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Human Factors (HF);
Guidelines for procedures and announcements
in Stored Voice Services (SVS) and
Universal Personal Telecommunication (UPT)

ETSI

Contents

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Foreword

This ETSI Technical Report (ETR) has been produced by the Human Factors (HF) Technical Committee of the European Telecommunications Standards Institute (ETSI).

ETRs are informative documents resulting from ETSI studies which are not appropriate for European Telecommunication Standard (ETS) or Interim European Telecommunication Standard (I-ETS) status. An ETR may be used to publish material which is either of an informative nature, or which is immature and not yet suitable for formal adoption as an ETS or I-ETS.

Introduction

In 1993, ETR 131 [1] reported an investigation into the need for standardization in the area of stored voice services and made a number of recommendations for future work. Two of these are included in the scope of this ETR - guidelines for user procedures and dialogue in stored voice services, and guidelines for the preparation of introductory user procedures and voice announcements for use in stored voice services. As a similar requirement was identified for UPT service in ETR 198 [2], and because the UPT user interface is a particular example of a stored voice service, the guidelines were extended to include UPT.

The purpose of preparing this ETR was to collect relevant recommendations from many sources into one document to facilitate their common application to all services in telecommunications including those employing an interactive dialogue, where announcements, feedback and instructions about user control actions are given in verbal form.

This ETR draws on the ISO/IEC standard [3] and guidelines from other sources, including ETSI [4 - 8, 19, 22, 24 and 25], the Voice Messaging User Interface Forum (VMUIF) [9], France Télécom [10], KPN Research (formerly Netherlands PTT Research) [11], ITU-T [12 - 17, 23], the IEC [21], the Nordic Committee on Disability [26], and includes some original material from the Centre for Communications Interface Research (CCIR) at the University of Edinburgh [18 and 27], whose recommendations are supported by empirical research.

The scope of this ETR is extended beyond that of ETR 096 [6], which was aimed at achieving consistency across a number of core functions within phone-based interfaces using DTMF input, and it contains additional material not included in the ISO/IEC standard [3], which specifically addresses the standardization of a user interface to voice messaging services (although it makes it clear that the standard may be applied to other interactive voice-response services).

It is intended that these recommendations are generic in nature, for application to general, service-unrelated aspects of a stored voice service. In this way service developers are free to exploit any means available to make their service better in terms of content and navigation, as for example by the use of dedicated controls or keys, speech recognition, dedicated terminals or the use of instructions issued to the user. These guidelines are directed towards access to services, general common operating commands and ways of getting out of, or terminating, a service. This may be best understood by reference to the model shown in figure 1.

Generic Service Commands	Service Access Procedures
	Service dependent content: **e.g. independent customized use of** **voice annoucments and** **service specific use of keys**
	Service Exit Procedures
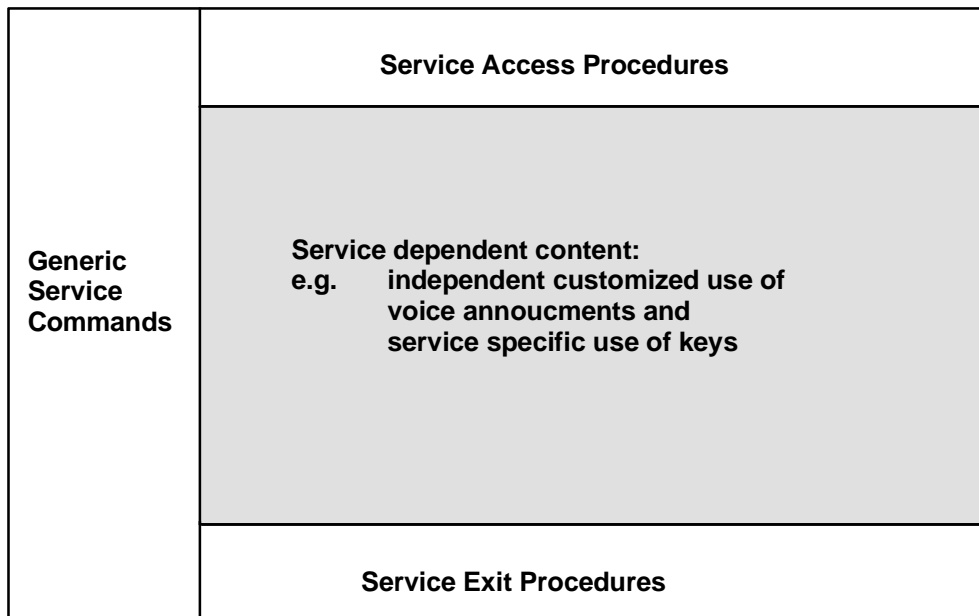
Figure 1: Model illustrating the area of application of these guidelines

The intended users of this ETR include:

Table 1: Intended users and potential benefits

	User	ETR used for	Potential Benefit
1	Manufacturers, Network Operators, and other developers and providers of SVS and/or UPT services	Development and qualification of user control procedures and announcements for SVS/UPT	Increased usability through harmonized and supportive procedures
2	User groups concerned with SVS and UPT services	To identify problems within SVS/UPT user control procedures and announcements	Increased awareness by user groups of user requirements for SVS and UPT Service
3	ETSI Technical Committees	Development of SVS and UPT standards	Improved usability of services by ensuring consideration of user needs

1 Scope

This ETR provides guidelines for the user interface to all interactive stored voice services.

The guidelines provide a set of generic user control commands for access and control of these services. They also address the structure and production of voice announcements (prompts and feedback), the use of tones, and the provision of visually displayed text equivalents of the voice announcements.

The guidelines do not provide the user control commands, the content of voice announcements or the use of tones that are specific to any particular stored voice or UPT service.

The guidelines apply to:
- all interactive stored voice services controlled by user commands consisting of the ten digits 0-9 and the two symbols ∗ (star) and # (square), employing DTMF, pulse or digital signalling;
- the user interface for the access and control of the UPT service;
- public or private network-based supplementary services in the case where they are controlled by an interactive dialogue.

The guidelines do not apply to:
- stored voice services controlled by voice commands;
- supplementary services where they are controlled by command dialogues.

2 References

This ETR incorporates by dated and undated reference, provisions from other publications. These references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETR only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1]   ETR 131 (1994): "Terminal Equipment (TE); An investigation into the need for standardization in the area of stored voice services".

[2]   ETR 198 (1995): "Human Factors (HF); User trials of user control procedures for Integrated Services Digital Network (ISDN) videotelephony".

[3]   ISO/IEC 13714 (1995): "Information Technology - User Interface to Telephone-based Services - Voice Messaging Applications".

[4]   ETR 116 (1994): "Human Factors (HF); Human factors guidelines for ISDN Terminal equipment design".

[5]   ETR 095 (1993): "Human Factors (HF); Guide for usability evaluations of telecommunications systems and services".

[6]   ETR 096 (1993): "Human Factors (HF); Phone Based Interfaces (PBI) Human factors guidelines for the design of minimum phone based user interface to computer services".

[7]   ETS 300 738: "Human Factors (HF); Minimum man-machine interface (MMI) to public network based supplementary services".

[8]   ETS 300 640: "Human Factors (HF); Assignment of alphabetic letters to digits on standard telephone keypad arrays".

[9]   Voice Messaging User Interface Forum (VMUIF) (1990): "Specification document" Cedar Knolls, NJ: Probe Research.

[10]   France Telecom (1991): "User-friendly recommendations for voice services designers".

[11]   KPN Research (formerly Netherlands PTT Research) (1994): "Ergonomics recommendations for interactive voice response services".

[12]   ITU-T Recommendation E.161: "Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network".

[13]   ITU-T Recommendation E.182: "Application of tones and recorded announcements in telephone services".

[14]   ITU-T Recommendation E.183: "Guiding principles for telephone announcements".

[15]   ITU-T Recommendation I.210: "Principles of telecommunication services supported by an ISDN and the means to describe them".

[16]   ITU-T Draft Recommendation F.902: "Interactive services design guidelines".

[17]   ITU-T G.115: "Mean active speech level for announcements and speech synthesis systems".

[18]   CCIR (1995): Dialogues 2000. Experiment Series Report No.1: "Tones in Automated Telephone Services". University of Edinburgh, UK.

[19]   ETS 300 375 (1994): "Human Factors (HF); Pictograms for point-to-point videotelephony".

[20]   ETR 070 (1993): "Human Factors (HF); The Multiple Index Approach (MIA) for the evaluation of pictograms".

[21]   IEC 417, including Supplement M (1994): "Graphical symbols for use on equipment".

[22]   ETR 170: "Human Factors (HF); Generic user control procedures for telecommunication terminals and services".

[23]   ITU-T Recommendation E.121: "Pictograms and symbols to assist users of the telephone service".

[24]   ETR 029 (1991): "Human Factors (HF); Access to telecommunications for people with special needs Recommendations for improving and adapting telecommunication terminals and services for people with impairments".

[25]   ETR 166 (1995): "Human Factors (HF); Evaluation of telephones for people with special needs; An evaluation method".

[26]   The Nordic Committee on Disability (1995): "Telephones for all". The Danish Centre for Technical Aids for Rehabilitation and Education, Taastrup, Denmark.

[27]   CCIR (1996): Dialogues 2000. Experiment Series Report No.3: "Attitudes to voices". University of Edinburgh, UK.

[28]   Bellcore SR-INS-002461 (December 1992): "Customer premises equipment compatibility considerations for the analogue display services interface".

[29]   ITU-T Recommendation E.180: "Technical Characteristics of tones for the telephone service".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of this ETR, the following definitions apply:

announcement (also referred to as **voice announcement**): An audible indication in the form of speech (see ITU-T Recommendation E.182 [13]), utilized for information, instructions and guidance in a stored voice service.

command dialogue: A dialogue format which enables a user to control a service by entering a complete sequence of digits and symbols that includes the full information necessary to execute a service function. A command dialogue does not provide any help or guidance during the entry of a command. This dialogue format requires the user to know the syntax of the commands as a prerequisite for the use of the service. (See also *Interactive dialogue.*)

control menu: A menu of control functions provided in Type B SVS services and accessible from any state in the system. This menu is presented when the user presses the star (∗) key in any context other than the control menu itself. (See table 4, subclause 5.5.2.13.)

data string: A sequence of digits, with or without separators or delimiters, used for data entry via a telephone keypad.

delimiter: A term used to describe a specific user input or an automatic service action intended to signify the end of a sequence or string of data. An example of a manual user input is the use of the square (#) to define the end of a sequence of digits entered into a variable length data entry field. An example of an automatic delimiter is a service's use of a time-out to define the end of user inputs.

dialogue: A series of exchanges between the user and a system. It is two-way, and takes place across the man-machine interface. It may be Command or Interactive (see the appropriate definitions). Phases in a dialogue may be identified for descriptive purposes, such as connection and access, authentication and security (optional), control and navigation through the system, exchange of information, and closing or exit from the system.

feedback: Information with respect to the state of the system (terminal, network, or service) that is provided to a user in response to their previous control action. Feedback includes confirmation indications, error indications and status information, as well as implicit or explicit guidance information that further control action may, or may not, be required. (See also Prompts and ITU-T Recommendation F.902 [16].)

interactive dialogue: A dialogue format which enables a user to control a service by following step by step the indications (prompts) given by the service. No prior knowledge of the service or its command syntax is required for the user to use the service. Each time the user reaches a new service state or stays idle, the service prompts for the next user actions. (See also Command Dialogue.)

