copy;
- paste;
- delete.

C.4 Objects

C.4.1 PUA profile

The PUA profile (referred to as a profile in this annex) is an object that contains a few unique attributes and a set of pointers to a number of sub-profiles (see clause C.4.2).

C.4.2 PUA sub-profile

A PUA sub-profile (referred to as a sub-profile in this annex) is a named set of rules and settings. A sub-profile is defined to support a user in a certain situation. For example, a user goes to a meeting and chooses the "Meeting" sub-profile, which results in a number of settings that suit a meeting being set. A base-profile is also a form of sub-profile.

The definition of sub-profiles is a PUA administrator function, whereas activating and deactivating sub-profiles is a user function. Typically, users will also be PUA administrators, so the term "user" will also cover a PUA administrator in this annex.

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	
Inheritance information	Pointer to related sub-profiles	Defines inheritance relations between sub-profiles.
State	Values: Active Passive	
User confirmation of activation/deactivation of sub-profiles:	Values: On Off	Users may define rules for automatic activation/deactivation of sub-profiles. Users may choose whether they prefer activation/deactivation to take place with or without having to confirm it.
Rules that are active when the sub-profile is active	Pointer to a set of rules.	One or more rules can be associated with the sub-profile and are thus active when the sub-profile is active.
Settings that are active when the sub-profile is active	Pointer to a set of settings.	Settings can be associated with the sub-profile and are thus active when the sub-profile is active.
Rules for activating the sub-profile.	Pointer to a set of activation rules	If no activation rule is defined, the sub-profile has to be activated manually.
Rules for deactivating the sub-profile.	Pointer to a set of deactivation rules	The sub-profile will be deactivated when another sub-profile is activated unless the sub-profile is a base-profile. (Optional)
Sub-profile to be activated when this sub-profile is deactivated.	Pointer to a sub-profile	The sub-profile that will be automatically activated when this currently active sub-profile is deactivated.
Association to a live template.	Pointer to a live template	If there is an association to a live template then the sub-profile will automatically be modified when the live template is modified. (Optional.)
Version		The user can choose to use previous versions. The PUA provider should also keep old versions of the sub-profiles, which can be useful if something serious happens with the user's sub-profiles.
Lifetime		When the rule is created, it is possible to assign it a Lifetime (e.g. to be applied once, a user defined length of time, or until the user decides to delete the rule). The lifetime of a sub-profile is not to be confused with the time a sub-profile is active. A sub-profile that is deactivated still exists and can be activated again. A sub-profile disappears and cannot be activated again when the lifetime is ended. See ISO 8601 [10].

Operations:

Operation	Comment
Create new	A sub-profile can be created from scratch by entering all the data. It can also be created from a template followed by the entry of some data. (PUA administrator privilege)
View	(User privilege)
Modify	(PUA administrator privilege) A PUA profile can be manually modified. It can also be automatically modified when based on an live template.
Copy	(PUA administrator privilege)
Paste	(PUA administrator privilege)
Delete	(PUA administrator privilege)
Activate the sub-profile	(User privilege)
Deactivate the sub-profile	(User privilege)

C.4.3 Template

A template can be viewed as a schema that specifies a whole PUA profile, PUA sub-profiles and other objects such as rules or settings. Once a template is created, any object created from that template will inherit all of the template's properties.

Examples of different template categories are:

- corporate;
- club;
- personal, e.g. for work time, spare time, sleep time;
- persons with special needs.

Templates will be very useful for corporate PUA administrators or other PUA administrators configuring PUA profiles for many people

PUA administrators will be able to specify an option to determine whether objects already created from a template will or will not be affected. Templates where objects already created from the template will be affected by changes to the template are called "live templates". Templates where objects created by the template are unaffected by subsequent changes to the template are called "creation templates".

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	
Live template	Values: • Yes • No	Objects created from a "live template" (if value = Yes) will be affected when a modification is performed to the template. Objects created from a "creation" template (if value = No) will not be affected when a modification is performed to the template.
profile attributes		The template can be used for the creation of profiles, sub-profiles, settings or rules and will thus contain the attributes of those profiles, sub-profiles, settings or rules.