Man-Machine Interface (MMI): The interface through which a user communicates with a telecommunications terminal or via a telecommunications terminal to a telecommunications service provider. The communication is bi-directional and includes the information presented to the user before a control action, the control actions initiated by the user and the information presented to the user after a control action.

menu: A menu offers a user a list of choices from which a selection can be made. A menu dialogue offers a user a series of lists of choices from which a series of selections can be made. The result from any one selection may be another menu.

message: Verbal or other auditory data recorded by users of a service. Messages may be recorded by callers, subscribers, or system administrators.

network operator: The entity which provides the telecommunications network offering connection to the service provider. For the purposes of this ETR there may be one or more network operators between a user and a service provider, and the term may also include any telecommunications infrastructure providers.

prompts: Information presented to a user that a specific service state is current and that a control action is expected in order for the service state to be changed. Within stored voice services the prompts are auditory outputs from the service providing instructions or guidance to the users. Prompts consist of voice announcements and/or tones, and their text equivalents for visual display.

service provider: The entity which provides one or more services to a user. A network operator may also be the service provider.

stored voice service: A telecommunication service that involves the use of stored voice announcements and messages. Such a service may employ general announcements which are for information and guidance only, or be part of an interactive dialogue with the user.

subscriber: The person who (or organization which) has made arrangements with a network operator to have connection with a telecommunications network and who (which) may make arrangements with a service provider for the provision of services via that network.

supplementary service: An additional service that modifies or supplements a basic telecommunication service. Consequently it cannot be offered to a customer as a stand-alone service; it must be offered in association with a basic telecommunications service. The same supplementary service may be common to a number of telecommunications services. (See ITU-T Recommendation I.210 [15].)

tone: An audible indication comprising a small number of discrete frequencies, but excluding speech (see ITU-T Recommendation E.182 [13]). Examples are dial tone or special announcement tone.

Universal Personal Telecommunication (UPT): Access to telecommunications services while allowing personal mobility. It enables each UPT user to participate in a user-defined set of subscribed services and to initiate and receive calls on the basis of a personal, network-transparent, UPT number across multiple networks on any fixed or mobile terminal, irrespective of geographical location, limited only by terminal and network capabilities and restrictions imposed by the network operator.

user: The person who uses a telecommunications terminal to gain access and control of a telecommunications service. The user may or may not be the person who subscribes to the provision of the service. Also, the user may or may not be a person with an impairment, e.g. elderly or disabled persons.

user interface: Another term for the Man-Machine Interface.

user procedure: A sequence of user control actions and equipment display indications specifically developed to enable completion of a user's task or sub-task.

visually displayed announcement: The text equivalent of a recorded (voice) announcement presented on a visual display.

3.2   Symbols

For the purposes of this ETR, the following symbols apply:

∗   The star on the standard telephone keypad arrays, see ITU-T Recommendation E.161 [12]. Also known as the asterisk.

The square on the standard telephone keypad arrays, see ITU-T Recommendation E.161 [12]. Also known as the hash, number, or sharp sign (or pound sign in the USA).

3.3 Abbreviations

For the purposes of this ETR, the following abbreviations apply:

ADSI	Analogue Display Services Interface
BTL	British Telecom Laboratories
CCIR	Centre for Communications Interface Research (University of Edinburgh)
CCITT	Consultative Committee for International Telegraphy and Telephony
CD	Compact Disk
CLI	Calling Line Identification
DTMF	Dual Tone Multi-frequency
GSM	Global System for Mobile Communications
HF	Human Factors
IEC	International Electrotechnical Commission
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ITU-T	International Telecommunications Union - Telecommunication Standardization Sector (formerly CCITT)
KPN	Koninklÿke PTT Nederland
PBI	Phone Based Interface
PIN	Personal Identity Number
PSTN	Public Switched Telephone Network
PTT	Post Telegraph and Telecommunication
PUI	Personal User Identity
SIM	Subscriber Identification Module
SVS	Stored Voice Service
UPT	Universal Personal Telecommunication
VMUIF	Voice Mail User Interface Forum

4 What is a Stored Voice Service?

4.1 Definition

The broadest definition of the term is a telecommunication service that involves the use of stored (i.e. recorded) voice announcements. For the purposes of this guideline document, the term includes any service that employs recorded voice announcements and prompts that may be introductory in character relating to a particular service, for information and guidance about a service, or form part of an interactive dialogue with the user.

4.2 Classification of Stored Voice Services

Stored voice services (SVS) were defined and classified in ETR 131 [1], based on a taxonomy developed by ISO/IEC [3], which identified types of stored voice service, but dealt primarily with voice messaging applications. This classification is reproduced in figure 2.

```
                          ┌──────────────────────────┐
                          │  Telephone based services │
                          └──────────────────────────┘
                                       │
        ┌──────────────────────────────┼──────────────────────────────┐
   ┌─────────────┐              ┌──────────────────┐            ┌─────────────┐
   │ Transaction │              │ Stored voice     │            │ Messaging   │
   └─────────────┘              │ services         │            └─────────────┘
                                └──────────────────┘             Facsimile
                                       │                         Paging
                                       │                         Text
                                       │                         Tele for deaf
```

Access	Messaging	Transaction	Data base Access
Auto operator Dir. Enquiry UPT		Bank by phone Benefits Reservations Service registrations Share trading Transcription services Trouble reporting	Info entry / Info retrieval

Info entry
Form filling
Register of interests
Voting

Info retrieval
Account status
Case status
Puzzle clues
Financial info
Health
Movie info
News
Sport
Share price
Train times
Weather

Messaging:
Voice Mail | Call answering | Voice Message Delivery | Voice bulletin board

Figure 2: Classification of Stored Voice Services (from ETR 131 [1])

Stored voice services within the scope of this ETR are illustrated in figure 2 and include:

- Access Services, such as automated attendant and customer services, information and directory assistance;
- Messaging Services, such as voice mail, voice message delivery and voice bulletin boards;
- Transaction Services such as home banking, home shopping, and automated reservations; and
- Data-base and Information-retrieval Services, such as account status, weather forecasts, transport schedules and news.

For the purposes of this classification, UPT may be considered as an example of an Access Service. Some of these services may be by subscription or membership with a restricted access, where typically the dialogue will entail identification and authentication procedures, while others are free or public access services. Both types of service are covered by recommendations in the guidelines.

Following the recommendation from ETR 131 [1], and for the purposes of these guidelines, recommendations are made in this report which are applicable to a number of services beyond voice messaging. This is for two reasons. Firstly, to improve the commonality in operating procedures for access and control of such services to allow the user to move freely from service to service without having to re-learn basic operating procedures, and secondly, to harmonize the way that announcements are presented to the users to ensure rapid understanding of service content and instructions, as well as the information the user is trying to obtain. Both of these contribute to the usability of such services.

Access to and control of the UPT service can be offered to the subscriber through a stored voice service. Because of the personal mobility the UPT service offers, it may be supported by a network itself within a series of networks, each offering a variety of local services, which makes announcements especially significant and raises issues of language and navigation. The need for identification and authentication procedures for these features is critical for security, so that the user has a particular requirement to understand announcements in his own language. The UPT user interface can therefore be considered as a particularly interesting example of a stored voice service.

4.3 Comparison of command dialogue and interactive dialogue

When a service requires input from a user in order to meet his expectations there are two ways of achieving it, via either a command dialogue or an interactive dialogue.

In a command dialogue the user knows the way he is supposed to enter the required data, and enters a command that includes all the necessary information without any prompt or interaction with the service. As long as an incorrect command is not entered, there is no guidance whatsoever by the service.

EXAMPLE: For a wake up call at 7.30 am on the telephone number 9605 1709, a command dialogue format may be:

User input	**Dial ∗55∗96051709∗0730#**
SVS response	*"Company X Alarm Service, at 7.30 am you will be called back on telephone number 9605 1709"*

There would be no response from the service until it receives the square (#) signalling the end of the data string. In particular, there would be no help if the user stayed idle in the middle of the string. (NB: The sequence ∗55 is the usual prefix and supplementary service code for setting an alarm call; and the star ∗ is used as a separator between digit strings, see ETS 300 738 [7]).

In an interactive dialogue the user can use the service without any prerequisite knowledge, as the interactive dialogue guides him through all the steps. Each time the user reaches a new state or stays idle, the system explains what is expected from him. When a service function requires several items of information, the dialogue prompts the user to enter them one at a time as opposed to his having to enter them all in a single sequence or string.

EXAMPLE: Using an interactive format, the alarm service dialogue may be:

User input	**Dial ∗55**
SVS response	*"Company X Alarm Service, Please enter the phone number where you want to be called back followed by the square"*
User input	**96051709#**
SVS response	*"Enter the time when you want to be called and terminate by the square"*
User input	**0730#**
SVS response	*"Thank you, at 7.30 am you will be called back on telephone number 9605 1709"*
NOTE: SVS responses can take the form of announcements and/or tones.	

In this case, the user would also be assisted with an announcement if he remained idle in the middle of numeric data entry.

An interactive dialogue may also offer the possibility for the user to override the guidance and to enter all the required data in only one string. This means that any service that can be offered by a command dialogue can also be offered by an interactive dialogue in a more usable way.

Command dialogues are often used for public network based supplementary services (see ETS 300 738 [7]). The user picks up the phone, and enters a command that includes the service code or feature of the service he wants to access and all the information needed to achieve it. However, these same services could also be offered through an interactive dialogue: e.g. the user may call a specific phone number, he may then choose from one or several menus the features of the services he wants to achieve, and then the dialogue would ask for all the required data, one step at a time.

The choice of dialogue type (command or interactive) depends on the service and the tasks the user is expecting to carry out. If the service only offers a single option, such as time of day, a command dialogue is appropriate. When a variety of options is available, such as in banking services which offer a selection of services, including identification of account, amount of payment, payment date, etc., an interactive dialogue is to be preferred. Any service, including UPT, where authentication and personal identity need to be input by the user and verified by the system, will also require an interactive dialogue.

This ETR provides recommendations on the user procedures for stored voice services using interactive dialogues only. User procedures for stored voice services using command dialogue are outside the scope of this ETR, but see ETS 300 738 [7] for supplementary service dialogues. In general, the recommendations offered for voice announcements apply equally to interactive or command dialogues.

4.4 Complexity of SVS dialogues - classification of stored voice services

The structure of stored voice services may differ widely in its complexity. Some services are comparatively simple, offering limited choices which may be presented in a linear form for data entry into given fields, or in a single menu having few choices, and without branches to sub-menus. These may be referred to as Type A services. An example of a Type A service is a minimum banking application, described in subclause 6.1.

Other services, which offer a number of menus, each with many choices and descending to sub-menus are referred to as Type B services. An example of a Type B service is given for a possible UPT service in subclause 6.2. Voice mail services are generally of Type B.

4.4.1 Definition of a Type A stored voice service (SVS)

Type A stored voice services are simple services which comprise either:

- a single menu, with a maximum of 4 unrelated (or 6 related) choices and up to 4 general functions, e.g. Repeat, Language, Disconnect and Help; or
- a single linear sequence of data entry fields, e.g. Calling Card Number, Personal Identity Number, Directory Number; or
- a single linear sequence of skip and scan choices, e.g. Bank Accounts A - L; or
- a single menu, with some selections leading to either a single linear sequence of data entry fields and/or a skip and scan sequence.

4.4.2 Definition of a Type B stored voice service

Type B stored voice services are complex services which comprise either:

- a hierarchy of 2 or more levels of menus, with 3 or more choices per menu; and/or
- which have a requirement for access to a set of common (or short-cut) functions, in addition to the general functions, Top Menu, Language, Disconnect and Help, at all levels of the dialogue; and/or
- which include linear sequences of data entry fields or skip and scan lists as the result of menu selections.

5 Guidelines

This clause starts with some general human factors principles for user interface design (see subclause 5.1). It then follows the logical path of a service designer who defines a dialogue in a number of steps, going from its general structure towards the precise definition of each prompt, as below:

- the general structure of a dialogue, see subclause 5.2;
- moving around the dialogue, see subclause 5.4;
- particular parts of a dialogue, see subclause 5.4;
- generic user controls, see subclause 5.5;
- the structure and format of announcements, see subclause 5.6;
- the use of tones, see subclause 5.7;
- the use of visual displays, see subclause 5.8.

5.1 General SVS design principles

5.1.1 Human factors principles for interface design

General user requirements applying to all telecommunications services are discussed in some detail in ETR 116 [4], and a number of more specific requirements have been identified for UPT service in ETR 198 [2], which may be applied also to stored voice services.

Services need to be usable and the concept of usability and its assessment is addressed later (subclause 5.1.6) and in ETR 095 [5] and ETR 166 [25] The components of usability include learnability and satisfaction, implying the user's requirement to be able to appreciate the need for the service, be able to understand how to use it and be able to use it in a speedy and error-free manner. On completion of use of a service, the user should feel that it has been satisfying and have confidence in the outcome.

Where security is an integral part of a service, users should be confident that the privacy and security of any data they input to the service cannot be accessed by unauthorized users, and that any such data is not stored or otherwise left unprotected in the user interface when they have finished.

User control procedures should comply with the simple rule "indicate-control-indicate". This rule summarizes the human factors principle that users require information on the state of a service or system and its control (e.g. instructions, prompts, etc.) to be available before they execute a control action; and for further information (e.g. feedback, additional prompts, error cues, etc.) to be given after a control action about the changed state of the service or system (see also subclause 5.3.1).

Users require to be able to correct errors, especially self-detected errors, without detriment to the service being used or causing any loss of previously entered data. Users should never feel it necessary to hang up and start again.

Users require as little load on their memory as possible. They should not be expected to learn lengthy, unstructured numeric or alphanumeric command strings. However, services should be designed to be flexible enough to allow users to utilize already learned sequences, without interruption.

An important feature of telecommunications services is their availability for all users, including those who are elderly or disabled. This may entail attention to the attributes of a number of impairments - for the hearing impaired by provision of loudness control; for the memory impaired with respect to the memory load, e.g. control sequences, menu design, response times and, where a visual display is provided, for the needs of the visually impaired. Physically disabled users may need special input devices and procedures. Response times have to be consistent with the needs of the whole range of users. (See also ETR 029 [24], ETR 166 [25] and "Telephones for All" [26].

Information presented to the user, whether in menu form or as announcements, should be comprehensible to the target user group, jargon free, concise and consistent with user expectations and stereotypes.

5.1.2 Ease of learning

To encourage rapid learning, the system should not violate user expectations, but build on his past experience with similar services, in terms of the commands used to access the service, the terminology and announcements used and the dialogue structure.

5.1.3 User control

The system should be designed so that the user controls the pace of the dialogue, and does not feel pressurized by the announcements and prompts. This can arise as much through the intonation, rhythm, speed and choice of the words spoken in announcements, as through the speed of the system's responses and the rate at which the dialogue progresses from one point to another.

5.1.4 Consistency and reliability

The dialogue should be designed to be externally consistent with similar services at least from the same provider, and internally, within itself, including the use of terms for functions, text style, and key assignments.

The system should be reliable, so that each time it is used system reactions do not change, and robust, so that no amount of abusive input will change the system.

5.1.5 Feedback redundancy

In general, it is better for the user to have too much feedback rather than too little. In most cases it is better to give feedback on one action as well as a prompt for the next. These may be integrated into one announcement. Giving the feedback to the previous action may be sufficient to confirm to a user they need to return to the previous service state. Giving only the prompts to the next actions may simply lead the user on into parts of the dialogue that do not address their current task.

Where the opportunity arises, redundant feedback should be provided by employing more than one medium e.g. audio and visual. If additional feedback is provided, ensure consistency is maintained between media, in terminology, commands and procedures (see subclause 5.8).

5.1.6 User guidance material

Printed material about the service should be provided for user guidance.

The material should explain the purpose of the service, describe the necessary user procedures required for each user task the service supports and include an overview of the whole dialogue, e.g. a route map of all menus. The printed material should always be consistent with the service dialogue and announcements in terms of terminology, controls and procedures.

A prompt card may be offered to remind users of a set of essential commands and available short-cuts.

5.1.7 Usability testing

It is important that stored voice services should be tested for usability, in near final or prototype form, using a sample of users representative of the target group, and preferably using different terminals. The testing should cover the terminology, the commands, the announcements, the time-outs, the response times and the user guidance materials.

The usability of a service will have a great influence on its usage and efficiency in terms of the utilization of network and service time. Measures of usability are commonly of two kinds:

- performance measures, which are "objective" measures or observations of user behaviour and are focused on task performance, i.e. how well the user can achieve a specific task;
- attitude measures, which are "subjective" measures or observations of the users opinion of working with the system, i.e. how well they like to use the system.

For a full explanation of the concepts and preferred methods for usability testing, refer to ETR 095 [5], and ETR 166 [25] for usability issues relating to people with special needs.

5.2 Guidelines on the structure of a dialogue

The first step for a service designer is to define the general structure of a dialogue. This section provides guidelines on how to organize a dialogue.

The dialogue may start with a procedure for access to the service (see subclause 5.2.2) and/or a language selection (see subclause 5.2.3).

Once these preliminary steps are achieved, the dialogue guides the user through simple tasks to obtain the desired end-result. The dialogue design and structure depends on the complexity of the service. A dialogue will present typically an audio menu offering a number of choices; the result should be the feature or service selected, but may be another list of choices. The list of possible choices within a service should

be established, and sorted into a hierarchical or tree structure, containing a limited number of menus (see subclauses 5.2.4, 5.2.5 and 5.2.6).

A general rule to keep in mind when designing the structure of the dialogue is that the more defaults are used, the simpler it may be to the user (see subclause 5.2.1).

5.2.1 Use of defaults

The service should collect information from all available sources other than the user in order to prompt the user for as little information as possible and thus minimize the number of manual input operations to be performed.

EXAMPLE 1: When the service needs the number of the phone the user is currently using, it should use Calling Line Identification (CLI) when available.

EXAMPLE 2: When the user is prompted to enter a date, if he is likely to enter the date of the current day, the service should provide the user with a simple command to choose the default "today" while offering at the same time the possibility of entering any other date.

EXAMPLE 3: When the service can deduce the language of the user from his personal user identity (PUI), it should do so and not prompt for this information from the user.

5.2.2 Access to the service: identification - authentication

When access to a service is restricted to a limited number of users, the use of a PUI and/or PIN (Personal Identification Number) and/or any other type of authentication data may be necessary.

Whenever possible, the service should use the network information (e.g. CLI) or any other source of information in order to identify the user without his having to enter his PUI (see subclause 5.2.1).

When this default identification is thought to be safe enough to be also used as an authentication, it should be used.

EXAMPLE: A user who calls his voice mail system from his GSM phone may access directly to the listen menu upon dialling the phone number of his voice mail; his identity (CLI) is provided by the GSM network, and the PIN required to access the GSM network (with the SIM card) may be considered as appropriately secure authentication.

When a default identification based on CLI is used, an alternative way of identification may also be offered so that users other than the access owner may access their services from this telephone.

EXAMPLE: When the CLI is used to direct each subscriber directly to his mailbox, there should be a way for a subscriber who calls from another subscriber's phone to access his own mailbox.

5.2.3 Multiple languages

When a service is offered in a multilingual environment the announcements should be available in each of the supported languages.

Within very simple dialogues or isolated dialogue parts (e.g. at the caller's invitation to leave a message as part of a Messaging Service), the service may offer the whole dialogue or dialogue part using all the possible languages for each announcement.

Within other dialogues, it is more appropriate to use only one language and to provide a facility for language selection.

Where a service will only be accessed by a subscriber, the preferred language can be selected at subscription for each subscriber.

Where a service may be accessed by users with differing preferred languages, language selection should be made by one of the following means whenever possible and if the data is considered as accurate enough:

- the service selects a default language according to information obtained from the network (e.g. CLI; language passed over by a pay phone; phone number that has been dialled to connect with the service);

- the service requires the user to identify himself and from this data it deduces the user language (e.g. from a calling card number). Entering identification before selecting language requires either the use of multilingual announcements for the identification procedure or of a standard special tone to let the user know the system is ready to receive the PUI (see subclause 5.7.2);

- the dialogue selects the most often used language as a default.

In all these cases of automatic language selection, the user should be able to modify the selected default language.

When none of these default selections are possible, or are not considered reliable, the dialogue should offer to the user, as the first step, the different choices (see subclauses 5.4.3 and 5.5.2.7) and the dialogue should not move on until a choice has been made.

5.2.4 Menu hierarchy or Tree structure

A menu hierarchy or tree structure refers to the way SVS service related functions and choices can be collected into menus and sub-menus and presented as a branching hierarchy.

The number of levels in the hierarchy or tree structure should be kept as low as possible; preferably less than 4 levels.

The most often used functions should be accessible in the higher levels of the tree structure.

The functions that are logically related should be close to each other in the hierarchy.

EXAMPLE: The choice of the phone number at which the user wants to be notified on the receipt of new messages should be close to the choice to activate or deactivate the notification upon the receipt of a new message.

5.2.5 Menus

A menu should not contain more than a maximum of four unrelated context dependent choices. These do not include the generic commands (help, go back one step, go to main menu, etc.) which are not considered as context dependent.

The number of choices may be increased to six when the different choices are specifically related (e.g. different types of fruit).

When the number of unrelated choices exceeds four, the menu should be split into several sub-menus.

When the number of related choices exceeds six, the skip and scan function should be used (see subclause 5.2.6).

It may sometimes be faster to play directly a short information announcement that indicates the state of a variable (e.g. the number of messages in a mailbox) than to add a prompt in a menu inviting the user to enter a command in order to get information about this variable.

EXAMPLE: The structure "You have 3 new messages. To listen to your messages, press 1, or to send a message press 2" should be used instead of the structure "To listen to your messages, press 1, to know the number of new messages press 2, or to send a message press 3".

Items in a menu should have the same logical relationship to each other and to the previous menu.

5.2.6   Skip and scan

Skip and scan is a technique to allow a user to select rapidly one item from a lengthy list of related items, i.e. more than the recommended limit of 6 in any menu. The user is prompted to use two or three dedicated controls, one to select the correct item and one to skip to the next item in the list and perhaps one to skip back to a previous item. The list is then presented one item at a time without the need to define further which key to press.

EXAMPLE:

Menu:	Skip and scan:
Select a fruit:	To select a fruit, press # or to skip forward press 3, to skip back, press 1
For apples, press 1	apples
For bananas, press 2	bananas
For cherries, press 3	cherries
For grapes, press 4	grapes
For kiwi fruit, press 5	kiwi fruit
For lemons, press 6	lemons
For limes, press 7.	limes
	oranges
	peaches
	pears
	etc.

When the service has to present to the user a fixed list of seven or more related items (e.g. a list of all possible bank accounts for a banking service) it should be done through a skip and scan structure in preference to a menu (see subclause 5.2.5).

A skip and scan structure may also be used when the service has to present to the user a variable length list of related items (e.g. the list of messages received in a mailbox).

5.3   General principles on user control over a dialogue

Once the general dialogue structure is defined (see subclause 5.2), the service designer should define what the user will be able to do in order to navigate through the tree structure (user procedures) and how the service will manage errors from the user.