Operations:

Operation	Comment
modify (option 1): Affect objects already created	Modify the template. The changes affect all objects already created and those that will be created in the future.
modify (option 2): Affect objects now and in the future	Modify the template. The changes only affect objects that will be created in the future.
Create new, view, copy, paste, delete, activate, deactivate	

C.4.4 Communication request

Some attributes of a communication request should be standardized so that they can be addressed in rules.

Attributes:

Attribute	Description	Comment/Standard
Source/destination	Values: • Business Partner • Customer • Commercial • Family • Friend • Colleague • Club member • Parent • etc.	The internal format is a code and the value is displayed in the user's preferred language.
Priority	Values: • Low • Medium • High/Urgent • Emergency • etc.	The internal format is a code and the value is displayed in the user's preferred language.

C.4.5 Rule

A PUA sub-profile consists of rules and/or settings. A rule consists of one or more *actions* and one or more *conditions* and is used for defining:

- activation of sub-profiles;
- deactivation of sub-profiles;
- giving priority to communications;
- diverting communications;
- filtering communications;
- etc.

A rule can be active if its sub-profile is activated and will always be deactivated when the user deactivates the sub-profile. Rules and settings in base sub-profiles are more active on a more permanent basis. The PUA should allow rules that cannot currently be processed (e.g. not currently relevant) to be stored for future modification and use.

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	
Source	Values: • Any • Address book record (UCI or Non-UCI number or group) • Terminal • Accessory • Place/Activity	
Destination	Values: • Any • Address book record (UCI or Non-UCI number or group) • Terminal • Accessory • Place/Activity	
Service type	Service code	The services that can be referred are dependant on which services the UCI user has. When a user subscribes to a new service, then the new service should preferably be automatically inserted in the list of services. When a user unsubscribes from a service, then that service should preferably be automatically deleted from the list of services. The user should be offered the option that rules related to that service are stored for future use. The internal representation is a service code, but the users prefers names describing the services, such as: • Voice call • Email • Voice mail • IP telephony • Videoconference • Accessibility service, e.g. the possibility to listen to written messages
Action	Values (examples): • Activate profile • Deactivate profile • Allow communication • Deny communication • Divert communication • Filter communication • Authenticate • Encrypt	Defines the action that will result from the rule being activated.
When	Values: • Time • Expression	See ISO 8601 [10].
Related rules	Pointer to other rules	Several rules can be related to each other and the resulting behaviour may depend not only on each single rule, but also as a result of several related rules.
Lifetime	Time	When the rule is created, it should be possible to assign a lifetime e.g. to be applied once, a user defined time length, or until the user decides to delete the rule. See ISO 8601 [10].

Operations:

Operation	Comment
Create new	(PUA administrator privilege)
View	(User privilege)
Modify	(PUA administrator privilege)
Copy	(PUA administrator privilege)
Paste	(PUA administrator privilege)
Delete	(PUA administrator privilege)
Rule check	It should be possible to check a rule. It is valuable if the system can propose a suitable action if any problems are encountered. It is valuable to check that the rule in itself is correct syntactically and semantically if the rule interferes with another rule.

C.4.6 Place/Activity

Time and activity are words that can have a similar meaning to users, e.g. work is often associated with a specific place and the user performs an activity there. Objects related to place/activity are useful when defining source or destination in rules. They are also useful for activation and deactivation of PUA sub-profiles.

The user may think "I define a phone and I associate it with home or work". The user may also think "I define a profile and call it work or home and then I associate it with a phone".

C.4.6.1 Presence information

Presence attributes contains presence information intended for the user and may also contain meta-information for machine-to-machine communication between the publishing client and receiving clients. The location can be given using different methods and should be given with accuracy information indicating the average positioning accuracy achieved by the method.

Presence attributes can be divided into the following classes:

- client status describes the availability of the client for communication, location information and client capabilities;
- user status describes the availability of the user;
- extended presence information that is specific to the vendor or service provider, non-standard presence attributes that need to be passed through standard presence servers.