The current clause focuses on these topics. Guidelines for the control of specific steps of the dialogue (access, data entry, disconnect, etc.) are listed in subclause 5.4.

5.3.1   User control procedures

User control procedures are procedures performed by a user to complete a specific task or sub-task. Within stored voice services they will normally consist of pressing key sequences using the standard 12 key keypad in response to prompt and feedback announcements from the service.

User control procedures should always follow the general rule:

Indicate - Control - Indicate

Where each control action follows from an indication from the stored voice service, such as a tone (e.g. dial tone) or voice prompt, and is then itself followed by a feedback indication about the changed state of the system (see also ETR 170 [22]).

When this sequence is combined with the necessary wait states within a service the sequence becomes:

Wait - Control - Indicate (feedback) - Indicate (prompt) - Wait

The implication is that there are two components to any indication or announcement used to progress the dialogue. One part is a feedback of the results of the user's previous control action and the other part is a prompt to the next control action required.

5.3.2 Interruptible and non-interruptible announcements - cut-through

An announcement is said to be non-interruptible when no command from the user is taken into account until the announcement is fully played.

An announcement is said to be interruptible if all the commands that are valid at the end of the announcement are also taken into account while it is being played.

When a valid command is entered during an interruptible announcement, the announcement should be interrupted and the system should go to the same state as if the command had been entered at the end of the announcement, a facility known as "cut-through".

In order to allow the user to "cut-through" the dialogue, all the announcements should be interruptible except those containing information about which the user has to be aware.

The only items of information that the user must be aware of are:

a) announcements explaining to the user he is not in the state he expected. This can occur in two instances:
   - the user makes a mistake and the system has to inform him that it cannot react positively to the user input (e.g. access to the mailbox N is not possible, since mailbox N does not exist, or, the date entered does not correspond to a possible day of the year);
   - the system is not able to provide the user with the usual sequence of events: for instance, when the user requests an action that the system is temporarily unable to achieve (e.g. record a message when the system is full; check a balance when the link to the database is down).
b) confirmation announcement of actions leading to a change in the system (e.g. a message is sent, a greeting message has been changed, a reservation has been taken into account).

Any announcement that does not fall into one or other of these two categories should be interruptible.

Announcements that fall into the second category (confirmation of actions leading to a change), may be interruptible when the action is very commonly used and the service designer does not want to slow down the user too much.

EXAMPLE: In the listen menu of a voice mail system, if the erase command is the most often used after a message has been played, the announcement confirming erasure may be interruptible.

A non-interruptible announcement should be as short as possible. It only has to explain what is taking place; more details about what can be done next can be given in an interruptible message coming after this non-interruptible announcement.

5.3.3 Dial-ahead

Cut-through allows the user to short-cut one system state by invoking a command before the end of an interruptible announcement. Dial-ahead allows the user to enter a command available from one state before the system is in that state.

NOTE: The user can then enter ahead of time several commands in a sequence. All the commands are memorized in the system which treats them one at a time. When a system has a very short response time, it goes into the next step as soon as a command is entered and dialling-ahead has the same effect as cutting-through.

When a sequence of commands is entered by the user, the system should keep track of them and when the sequence makes sense, the system should bring the user directly to the corresponding state.

EXAMPLE: A UPT user who wants to make an outgoing call (out-call) needs to enter his PUI and PIN, select the feature "out-call" and enter the number. The user should be able to dial all the digits and delimiters necessary for this command as a single string. This would also allow the use of a pre-programmed DTMF device.

When the sequence leads to a state where a non-interruptible announcement has to be played (see subclause 5.3.2), any subsequent command entered during the period after the entry of the command that led to that state and before the non-interruptible announcement is fully played should be ignored.

5.3.4   System response times

In all situations, including where dial-ahead or cut-through is used, the time from when the system receives the last user input to the beginning of the corresponding announcement should be less than 1 second. If the response time is likely to be longer than this, the system should present a holding announcement within 1 second.

To accommodate the needs of users who cannot press a key and listen to the communication at the same time (e.g. users of telephone handsets with a keypad built-in), the minimum delay from the receipt of a user input to the audible start of the corresponding system response should be of the order of 500 ms.

If a valid user input is made while an interruptible announcement is being played, the announcement should be interrupted immediately so that the user understands his command has been taken into account.

System response times should always be tested during usability assessment, using different types of terminal.

5.3.5   Press of an invalid key

When a key is pressed that is not attached to any particular function in a given system state (i.e. all the keys during non-interruptible announcements and the keys that have no function during an interruptible announcement), it can be processed in either one of two ways:

a)   the system responds as if no key had been pressed at all;

b)   an error announcement (see subclause 5.3.6) is played explaining that a wrong key has been pressed, and then the system repeats from the beginning the announcement corresponding to the current state.

Only one of these two rules should apply to a whole dialogue, so that once the user understands the principle of invalid key management, it stays consistent.

NOTE 1:   When rule a) is chosen, it has the following effects:

-       when a sequence of commands including an invalid key is dialled ahead, the invalid key is going to be discarded with no feedback to the user and all the ensuing commands may be misinterpreted;
-       when the user enters an invalid key and immediately realizes his mistake, he will be able to press a correct key at once, without having to wait for the system to notify him about something he already knows. In the case where the user does not himself realize the mistake, he will understand he pressed a wrong key because the announcement being played is not interrupted.

NOTE 2:   When rule b) is chosen, it has the following effects:

-       when a sequence of commands including an invalid key is dialled-ahead, the invalid key is going to be discarded and a non-interruptible error announcement will be played. Any key pressed after this invalid key and before the end of the error announcement will be discarded. This reduces the chances of chain errors due to misinterpretation of the subsequent keys;
-       when the user enters an invalid key and immediately realizes his mistake, he will have to wait for the end of the error announcement before he can press the correct key. This puts constraints on an experienced user who may notice his

mistake at the same time as the system and would not need any error announcement.

5.3.6 Error management

Services should be error tolerant and try to prevent errors. When the system detects an error from the user, it should play a context sensitive error announcement:

- an error announcement should include a statement of the nature of the error;
- an error announcement may be preceded by an error tone (see subclause 5.7.1).

To make sure the user acknowledges the error, an error announcement should be non-interruptible. This error announcement should be short and followed by a more detailed interruptible announcement that explains the current state and the available commands. This current state is the state the user was in when he made the mistake. More supportive announcements may be used on second and subsequent errors made in the same context. (See subclause 5.3.2).

After a number of consecutive errors or total errors, to be determined by the service designer, including periods of no input from the user (i.e. time-outs, see subclause 5.3.7), the system may take some special action such as disconnecting the user or connecting him to an operator. An announcement should be provided to inform the user that such action will occur.

5.3.7 Time-outs

A time-out occurs when a user is idle and gives no input for a pre-determined period of time.

A time-out may occur in the following system states:

a)   the user stays idle after being prompted to provide some voice input (see subclause 5.4.9);
b)   the user stays idle after having provided some voice input (see subclause 5.4.9);
c)   the user stays idle after being prompted to dial a number (see subclause 5.4.7);
d)   the user stays idle in the middle of a numeric data entry, i.e. inter-key time-out (see subclause 5.4.7);
e)   the user stays idle after completing the input of a numeric data (see subclause 5.4.7);
f)   the user stays idle after being asked to select a choice from a menu.

The length for a time-out should be service state-dependent. For instance, the time-out after a data entry has been completed in case e) may be shorter than the inter-key time-out in case d).

Time-outs may range from 2,0 to 8,0 seconds. For new services it is desirable to investigate the proposed time-out values during user trials of a prototype (see subclause 5.1.6).

When the system prompts a user for an input, if a time-out occurs a help announcement should be played (see subclause 5.3.11). The time-out after the help announcement may be longer than the one after the initial prompt since the user hesitation indicates that he needs time to enter his command.

After some service-determined number of consecutive time-outs, the system may take some special action (e.g. disconnecting or connecting to an operator), after informing the user that such action will occur.

5.3.7.1 Change of state after time-out

As a general rule, a time-out should not change the system state, because it may make it difficult for the user to understand his current state.

In the case where a time-out does change the state, it should be made clear to the user. These cases include:

- when a time-out is considered as a default command (e.g. delimiter for a voice or numeric input delimiter);
- when an action like disconnecting or connecting to a human operator is taken after multiple time-outs.

5.3.8 User control of irreversible actions - confirm/undo

Each time an action is going to change the system in an irreversible way (e.g. stored data is going to be erased, a message is going to be sent, the greeting message is going to be replaced, the reservation is going to be taken into account), the system should ask for confirmation from the user.

As long as the confirmation command has not been entered, the user should be able to discontinue the on-going operation by invoking a cancel or go-back-one function. This function should be available at each state of the dialogue, except while a non-interruptible announcement is being played (see subclause 5.3.2).

EXAMPLE 1: Invoking the "cancel" function after having entered a few digits in data entry leads to discarding all the digits and to re-prompting the user to enter his data.

EXAMPLE 2: Invoking the "cancel" function during voice input leads to erasing the message being recorded and the user is re-prompted to enter his voice input.

EXAMPLE 3: When the user invokes the "go back one step" command at one layer of the tree structure, the system brings him to the state that lies at the previous level.

As soon as the confirmation command has been entered, the action is taken into account and the user cannot go back unless the service offers this option. To make sure the user is aware of the consequences of his command, a non-interruptible message may be played (see subclause 5.3.2).

The confirmation step may be skipped in order to simplify frequently used commands.

EXAMPLE 4: When most users erase their messages after reviewing them, the command to erase the current message may be a single key to be pressed during its review.

In such cases, the service needs to ensure that the user understands that his action is irreversible, either by an unambiguous prompt, or by stressing this fact in the documentation.

When the user hangs up before he has explicitly confirmed the on-going operation, that operation should be cancelled.

An exception may be while recording a message (see subclause 5.4.9):

- in order to stay consistent with habits learned through the use of an answering machine, a message recorded in telephone answering mode should be taken into account even if the user hangs up while recording;
- any other message (e.g. greeting) may or may not be taken into account if the user hangs up before explicitly confirming his recording.

5.3.9 Feedback

Feedback should always be given in the following cases:

- after entry of complex data (e.g. dates, times, names, account number) to confirm the data entered;
- after stored data has been changed (e.g. a message has been erased, a password has been changed, a mail order has been recorded, a money transfer has been taken into account, a mailbox has been created). In these cases, a non-interruptible announcement may be considered if the command is not frequently used and the change has important consequences (see subclause 5.3.2)

When the user navigates through the menu hierarchy or tree structure, feedback should be used in order to inform the user of the state corresponding to the command just used.

A descriptive name should be attached to each menu, and in cases where it may not be obvious to the user he has reached this menu, the corresponding name should be played.

The use of feedback announcements may not be necessary when an operation coming after a command makes it clear that the command has been taken into account.

EXAMPLE: When a correct password is entered, getting access to the service makes it obvious to the user that his password has been accepted, there is no need for an announcement like "Your password is correct".

In numeric data entry, feedback should not be given after each digit (unless there is a visual display). Security sensitive data (e.g. PIN) should not be played back to the user.

5.3.10   Navigation facilities

When the menu hierarchy is complex as in Type B services (see subclause 4.3.2), the service should provide a command to enable the user to return easily to the main menu.

The service may provide short cuts through the tree structure.

EXAMPLE 1:   In a voice mail system, there may be a command which can be invoked at any time in order to access the listen menu from anywhere in the dialogue. With this feature, there would be no need to come back to the main menu, and then select the appropriate path to reach the listen menu.

NOTE: Service designers should be aware of the fact that short cuts complicate the user's model of navigation through the tree. If immediately after using a short cut, the user invokes the go-back-one function, it may be interpreted as either "I want to go back to the state from which I invoked the short cut command", or "From where I am now, I want to go one level up".

When the step following the current step can be anticipated by the user, the service should provide him with a skip-ahead command that allows him to reach that step immediately.

EXAMPLE 2:   In a voice mail system, the next step after a greeting message is always to record a message. Invoking the skip ahead function should lead directly to the record tone.

EXAMPLE 3:   When the user is prompted to input numeric data or to choose the default value, invoking the skip ahead function should skip the data entry process and take the default value as entry.

EXAMPLE 4:   When a user is reviewing a list of items (e.g. phones numbers, messages), invoking the skip ahead function should bring him to the next item.

5.3.11   Help function

A help announcement should be available at any point of the dialogue. This announcement should be context-dependent and should include one or more of the following:

-        a reminder of the action which just brought the user into the current state;
-        a description of the user's current state;
-        a detailed list of the actions available to the user in that state;
-        a detailed list of the additional generic actions available to the user.

The help announcement should be played each time a time-out occurs after the user has been prompted for an input (see subclause 5.3.7).

The user should be able to invoke the help announcement by a command (see subclause 5.5.2.6), except when:

-        a non-interruptible message is being played;
-        the command used to invoke the help function is used by another function (e.g. data entry in Type A services).

When providing help, the system should not change state; the user is in exactly the same state as before he invoked help or before the time-out occurred. This means that all the commands available before the help announcement was called should be available while it is played so that when a valid command is entered, the system should behave exactly as if it had been entered before the help announcement. There

should be no notion of "help state" to the user, help is only a more detailed announcement explaining the current user's state.

Help on generic commands may be given as help at the main menu or when the user requests help during a help announcement. The dial-ahead facility may also be explained at that time.

5.3.12 Repeat function

The service may provide a repeat function to enable the user to replay the current announcement or message without having to wait for the time-out.

5.3.13 Pause function

The service may provide a pause/suspend function to enable the user to halt the dialogue in its current state. In this case a "resume the dialogue" command should also be provided.

While in pause, an announcement should be played regularly reminding the user of the "resume dialogue" command.

The system should not leave the pause mode and offer a default follow-on until the user enters the command "resume dialogue". This is consistent with the rule "change of state after time-out" (see subclause 5.3.7.1).

5.4 Guidelines on user procedures for specific steps of a dialogue

This subclause focuses on what the user should be able to do in particular steps of a dialogue.

5.4.1 Procedure for connecting to a service

Connection to an interactive service may be activated either by simply picking up the phone (if the network operator felt it was useful to provide such an easy connection to the service) or by dialling a phone number from any public and/or private network. In the second case, the interactive service takes over at call pickup.

5.4.2 Procedure for accessing the service

The data that need to be entered to access a service with restricted access is described in subclause 5.2.2.

When the access procedure requires the entering of a PUI and a PIN, security may be increased by interpreting the two inputs together instead of testing the validity of the PUI first and then of the PIN. When an error is detected (invalid PUI or PIN not corresponding to the PUI), the feedback to the user explains that the data is not valid without pointing out which number is wrong, and then the user should be prompted to start again with his PUI. This would prevent a possible unauthorized user from discovering valid PUIs.

The different forms for numeric data entry should follow the guidelines listed in subclause 5.4.7.

> NOTE: Since access to a service may require entering long strings of digits, respecting the "dial-ahead" recommendation (see subclause 5.3.3) is particularly important. This would allow the use of pre-programmed DTMF devices to send all the required data in one string.

5.4.3 Procedure for selecting language

When a service offers multilingual announcements, if the language selection is not made by the user as a preliminary step of the dialogue (see subclause 5.2.3), it should be made possible for him to access this feature at any time by invoking a command "language selection".

Language selection by the user (proposed as a preliminary procedure or after the command "language selection" has been invoked) may be performed by prompting him with a series of announcement prompts

in each of the available language choices, each describing the user action required to select that language.

EXAMPLE: For instructions in English, press 1,
Pour les instructions en français, faites le 2,
Para instrucciones en español, marque el 3.

5.4.4 Procedure for entering sequences of inputs

When an operation requires a sequence of choices or inputs from the user (e.g. a reservation for a telephone conference requires the choice of the date, the start time, the finish time, and the number of participants), the following guidelines apply:

- each input should be checked immediately by the system in order to inform the user about a possible error as soon as possible, rather than at the end of the sequence only;
- explicit confirmation should not be asked of the user after each input. It is enough to provide feedback to the user about the input he just made, moving directly to the next item, while leaving him the possibility to modify the input;
- the user should be able easily to modify one of his inputs without having to cancel the whole sequence and go through it all over again;
- a summary of the whole sequence should be presented at the end and explicit confirmation should then be asked before the sequence is activated.

5.4.5 Procedure for selecting a choice from a menu

When the user is presented with a list of choices in a menu with six items or less (see subclause 5.2.5), a single key press is enough to indicate his choice and no delimiter should be required.

The order of menu items should reflect the frequency of use, unless another "natural" order exists, e.g. alphabetic, logical.

The users should not be prompted for features to which they do not subscribe, or which are not available.

Generic functions such as "help" or "go back to the main menu" should not be presented to the user in the list of menu items, unless there is a time-out or the user explicitly asks for more information (see subclause 5.3.7).

5.4.6 Procedure for the skip and scan function

When the service offers the skip and scan function (see subclause 5.2.6), the user should be able to invoke a command to "go to the previous item", "go to the next item", and "select" the particular item he wants to deal with.

At any time, the user should be able to exit the skip and scan mode by invoking the "go back one step" command.

5.4.7 Numeric data entry

Numeric data entries include: a PUI, a name coded with the letters on the keypad, a date, an account number or a telephone number.

At any time during numeric data entry the user should be able to cancel the entry and start again.

A time-out or an explicit command from the user can be used as a delimiter to a numeric data entry. The choice between those two options may depend on the following criteria:

a) when the entry can be a data string of variable length, a delimiter should be used when the same string can be either a valid complete string or only the beginning of another valid string;

EXAMPLE 1: For a time entry, 200 can be either 2:00 am or the beginning of the string 2000 for 8:00 pm.

b)   when the entry is of fixed length a delimiter may or may not be required;

c)   when the system prompts the user for a sequence of entries, a delimiter should be used in order to prevent chain errors (see subclause 5.4.4);

d)   the use of a delimiter should be consistent throughout the service. When several entries require a delimiter it may be useful to require a delimiter even for data of fixed length. This would keep the user from wondering each time whether a delimiter is needed or not.

When a numeric data entry does not require a delimiter, entering the usual command for the delimiter at the end of the entry should have no other effect than replacing the time-out. This would keep the user from ending up in an unexpected state when he invokes this command out of habit.

When the user stays idle before the entry is complete (e.g. at least one digit or a delimiter is missing), the system should assume that the user needs more information about the entry and a help announcement should then be played (see subclause 5.3.7) explaining his current state and what he can do to complete or cancel his entry.

The expected format of a numeric data entry should be clearly stated when the user is being prompted to enter his data.

EXAMPLE 2:   In banking transactions the decimal point may be omitted by multiplying by 100, e.g. £15.35 becomes 1535.

The format of numeric data entries that depends on the culture (e.g. time, date) should be presented for each type of user accordingly to his culture.

EXAMPLE 3:   For 8:00 pm, a user calling a service targeted at North Americans should be able to enter his time as 8:00 pm, whereas a user calling a service targeted at Europeans should be able to enter 2000.

5.4.8   Alphabetic data entry

Alphabetic letters are not universally available on telephones keypads, so that it is not desirable to employ them, either for fully spelled words, or for abbreviations and mnemonics. Their use may give rise to misleading, ambiguous or badly adapted word choices, especially when translated into other languages.

The difficulties of using alphabets assigned to keypads for alphabetic data entry are too great to recommend this form of data entry, unless a specialized terminal is available with an alphanumeric keyboard. See also prETS 300 640 [8].

5.4.9   Voice input

The use of speech recognition systems (such as voice dialling) is beyond the scope of this ETR.

When the user needs to enter voice input (e.g. to record the message to be delivered, to record his name or a greeting), he should have control over the start of the recording. This recommendation does not apply in telephone answering mode where the user is presented with a recording tone without having to press any key.

A recording tone should be used to notify the user that the system is ready to take his voice input (see subclause 5.7.3). This tone should be non-interruptible. After the tone, the system may use voice detection to trigger the recording.

The user should be able to delimit his recording by a dedicated key, but in any case a time-out should be used to detect the end of recording

Verbal pauses in the recorded speech that are shorter than the time-out may or may not be erased from the message.

After recording, the user should be able to review, confirm, or erase and re-record the message. As an option, the user may also be able to resume recording from where he stopped.

When the user hangs up during a recording, the message may or may be not be retained (see subclause 5.3.8).

5.4.10 User forced disconnect - navigation through nested services

Some services may be seen as "access services" where one of the features is to provide a connection through the network (e.g. UPT, calling card services). When such services provide the feature "follow on calls", a user can make one phone call, terminate the call and then make another phone call without having to go through the identification/authentication procedure each time.

In order to use this feature, when a user connects through an "access service" to another stored voice service (e.g. a user calls his mailbox from the outgoing call option in a UPT service), the user should be able to disconnect from that service without having to hang up. This "forced disconnect" option may be invoked at any time by a dedicated command from the user.

> NOTE: This facility is particularly important because there is no simple way for the "access service" to forcibly disconnect from the service to which it is connected. This means that a "follow on calls" feature can be used only if this other service offers the "forced disconnect" feature.

5.4.11 System disconnect

When the system decides to terminate the call (e.g. the time dedicated to the current call has elapsed, the user has made too many errors, the system is not able to provide the service because the link to a database is broken), an announcement should explain to the user the reason for the disconnect and the way the actions being processed are going to be dealt with.

5.5 Guidelines on commands attached to common user controls

In the previous sections, guidelines were presented for application to procedures that users require to control the dialogue. This section provides guidelines on how to command these functions by using a keypad with 12 keys (0 to 9, star (∗) and square (#)).

The section starts with general principles relating to commands, and then describes the preferred key allocation for the two types of services, Type A and Type B, as defined in subclause 4.4.

5.5.1 General principles for commands

5.5.1.1 Introduction

Input to SVS systems is usually by key presses using the 12 key telephone keypad. The inputs may be made manually or may be sent from a dialling device which emits the appropriate DTMF frequencies, or from a repertory dialler or other memory based dialling facility.

> NOTE: Some terminals might have keypads without the star and square keys. Use of SVS services by these restricted keypad and also rotary dial terminals are outside the scope of this ETR.
>
> Input may also be by voice, but guidance on voice recognition systems is outside the scope of this ETR; some general guidance can be found in ETR 116 [4].

From a user perspective, commands should be simple and easy to memorize, be consistent with other services and relate directly to the telephone interface, with the constraints imposed by any particular telephone terminal, e.g. with or without a display.

5.5.1.2 Simplicity of commands

Commands should be as simple as possible. Pressing a single key once to invoke a command should be preferred to any other form.

5.5.1.3 Use of double key presses

Commands should not be invoked by a "quick" double press of the same key, because of the possible errors introduced by unintentional double-keying, the effect on slow, inexperienced users and possible implications on time-outs.

5.5.1.4 Consistency between functions

One function (e.g. delimiting voice input, invoking help) should be attached to the same key throughout the whole dialogue.

Similar functions should be assigned to the same key in order to make it easier for the user to understand the role of each key.

EXAMPLE: "Cancel" and "Go-back-one-step" should be assigned to the same key, whereas "Confirm", "Skip ahead", "Delimit" should be assigned to another key.