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	
Association to a certain place/activity		Association of device to a certain place or activity. Example of such device can be a terminal or an accessory. Another example is when users are using automatic teller machines or using their credit cards which might give an indication of where they are.
Association with service		Association with service, for example travel bookings made online, etc.
Time zone/Local time		See ISO 8601 [10].
Geolocation	Values: • Longitude • Latitude • Altitude • Accuracy	Geolocation gives the measured position of the client device. It may be either sensor based (e.g. GPS) or network based or a combination of both. See the Wireless Village initiative, Presence attributes [11].
Address	Values: • Country • City • Street • Crossing1 • Crossing2 • Building • Named area • Accuracy	See the Wireless Village initiative, Presence attributes [11].
PLMN		PLMN (Public Land Mobile Network) gives name or code of the mobile network where the client device is currently registered. Mobile network support for the PLMN attribute is needed.
Freetext location		A human-readable description of the location e.g. Nice Airport, Terminal 2.

C.4.7 Terminal

A terminal can be a fixed phone, mobile phone, computer etc. and is useful when defining source or destination in rules. It can be associated with services and place/activity. Users may want to define a phone and associate it with home or work. They may also define a sub-profile and call it "work" or "home" and then associate it with a phone.

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	
Terminal type	Values (examples): • Fixed phone • Mobile phone • PDA • Computer • Other	
CommC	Enumerated String Values: • VIDEO_CALL • VIDEOSTREAM • AUDIO_CALL • SMS • MMS • IM_ONLINE • IM_OFFLINE • EMAIL	See the Wireless Village initiative, Presence attributes [11]. It is describing the following communication capabilities of the terminal: VIDEO_CALL – The terminal can participate in a video call. VIDEO_STREAM – the terminal has video streaming capability. AUDIO_CALL – the terminal can be called. SMS – the terminal can receive a short message. MMS – the terminal can receive an MMS. IM_ONLINE – the terminal is able to have an IM/Chat session. IM_OFFLINE – the terminal is not able to have an IM/Chat session. IM messages may be stored in WV server. EMAIL – the terminal is able to send/receive emails.
Association with place/activity		
Association with accessories		
List of possible states	Values (examples): • Busy • Idle • Reachable • Not reachable	The user can define actions in rules that depend on states. The state information may depend on whether state information can be obtained from the terminal and/or network.
Actual state	One of the possible states above.	

Operations:

Operation	Comment
General operations	See clause C.3.2.
Get possible states	This might return a list such as "active, idle, off".
Get actual state	This might return a value such as "busy".
Get association with accessory	This might return a value such as "handsfree attached".
Synchronize with accessory	This would activate a synchronization process.

C.4.8 Time

Users are likely to want a sub-profile to be activated or deactivated at a certain time. Users can define time in different ways and name it so that it can easily be referred to. It could be useful if a time schedule that is the complement to another time schedule could automatically be made available for use in rules.

Example: a user defines "work time" as Monday to Friday 8.00 to 17.00. She sets "spare time" to be the rest of the week hours. "spare time" is automatically made the complement to work time. When the user redefines "work time", the PUA will, knowing that "spare time" is the complement to "work time", ask the user to confirm that "spare time" should also be automatically modified.

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	
Association to regional settings		
Start time		See ISO 8601 [10].
End time		See ISO 8601 [10].
Duration	Values: • Always • Interval • Until • After • According to a schedule • One single time (or date)	One single time (or date): for example the user defines a profile that can be active once (but used several times). An example of that is when Ellen has to use a fixed phone owned by her friend George but lets the phone call be identified as Ellen's UCI. Immediately after Ellen hangs up, George's phone reactivates the profile that was active before the call.
Synchronization data		The PUA calendar tool can be synchronized with an external calendar.

Operations:

Operation	Comment
General operations	See clause C.3.2
Make complementary time	It can be useful to set a time schedule automatically as a complement to another time schedule (see example at the beginning of this clause).
Synchronize with an external calendar	This would activate a synchronization process.

C.4.9 Service

The user may refer to services in the rules. The user can define settings for services. The PUA profile manager contains a predefined set of services, which can be updated automatically and the user can also add new services.