5.5.1.5 Consistency over duration of a dialogue

The key associated with a particular action should not vary over the whole duration of a dialogue.

EXAMPLE: If, at one point of the dialogue in a menu the key 1 is associated with action 1, key 2 with action 2 and key 3 is associated with action 3, action 3 should never be moved to key 2 even if during the dialogue it turns out that action 2 is no longer available.

5.5.1.6 Keypad convention

A convention exists that the keys in the right hand column of the keypad should be reserved for functions associated with progressive and positive steps (next item in a list; skip forward 10 seconds within the current message; confirm) and the keys in the left column should be reserved for functions associated with regression or negative steps (previous item in a list; skip backward 10 seconds within the current message; go back one step).

This convention should be adopted to maintain consistency with the ISO/IEC standard [3], many existing dialogues in SVS, and in audio products (e.g. CD players, tape recorders).

5.5.2 Key allocation

This subclause defines the preferred key allocation for both types of SVS identified and defined in subclause 4.4.

5.5.2.1 Cancel/Go back one step

The "cancel" and "go back one step" functions should be invoked by the star key (∗) (see subclause 5.3.8). In Type A services this key should be available at all times. In Type B services this key should be available at all times from within the control menu.

5.5.2.2 Confirm

The "confirm" function should be invoked by the square key (#), (see subclause 5.3.8). There is no difference between Type A and B services.

5.5.2.3 Control menu (Go to)

The "go to control menu" function provided in Type B services should be invoked by the star key (∗). This function is not required in Type A services.

5.5.2.4 Delimiter

The "delimiter" functions should be invoked by the square key (#), (see subclauses 5.4.7 and 5.4.9). There is no difference between Type A and B services.

5.5.2.5 Forced disconnect

The "forced disconnect" function should be invoked by the nine key (9), (see subclause 5.4.10). In Type A services this key should be available at all times, except when this key is used another purpose (e.g. numeric data entry). In Type B services this key should be available at all times from within the control menu.

5.5.2.6 Help

The "help" function should be invoked by the zero key (0), (see subclause 5.3.11). In Type A services this key should be available at all times, except during numeric data entry. In Type B services this key should be available at all times from within the control menu.

5.5.2.7 Language selection menu (Go to)

The "go to language selection menu" function should be invoked by the eight key (8), (see subclause 5.4.3). In Type A services this key should be available at least at the first step of the dialogue. In Type B services this key should be available at all times from within the control menu.

5.5.2.8 Main menu (Go to)

The "go to main menu" function should be invoked by the seven key (7), (see subclause 5.3.10). In Type A services this function should not be required. In Type B services this key should be available at all times from within the control menu.

5.5.2.9 Menus

In menus, the different choices should be assigned to consecutive keys starting from 1. In Type A services the menu choices are restricted to the keys 1-6, but may be extended by the skip and scan technique. In Type B services menu choices can be assigned to the keys 0-9, but the service designer should also consider the recommendation limiting the total number of items in any one menu to four or six (see subclauses 5.2.4 and 5.2.5). The service designer should restrict the use of keys 7, 8, 9 and exceptionally 0 where the rule on consistency over the duration of a dialogue (subclause 5.5.1.5) has precluded the use of the keys 1-6.

5.5.2.10 Repeat menu

No specific key allocation is recommended for a "repeat menu" function. For both Type A and Type B services if a key is chosen for this command, it should be either 2, 5 or 8 to stay consistent with the keypad convention (see subclause 5.5.1.6).

5.5.2.11 Skip ahead

The "skip ahead" function should be invoked by the square key (#), (see subclause 5.3.10). There is no difference between Type A and B services.

5.5.2.12 Skip and scan

No specific key allocation is recommended for the "skip and scan" functions, but the keypad convention requires that a key in the right hand column should be used as a "go-to-next-item" command (e.g. key 9). Therefore, a key in the same row but in the left hand column should be used as a "go-to-previous-item" command (e.g. key 7). There is no difference between Type A and B services.

5.5.2.13 Yes and no

No specific key allocation is recommended for the "yes and no" functions, but the keypad convention requires that a key in the right hand column should be used as a "Yes" command (e.g. key 3). Therefore, a key in the same row but in the left hand column should be used as a "No" command (e.g. key 1). There is no difference between Type A and B services.

5.5.2.14 Summary of recommended key allocations

A summary of the preferred key allocations to Type A and B services are given in tables 2, 3 and 4 below.

Table 2: Key Allocation in Type A Services

Key	Recommended Control Function
1	Menu selection (note), Data entry
2	Menu selection (note), Data entry
3	Menu selection (note), Data entry
4	Menu selection (note), Data entry
5	Menu selection (note), Data entry
6	Menu selection (note), Data entry
7	Menu selection (note), Data entry
8	Go to Change Language Menu, Data entry
9	Forced Disconnect, Data entry
0	Help, Data entry
∗	Cancel data entry, Go back one step
#	Delimit data field, Confirm, Skip ahead
NOTE:	In general, keys 1 and 4 should be assigned to regressive functions, keys 2 and 5 to status quo functions, and keys 3 and 6 to progressive functions.

Table 3: Key Allocation in Type B Services

Key	Recommended Control Function
1	Menu selection (note 1), Data entry
2	Menu selection (note 1), Data entry
3	Menu selection (note 1), Data entry
4	Menu selection (note 1), Data entry
5	Menu selection (note 1), Data entry
6	Menu selection (note 1), Data entry
7	Menu selection (notes 1, 2), Data entry
8	Menu selection(notes 1, 2), Data entry
9	Menu selection(notes 1, 2), Data entry
0	Menu selection(notes 1, 2), Data entry
∗	Go to Control Menu
#	Delimit data field, Confirm, Skip ahead
NOTE 1:	In general, keys 1,4 and 7 should be assigned to regressive functions, keys 2, 5, 8 and 0 to status quo functions, and keys 3,6, and 9 to progressive functions.
NOTE 2:	Use rarely, the maximum number of items in any one menu should take account of the recommendations in subclauses 5.2.5 and 5.4.5.

Table 4: Key Allocation for a Control Menu in Type B Services

Key	Recommended Control Function
1	Unassigned (note)
2	Unassigned (note)
3	Unassigned (note)
4	Unassigned (note)
5	Unassigned (note)
6	Unassigned (note)
7	Go to Top Level Menu
8	Go to Change Language Menu
9	Forced Disconnect
0	Help
∗	Cancel data entry, Go back one step
#	Exit Control Menu and return to previous state
NOTE:	Unassigned key functions in the Control Menu may be assigned by the service provider to additional service specific functions which should be available to the user at all points of the dialogue, e.g. generic short-cuts.

5.6 Recommendations for announcements used in SVS

Output from SVS systems may be by voice or tones. The former is commonly used for welcome, introductory announcements and instructions, feedback, prompts and requests from the system to the user. Tones are sometimes used for simple feedback relating to input functions, or system detected errors. Music may be an output from a system used to fill in waiting time or as part of introductory material. The guidelines referring to the output or response side of SVS systems may also be applied to such systems which use voice recognition for input.

5.6.1 General

Voice announcements are prepared from recorded voice, using a number of techniques, and provided as output and feedback from a system. These guidelines recommend how to construct such an announcement, and the form and content of the announcements. No specific service announcements are recommended in this ETR, as this is the prerogative of the service supplier, but some may be given as examples.

Correct use of language is very important, as spoken information is transitory and sequential, unless repeated.

Texts that have been pre-recorded should be used in preference to artificially simulated speech.

It is desirable to use the same speaker to record all the announcements required within a service. Mixing different recorded speakers should be avoided unless there are specific benefits to help structure the information being presented, e.g. in large audio information systems.

For preference, possible future announcement needs within a service should be anticipated, and future parts of the dialogue should if possible be recorded by the same speaker.

5.6.2 Speaker

Selecting a speaker to record the voice announcements required for a SVS requires careful consideration. There are "technical" reasons why one voice will be preferred to another. For example, the speaker's pitch and pronunciation, their control of loudness, intonation, rhythm and speed. There may also be "marketing" reasons, e.g. the service company's image, reported customer preferences, the projected service's image.

Whatever other characteristics, the speaker recording the announcements should:

-    speak clearly, be assertive and agreeable;
-    articulate well, be able to modulate the voice;
-    not speak too slowly or quickly, be able to control speed and intonation;
-    not have a natural voice pitch at the extremes, i.e. too high or too low;
-    be practised at microphone speech.

In addition to the above considerations the choice of gender of the chosen speaker can also depend on the service topic. There is evidence from work at CCIR [27] that users prefer a female voice for announcements in SVS.

5.6.3   Recordings

The perceived quality of the stored voice service is directly related to the quality of the recorded announcements. To maximize the quality, the following points should be observed:

-    ensure the speed (words per minute) is acceptable for high levels of comprehension, for example in spoken English the normal rate is 150-200 words per minute. (ITU-T Recommendations E.182 [13] and E.183 [14]);
-    adjust the rhythm and intonation of each announcement to reflect the service context;
-    ensure the bandwidth of the recording is suitable for the minimum level of expected audio transmission e.g. 300 - 3 400 Hz if available within the PSTN;
-    minimize frequency distortion and extraneous noises;
-    ensure the recording of the text is faultless.

When compiling the recordings into the final dialogue, make careful use of absolute silence, e.g. when the user is waiting for a system response. Be aware that periods of "silence" can be too quiet as the user may interpret silence as a system failure. The use of a "comfort tone" may be considered (see CCIR [18]).

When separate blocks of text are used to concatenate into phrases, e.g. for expressing variable sums of money, defining a calling number, etc., the following points should be taken into consideration:

-    ensure the speed, volume and intonation of the separate blocks are such that they sound "natural" when put together. Record separate "isolated" "starting" "median" and "ending" blocks if necessary;
-    ensure the blocks of text for concatenation are recorded by the same speaker at the same session to ensure homogeneity.

Limit artificial text-to-speech conversion to areas where the use of recorded speech is impractical. If artificial speech is used, ensure the intonation and rhythm are "natural". If "naturalness" is impossible, limit text-to-speech to separate words or very short phrases/sentences.

Avoid combining artificial and recorded speech in the same sentence, if it cannot be avoided insert a short pause (1 to 2 s) between the two forms of speech.

Similarly when combining recorded messages (left by a user) and recorded announcements, ensure there is a short pause (1 to 2 s) between the two forms to emphasize the different sources of the material.

Ensure all forms of concatenated announcements have the correct intonation/inflections for "natural" speech, e.g. do not sound as though they are finished when they are not and vice versa.

5.6.4   Speech level for announcements

The sending speech level for recorded and generated announcements and its method of measurement in SVS should conform to ITU-T Recommendation G.115 [17]. This enables the preferred listening level for announcements quoted in ITU-T Recommendation E.183 [14] as -10 dB$_{Pa}$ ± 5 dB, to be met.

5.6.5 Background music

In general avoid using background music within a stored voice service. If background music is to be used it should conform to the following guidelines:

- ensure the majority of each musical phrase used is within the minimum bandwidth for the projected service users, e.g. 300 - 3 400 Hz for the PSTN;
- ensure it does not mask the recorded announcements, especially if there is a possibility that some of the service users will be hearing impaired or elderly;
- ensure there is no possibility that combinations of harmonics etc. of the music used can be interpreted as a DTMF input from the user.

Background music may be used during pauses while a service is processing a request to a distant database.

5.6.6 General text format of all announcements

Ensure the words used for all announcements are quickly and easily understood by all possible users of the service. For any service offered to the general public, consider especially the comprehension of the young, the mentally impaired, and users who are listening who are not familiar with the language offered.

When writing the text:
- avoid jargon, unless the service is targeted solely for specialist groups;
- avoid words with double/unclear meaning;
- ensure the context clearly indicates the meaning.

When giving instructions to the user, use the imperative form of the verb, e.g. "Enter your PIN now".

Avoid:
- discontinuous structures within sentences, e.g. try not to insert explanatory clauses;
- long lists of adjectives to describe a noun;
- double negatives, they are rarely easy to understand and will increase user errors.

Use terms consistently, do not rephrase or change words/terms at different points of the dialogue, and be careful with rephrasing text in explanatory help messages.

Use pauses between telephone numbers and other information items that the user may be expected to remember or write down, e.g. 0,5 to 1,0 s within digit sequences. Group digits in telephone numbers in blocks of two, three or four, according to local custom.

5.6.6.1 Information content

The number of items of information in each announcement should be kept as low as possible, and preferably to one, with a maximum of three items.

5.6.6.2 Sentence length

Announcements should be prepared without long sentences. For English, if a sentence exceeds 15 words, it should be rephrased or split into separate clauses.

5.6.6.3 Function titles

Titles or names used for menus or menu items should describe functions precisely for the target user population.

Functions should be described in simple rather than technical or jargon terms, to avoid ambiguity and unnecessary misunderstanding and errors.

Care should be taken when system announcements are translated into other languages.

5.6.6.4 Positive/negative actions

Text for announcements should be written in a positive manner to encourage user actions. Negative forms should be reserved to discourage or prevent user actions (ITU-T Recommendation E.183 [14]).

5.6.6.5 Action sequences

Sequences of actions presented in announcements to the user should follow the order in which the user is expected to carry them out (ITU-T Recommendation E.183 [14]).

For example, use the form "Press key, then hang up", rather than "Before hanging up, press key".

5.6.6.6 Early information

Important information should be given early in an announcement to allow the user to cut-through or dial-ahead.

5.6.6.7 Message start

When an announcement is played, a user should always hear it from the beginning. Do not allow the system to start part way through, then re-start. The first word should not be significant, so that the user is attuned to the speaker for the rest of the announcement.

5.6.6.8 Pauses in announcements

Give consideration to the distribution of pauses in announcements to allow users to digest and understand the information.

5.6.6.9 Text style

Text for announcements should be written with care to ensure accuracy, but should be concise and polite.

The use of humour should be limited or avoided, and conversational pleasantries such as "please" and "thank you" should be minimized.

5.6.7 Text format for menus

When presenting a list of related items, use "**or**" to identify the last item in a list, e.g. *"for oranges, press 1, for pineapples, press 2; or for grapefruits, press 3".*

Develop the text for menu items specifically for speech output:

- avoid using words in the same menu or menu tree which sound the same or similar but which can have different meanings (homonyms), e.g. "Pears" and "Pairs" or "Bears";
- for the key word in each menu item use single words or common word pairs;
- when recording the menu announcements maintain good rhythm, a near constant speech rate, and keep the gap between menu items short (0,5 to 1,0 s).

Be sensitive to the capabilities of the different users when designing the text. For example, expert users may require short precise prompts, but naïve and infrequent users may require more information. In many services it may be sufficient to accommodate this requirement within the Help, Error and Time-out support, but within some services it may be appropriate to offer alternative paths or multiple levels of prompts.

5.6.8 Text format for feedback announcements

Keep feedback announcements short and explicit. Often the feedback for the correct selection of a menu item can be given as the first part of the prompt for the next step of the dialogue.

Consider possible provision of feedback redundancy across different media i.e. audio and video, especially to accommodate users with impairments (see "Telephones for all" [26]).

The wording of feedback announcements for data input which is context sensitive should convey the correct meaning. For example, a data input for time of "1100", should be read back as "11 o'clock" or "11 am", not "one one zero zero".

Verbal announcements are preferable to tones, unless tones are very familiar.

5.6.9 Text format for error announcements

Report the cause of the error to the user only if it is certain. If the cause is uncertain, imply the system is at fault and has not correctly interpreted the input.

Avoid giving pedantic or lengthy error messages. Error messages should be short, clear and explicit.

Ensure the intonation is even. Do not show impatience, intolerance, sarcasm, etc. by intonation.

If the user makes the same mistake again, give a different error message with additional prompting information (see subclause 5.3.6). Avoid reproaching the user.

5.6.10 Text format for help announcements

At the user's first request for help or after a time-out on a null input, it may be sufficient to repeat the prompt for the current state of the dialogue and perhaps tell the user how to get more help. At the user's second request or after a subsequent time-out a more detailed explanation of the prompt is required where the text is expanded or worded in a different way.

Help announcements should always support the dialogue and emphasize what the user can do, instead of what he cannot do. Help, like error announcements, should be short, clear and explicit. They should not show impatience, intolerance or sarcasm.

5.7 Recommendations for tones in SVS

This clause makes recommendations about the use of tones within stored voice services. Some tones are included in ITU-T Recommendation E.182 [13] Annex A, including those specified in ITU-T Recommendation E.180 [29]. A possibility also exists for service providers to adopt a limited number of service dedicated tones, "earcons", or musical "jingles", strictly for use in their service, designed to be remembered and recognized by the service customers. (See ETR 116 [4]).

As a general rule, tones should be used only to catch the user's attention.

Tones should only be used that are clearly discriminable from existing network tones, and allow no possibility of confusion with them or any other tones used in other services, e.g. fax tones.

Tones provided within a dialogue having explicit meaning for the SVS being used, or as part of a transfer from one service to another should always be explained in announcements, e.g. telephony to voice mail in a public network.

After guidance announcements which ask for an input from the user, an indication to proceed should be given. In some cases dial tone may be appropriate, but not if the user may think the SVS has failed (see ITU-T Recommendation E.183 [14]).

When the user is required to go on-hook following an announcement, congestion tone may be used (see ITU-T Recommendation E.183 [14]). Guidelines about tones for specific steps of the dialogue appear in the following clauses.

5.7.1 Tones for error announcement

An error tone may precede error announcements so that the user realizes immediately that something wrong has happened. An error tone, if used, should be the same whenever an error occurs and be consistent across services.

5.7.2 Tones for the access procedure

Tones during the access procedures may be used to notify:

- a DTMF device that the system is ready to receive access data. This would allow for programming a device to dial the service phone number, wait for the tone and then send the access data;
- a user who does not understand the default language offered by the service, that he is connected and that the service is ready to receive access data. By employing a standardized tone, the user would not have to understand the voice prompt, but only to recognize this tone as being the prompt for entering data. The service could then deduce the user language from the data (e.g. PUI) and switch to that language for the rest of the communication;
- a calling stored voice service that another SVS has just been reached. This would allow, for instance, a message delivery service to invoke automatically the command "skip to recording" when it reaches a voice mail service.

5.7.3 Tones for voice input

A recording tone should be used to notify the user that the system is ready to take his voice input.

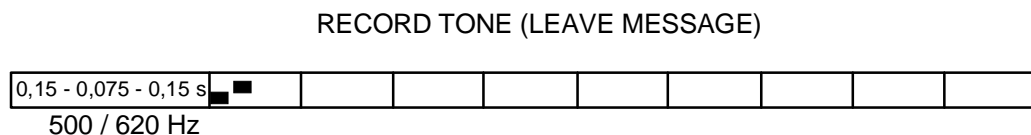ISO/IEC 13714 [3] recommends a two frequency tone, see figure 3.

RECORD TONE (LEAVE MESSAGE)

0,15 - 0,075 - 0,15 s	▬								

500 / 620 Hz

Figure 3: ISO/IEC defined "Record" tone

When a recording is limited in time, a specific tone may be played a few seconds before the time has elapsed. In such a case, the meaning of this tone should be explained to the user prior to the recording.

5.8 Visual display of text

This subclause deals with telephone subsets and mobile phones which are equipped with a visual display and permit the simultaneous display of a text version of the audio announcements.

Service designers and providers should also be aware of the developing North American proprietary guidelines and standards for the Analogue Display Services Interface (ADSI, see Bellcore SR-INS-002461 [28]) which make use of dedicated customer services equipment for the access and control of services via a visual display interface, softkeys and a keypad.

5.8.1 General

Visual displays on subsets are generally restricted in size, so that announcements visually displayed in text need to be kept short. Typically only one or two lines of 10 to 16 characters are displayable, although some mobile phones may employ displays having more, e.g. up to six, lines. The display type is almost universally reflective liquid crystal, so that visual contrast is not high. See also the recommendations on character displays in ETR 116 [4] and on visual displays in "Telephones for all" [26].

Where verbal announcements are repeated, or may be repeated on demand, so should the text equivalent, but a different duration may be required for listening and reading; the longer time should always be utilized. To avoid the two types of announcement becoming out of step, they should always start at the same time.

5.8.2 Language and displayed text composition

The text displayed should be an exact equivalent of the verbal announcement, only omitting unnecessary words where the meaning is not affected. The use of clear language is desirable for both types of announcement, and abbreviations or the use of acronyms and initials should be avoided, unless they are widely known or explained in help, user guidance handbooks or publicity material. Menus are a case where an exact equivalent should always be possible. Guidelines on verbal announcements are in general applicable also to visually displayed text.

The visual text should be in the same language as the spoken version, where language selection is possible. (See subclause 5.2.3.)

Polite terms should be employed sparingly and not when the text would exceed the display length or mean unnecessary scrolling or repetition.

5.8.3   Scrolling

Scrolling of text should be avoided if possible. If unavoidable, ensure that some significant words, e.g. nouns and verbs, are always visible. Where scrolling is required, it is preferable for the scrolling to be controlled by the user. If automatic scrolling is provided the scroll rate should be set for slow readers, e.g. minimum 3 seconds for 24 characters, 5 seconds for 40 characters. See ETR 116 [4].

An alternative to scrolling is to display no more than two halves of the displayed text alternately, at a rate suitable for slow readers. Care should then be taken to ensure that the two halves of the displayed text do not differ in meaning according to which half is read first.

5.8.4   Displays in handsets

It should be noted that for displays in handsets, which applies to all mobile phones, the text shall be read and control action carried out before the user can listen to verbal announcements or tones. The use of time-outs and their duration may be critical and should be checked during usability assessment. (See also subclauses 5.3.4 and 5.3.7.)

5.8.5   Visual feedback

Feedback is an essential part of the MMI and should follow the general guidelines given in ETR 16 [4]. Feedback text should be given as an indication of system state, such as "dial now", "busy", etc.), for control actions, such as numbers dialled, and repeated for the new system state, such as "ringing".

Other feedback text should relate to the status of the system where applicable, e.g. "service not available".

Feedback relating to errors should be the visual equivalent to their verbal counterparts.

5.8.6   Use of graphical symbols

There are no standard graphical symbols designed to be used specifically on visual displays on telephones. If a set is designed for particular applications, they should be developed and tested according to ETR 070 [20]. If pictograms are used they should only be employed after adequate publicity and user exposure.

A limited number of pictograms is recommended to assist users of telephone services in ITU-T Recommendation E.121 [23], and for videotelephony in ETS 300 375 [19]. These may be adapted for visual display use, if appropriate.

A more general set of symbols has been developed by IEC, which contains items suitable for telecommunications applications, and which could also be adapted for visual display use. See IEC 417 [21].

6   Applications of guidelines

This clause presents two examples of stored voice services which follow most of the guidelines presented in this ETR. The first is an example of a simple banking service, following Type A principles. The second is an example of how the guidelines may be applied to a complex service like UPT, which should follow Type B principles. Each service is described, a view of the structure is given, and the menus, announcements, key assignments and other features are described.