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	
Service type	Service code	The internal representation is a service code, but the users prefers names describing the services, such as: • Voice call • Email • Voice mail • IP telephony • Videoconference • Accessibility service, e.g. the possibility to listen to written messages
Preferred media type		A media type refers to one form of presenting information to a user, e.g. voice or fax.
QoS (quality of service) attributes		Can be used for service negotiation between PUAs.
Other attributes that are service dependent		

C.4.10 Accessory

An accessory is something that can be used together with a terminal to offer the user more features, in addition to those the user has when using the terminal separately.

A PUA could subscribe to events from accessories (each accessory will have a specific list of events that can be subscribed to). Events generated by accessories could prove to be a useful indicator of the location of a user and could be used to help activate appropriate sub-profiles (e.g. "attach" events from desktop chargers could be used to identify when users arrive at their desks and could be used to activate an "office" sub-profile).

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	
Accessory type	Values (examples): • Accessibility accessories For a mobile phone: • Desktop charger • Cordless Bluetooth headset • Portable handsfree • Vehicle handsfree • Infrared modem	
List of events		The user can associate rules with events such as state changes and the PUA can subscribe to the state changes. What the events and states are, will depend on the accessory.
State information		State information of the accessory can be used when defining rules. The state information may depend on the accessory and network.
Related to which terminal(s)		Indicates which terminals the accessory may be associated with
Related to which service(s)		Indicates which services the accessory may be associated with
Other attributes that are accessory dependent		

Operations:

Operation	Comment
General operations	
Subscribe to event (event type)	The parameter "event type" is one of the events offered in the specific accessory's event list.
Unsubscribe to event (event type)	The parameter "event type" is one of the events offered in the specific accessory's event list.
Get state information	Get state information of the accessory can be used when defining rules.

C.4.11 Group

The user may want to address a group of persons when creating a profile. It is possible to group different objects such as address book records, terminals such as fix phone, mobile, services, and activities. It is possible to separately add users in one group to another group or add a group in a group to create a hierarchy by nesting groups inside group. The PUA profile manager could offer some predefined groups to help the user take advantage of the concept, but of course, the user would have to add members to the groups. Examples of predefined groups are family, friends, colleagues, customers/business, club and association. White list is a concept that could include all records in the address book, and could be used for filtering incoming communication so that only persons in the address book are allowed access to the UCI user.

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	
Group type		Group type depends on the type of the members in the group.
List of group members	Values (example of their types): • Phone book record • Terminal (fix phone, mobile…) • Accessory • Service • Place/activity • Group • etc.	Groups can be nested.

Operations:

Operation	Comment
General operations	See clause C.3.2
Add a new member to a group	Users should get a list of objects and rules referring to a group so that they may think of the consequences of the modification.
Copy a member	Users should get a list of objects and rules referring to the group so that they may think of the consequences of the modification.
Paste a member	
Delete a member from a group	Users should get a list of objects and rules referring to the group to allow them to decide what action to take to avoid dangling references.

C.4.12 Network

Users may define in which order their terminal will select a network during automatic network selection, when the home network is not within range.

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	The user will probably not be able to choose a name, but will have to use the default network name.
Network type	Values (examples): • IP • POTS • ISDN • ATM • GSM • GPRS • UMTS • etc.	
Operator		
Priority		

Operations:

Operation	Comment
(add new)	Users are unlikely to be provided with the ability to manipulate the operations in parenthesis. Only the PUA should provide the user with information about which networks are available.
View	
(Modify)	
(Copy)	
(Paste)	
(Delete)	
set priority	

C.4.13 Log

Each user can choose what should be logged and how it should be displayed (e.g. what objects, what activities, or more complex combinations of these).

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	
Object to log	The object and a range of its attributes	Example objects are given in the table below.
Sorting order	• Increasing order • Decreasing order	Sorting order depending on selected attributes.
Alert	• SMS • A special ring tone • Ring tone combined with a voice message	It is possible to define Alert, which means that the user will be informed when a special event occurs. The user defines how to be informed for example by an SMS, a special ring tone or ring tone combined with a voice message.

Object	Attributes
Call info:	• Dialled Numbers/ persons • Answered calls • Missed calls
Activation of PUA profiles	• Profile name • Trigger for activation
Deactivation of PUA profiles	• Profile name • Trigger for deactivation
Rules applied	• Rule name • Trigger for application
Email	• Sender • Subject • Date • Priority • State • Size • Unread

Operations:

Operation	Comment
General operations	See clause C.3.2.
Choose version	E.g. long log, short log, restricted columns.
Define sorting order	
Define log filter	
View historical log data	
View real time log data	
Search	
Reset log	
Define what will trigger an alarm	E.g. if the number of rejected communications exceeds 2 per day.
Define alarm notification mechanism	E.g. a special ring tone or an SMS.

C.4.14 Personal settings

PUA profiles contain many settings for personalizing users' communications. Most of the settings in this present document refer to these communications settings. There are also settings for personalizing PUA access. Some of these settings can be predefined and/or in templates.

Some personal settings are more or less permanent and are preferably defined in a base-profile. Other personal settings are more suited to a certain situation and it might be relevant to define those settings in the sub-profile corresponding to that kind of situation.

Some of the settings for defining the behaviour when editing profiles might correspond to settings within those profiles, such as:

- accessibility;
- localization preferences (e.g. preferred language);
- terminals. The user might define terminals for using PUA profiles that could also be used for managing their PUA;
- authentication information.

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	
Identification information		Information about the user such as name, alias, organization (e.g. private, company, club). Some of this information can be given to other people.
Share identification information	Values (per identification attribute): • Yes • No	The user can decide which identification information can be shared with other users.
Regional settings		See clause C.4.15.
Personalization settings		Such as sounds, alerts, ring signals etc.
User management, Security and authentication settings		See clause C.4.18.
Mood		See clause C.4.16.
Accessibility settings		See clause C.4.17.
Contact info		See clauses C.4.7, C.4.9 and C.4.17.
Preferred contact method (PrefC)	An enumerated string. Values: • CALL • SMS • MMS • IM • EMAIL	Users define their preferred contact method. It is useful to share this information with other persons wanting to contact them. The preferred contact method could be used for negotiation of contact method between the two PUA's. The "Preferred contact method" (PrefC) are described in the Wireless Village initiative, Presence attributes [11].

C.4.15 Regional settings

Users might define one set of regional settings corresponding to where they live or spend most of their time. Users might also find it useful to have alternative regional settings, which can be addressed in PUA profiles used when travelling abroad.

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1.	
Language preference for personal communication		Defines languages preferences in desired priority order used for informing other persons about preferred language. Useful for vocal communication or sending messages. See ISO 639-2 [14] for standard language codes.
Language preference for network communication		Defines languages preferences in desired priority order used for presenting network and communication information.
Number attributes	• Decimal symbol • Digit grouping symbol	E.g. whether "." or "," is used for a decimal point.
Currency		Used for billing and tariff information.
Time		The format used for expressing times e.g. 12 h or 24 h clock.
Time zone		Offset of the local time from the UTC expressed in format defined by ISO 8601 [10] in basic format.
Date		The format used for expressing dates e.g. the order of day, month and year.

C.4.16 Mood

Some users (e.g. younger people) might want to define their mood and communicate it to other users. Moods may also be referred to in PUA profiles and rules.

Attributes:

Attribute	Description	Comment/Standard
General attributes	see clause C.3.1.	
Mood	Enumerated string. Values: • Happy • Sad • Angry • Jealous • Ashamed • Invincible • In Love • Sleepy • Bored • Excited • Anxious	These moods are described in the Wireless Village initiative, Presence attributes [11]. The moods mentioned here are predefined. The internal format is a code and the value is displayed in the user's preferred language. It might also be useful with user-defined moods. The disadvantage with user defined moods is that they will have to be passed to the other person as a string and cannot thus be presented in another language.
Share mood info	Values: • Yes • No	The user can decide whether or not to communicate the mood to other persons. The users can always use it for their own purposes in PUA profiles and rules.

Operations:

Operation	Comment
General operations	
Select mood	
Select "Share mood info"	The user can decide whether or not to communicate the mood to other persons.

C.4.17 Accessibility

Features of the UCI can be used to improve communications both for people with various functional impairments (e.g. people with different disabilities and elderly people) and also for very young people. The following two areas offer possibilities for improving accessibility:

- the additional information field of the UCI;
- accessibility settings and attributes in the PUA user profile.

This clause focuses on accessibility settings in the PUA user profile which can be used for defining:

- keyboard;
- sound;
- display;
- mouse;
- settings for connecting alternative input devices.

Some example attributes are shown in the tables below. These are described in the CEN Workshop Agreement CWA 13987-1 [12]. This agreement is not an official standard developed by CEN National Members, but provides useful examples and might possibly serve as input for further work on UCI and accessibility.

The accessibility related issues covered in the CEN Workshop Agreement are:

- keyboard: Large keys required;
- keyboard: Auto repeat function to be omitted;
- infra-red link to assistive technology required;
- manual wheelchair;
- motorised wheelchair;
- wheelchair not specified.

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	
Symbols		The accessibility object can be specified according to the attributes within EN1332-4 [13] and according to the UCI user's needs and readiness to indicate them. According to the standard there are an unlimited number of attributes that can be specified, but those currently specified are shown below.
Character size		
Screen colour		
Colour avoidance		
Position of screen		
Voice output		
Sound amplification		
High frequency amplification		
Low frequency amplification		
Input requirements		
Touch screen		
Position of input device		
Time-outs		
Language		
Interface complexity level		

Attributes, Special needs code:

Attribute	Value
Hearing	• no special needs • mild • medium • severe • totally deaf
Sight	• no special needs • mild • medium • severe • totally blind
Sight Colour RG	• no special needs • mild • medium • severe
Sight Colour BY	• no special needs • mild • medium • severe
Reduced Intellectual Processing	• no special needs • mild • medium • severe
Reduced Short Memory	• no special needs • mild • medium • severe
Dyslexic Reading	• no special needs • mild • medium • severe

C.4.18 Management of other user's PUAs

This functionality is targeted at PUA administrators managing other people's PUA profiles e.g. corporate PUA administrators or parents managing their children's PUA profiles. Normal users managing their own PUA profiles do not in general need user management. In general, private individuals manage PUA profiles for themselves and corporate PUA administrators manage PUA profiles for many people.

This functionality can be seen as an extension to normal PUA profile management and includes:

- management of multiple users and their PUA profiles;
- log management for multiple users;
- security including privileges and authentication;
- template operations.

Attributes:

Attribute	Description	Comment/Standard
General attributes	See clause C.3.1	
General PUA profile attributes		
Access privileges		The PUA administrator can define different access privileges for different kinds of users. Access privileges can be applied to operations e.g. add, delete, remove templates/attributes. This can be useful for parents wanting to reduce what the child can modify in the PUA profiles. It is also useful in corporate PUAs. Access privileges can be applied to read attributes. The user can decide how much information should be available for search. It is possible to define different read accessibility depending on different groups/categories, e.g. increased access for people who are in the user's address book. Users should be able to decide if their UCI information is available or not for commercial use.
E-signature settings.		
Authentication		The authentication attributes can only be set by a person with the highest privileges (e.g. the corporate PUA administrator or the PUA provider for a personal PUA). The following may be defined: • Lockout, to prevent password attacks by limiting the number of password failures permitted within a period of time. • Password strength. • Password expiration, defines how often passwords must be changed as well as who may change them.

Annex D (informative): Bibliography

- Interview: Ben Shneiderman and Allison Druin, Author: Elizabeth Dykstra-Erickson, Pages: 59 - 65, interactions, Volume 7, Issue 2 March-April 2000, ACM Press New York, NY, USA.
- "Technics and Civilization"; Lewis Mumford; (June 1984) Peter Smith Pub; ISBN: 0844661155.
- Sullivan, Louis H. The tall office building artistically considered. Lippincott's Magazine, March 1896.
- Marcus, Aaron. "Metaphors and user interfaces in the 21st Century"; p7 - 10, interactions, Volume 9, Issue 2, March 2002, ACM Press New York, NY, USA.
- van Hardeveld, J.W. and Mierop, J.R. 1988 "The basic dialogue for ISDN services" 12th International Symposium on Human Factors in Telecommunications, The Hague.

History

Document history			
V1.1.1	August 2003	Membership Approval Procedure	MV 20031024: 2003-08-26 to 2003-10-24