An example of a voice mail service is not given because ISO/IEC 13714 [3] fully illustrates such services and provides typical flow charts for some parts of the system, including call answering, mailbox access, listening to messages and bulletin boards.

6.1 Application to a banking service

Banking is an application built up around an account holder's specific needs, as perceived by the service provider. Usability is an essential goal for customer satisfaction and to minimize system occupancy. Conformance to these guidelines would also aid consistency across different banking services and other SVSs following the guidelines, e.g. voice mail.

This example provides a simple, minimum or standard, telephone banking service offering only current balance and mini-statement of the last five transactions.

Customer access to the service would be via a telephone number dedicated to the service, which responds with an announcement, and provides prompts and feedback through a linear process to completion. This service is a type A service.

User input	**Dial the telephone number dedicated to XYZ Bank**
SVS response	*" Welcome to the XYZ Bank Standard Telephone Service. To hear the balance on your account enter your Personal User Identity followed by square."*
NOTE:	A delimiter is used for the entry of the PUI because it is of variable length. To increase security, the PUI is not tested until the PIN is entered. A user trying to find out about existing PUIs will not be able to do so because the service will not provide this information after a PUI is entered.
User input	**123456#**
SVS response	*"Enter your PIN code followed by square."*
NOTE:	At this point of the dialogue, pressing star for cancellation of incorrect input would bring the user back to the prompt for the PUI. This choice is not prompted explicitly because the user is not likely at all to use it. In case of time-out, he will be prompted with all the possibilities i.e. enter his PIN or go back to the PUI entry by pressing star.
User input	**12....** (User enters an incomplete PIN).
SVS response	(After time-out) *"So far, you have entered two digits. To complete your PIN, enter the missing digits and press square, or to cancel your current entry, press star."*
NOTE:	On a time-out, the user is informed of his current system state, and he is prompted with all the choices he has.
User input	**34#**
NOTE:	A delimiter is used for the entry of the PIN even though it is of fixed length. Its purpose is to stay consistent with the entry of the PUI.
SVS response	*"Mister Smith, your account balance after the last transaction is 3 thousand 4 hundred and 56 ecus."* *"The last five transactions starting with the most recent are:* *- (description of the first transaction)* *- (description of the second transaction)* *- (description of the third transaction)* *- (description of the fourth transaction)* *- (description of the fifth transaction)"* *"To hear this information again, please hold on. Otherwise you can hang up, thank you for banking with us."*
NOTE:	*The "Mister Smith" part is used as implicit feedback: the account holder will know for sure that his PUI and PIN have been correctly interpreted.* *The balance is given in its natural spoken form, the service does not just say "... is three four five six point zero zero" (see subclauses 5.4.7, 5.6.3 and 5.6.6).* *Dialling ahead is available, and upon connecting to the service, the user can simply dial the sequence 123456#1234# and will hear, starting in less than 1 second, a welcome announcement followed by the balance announcement. Some adjustment may be necessary in the intonations to enable the announcements to be concatenated in this way (see subclause 5.6.3).*

6.2   Application to a Universal Personal Telecommunication service

The UPT service (see definition in clause 3) removes the fixed association between an individual user and his terminal or network access point. This leaves the user free to roam, and enter the network at any terminal of his choice, using a so-called personal number. Because of this freedom, very high regard shall be placed on security by protection at all times of his Personal User Identity (PUI) and personal identity number (PIN), as well as details of his so-called personal service profile. Although this requirement may be no greater than in some banking transactions, a UPT user is likely to use the service a great deal more, for which reason the authentication and security procedures shall be simple but foolproof.

The UPT user may, in principle, access and manage his service from any telephone in the world. In the short term, it is assumed that service providers will offer a MMI based on voice guidance from the service and DTMF input from the user via a telephone keypad or a DTMF input device.

The UPT service makes it possibility for the UPT user to be available 24 hours a day. So the UPT user may want to schedule his availability. This may be solved by creating a seamless interface to a Voice Mail service as part of the UPT service, to which incoming calls can forwarded when the UPT user wishes to be unavailable.

The use of the guidelines for design of a UPT service will benefit the user when he is using the service, but also when using the service as a means of access to other stored voice services, such as banking or voice mail, the user will benefit from a common approach to the design of these services as well.
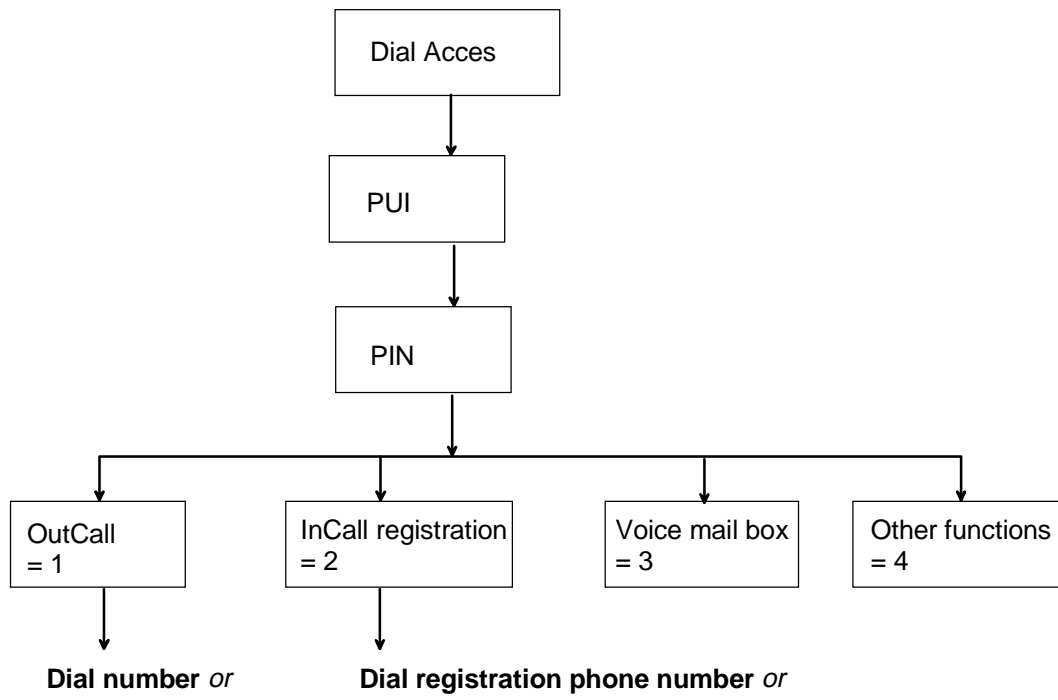
6.2.1   Application of guidelines to UPT phase 1 service

The UPT service may be considered as a Type B system because it offers a number of menus organized in different levels, offering many choices. The inclusion of a control menu gives additional possibilities for language selection (see subclause 5.2), navigation and the use of short-cut procedures. When the UPT service is integrated to a voice mailbox, the procedures and announcements for that service should also follow the same guidelines.

6.2.2   Flowchart for UPT

The flowchart shown in figure 4 represents a simplified example of a UPT Phase 1 service. It includes the steps the user performs to carry out identification and authentication procedures, menu choices at various levels and in the associated control menu.

Step 1   The UPT user dials the access number to the UPT service.
Step 2   The service plays the welcome message.
Step 3   The user is prompted by the service to enter his PUI.
Step 4   The user is prompted to enter his PIN.
Step 5   After a successful authentication, the UPT user is
                connected to the UPT service Main Menu.

```
        ┌──────────────┐
        │  Dial Acces  │
        └──────┬───────┘
               │
               ▼
        ┌──────────────┐
        │     PUI      │
        └──────┬───────┘
               │
               ▼
        ┌──────────────┐
        │     PIN      │
        └──────┬───────┘
```

| OutCall = 1 | InCall registration = 2 | Voice mail box = 3 | Other functions = 4 |

Dial number *or*   **Dial registration phone number** *or*

OutCall Menu   **InCall Register Menu**
. *Call Home = 1*   . *At Home = 1*
. *Call Office = 2*   . *At Office = 2*
. *Call Voice Mailbox = 3*   . *To Voice Mailbox = 3*
. *Call Mobile phone = 4*   . *On Mobile phone = 4*
. *Re-dial last number = 5*   . *At this number = 5*

Control Menu = *   **Control Menu = ***
. *Cancel input = ***   . *Cancel input = ***
. *Cancel call set-up = ***
. *Go to Main Menu = 7*   . *Go to Main Menu = 7*
. *Language selection = 8*   . *Language selection = 8*
. *Help = 0*   . *Help = 0*

Disconnect a call = #*#

Figure 4: Example of UPT phase 1 MMI flowchart

6.2.3   UPT dialogue for basic service access and provision

The following dialogue is an example of a possible call from a UPT service user. All the features available in this service do not appear in this example. The user inputs appear in bold text and the announcements appear in italics. It is assumed that the user access to the service will be via a dedicated telephone number.

User input	**Dials the UPT access number**
SVS response	*"Welcome to the UPT Service. Enter your Personal User Identity followed by square."*
NOTE:	At this point of the dialogue, pressing star calls the control menu (see figure 4). The user can then press 8 if he wants to change the language of the announcements.
User input	**Dials the PUI e.g. "123456#"**
NOTE:	The UPT service may change the language according to the PUI if different from the default language of the service provider.
SVS response	*"Enter your PIN code followed by square."*
User input	**Starts to Dial PIN and hesitates e.g. "12...."** (User enters an incomplete PIN).
SVS response	(After time-out) *"So far, you have entered two digits. To complete your PIN, enter the missing digits and press square; or, to go to the control menu, press star."*
NOTE:	On a time-out, the user is informed of his current system state, and he is prompted with all the choices he has. At this point of the dialogue, pressing star calls the control menu (see figure 4). From the control menu the user may then cancel his current entry by pressing star again, get more information by pressing 0 for Help, or go back to the partial PIN prompt by pressing square.
User input	**Dial the complete PIN e.g. "1234#"**
SVS response	*"UPT Main menu, For outgoing call, press 1,* *For incoming call registration, press 2,* *For voice mail, press 3,* *Or for other UPT choices, press 4."*
NOTE:	The commands offered in the menu are consecutive keys starting from 1.
User input	**None**
SVS response	(After time-out) *"You are at the UPT Main menu,* *To make an outgoing call, press 1,* *To register for incoming calls, press 2,* *To check your voice mailbox, press 3,* *For other UPT choices, press 4.* *Or for other options, press star."*
NOTE:	A help announcement is provided on time-out providing more information. It lists all the choices the user has in the current system state. Playing the help announcement does not change the state the user is in, exactly the same commands are available before and after the time out leading to the help announcement.
User input	**Dials 1**
SVS response	*"Enter the number you wish to call followed by square, Or to return the main menu, press star 7."*
NOTE:	Pressing star at any time will take the user to the control menu. From the control menu pressing 7 selects the main menu.
User input	**Dials Number e.g. "012345 678#"**
SVS response	*"Please hold on, your number is being called. To cancel this call, press star twice."*
NOTE:	Pressing star at any time takes the user to the control menu and from the control menu pressing star cancels the call set-up and returns the user to the outcall prompt.
User input	**Dials ∗ to cancel the call**

<div align="center">(continued)</div>

	(concluded)
User input	**Dials the UPT access number**
SVS response	"*UPT Main menu, For outgoing call, press 1,* *For incoming call registration, press 2,* *For voice mail, press 3,* *Or for other UPT choices, press 4.*"
User input	**Dials 2**
SVS response	"*You are currently registered on your mobile phone,* *To register at home, press 1,* *At the office, press 2,* *At your voice mailbox, press 3,* *At your mobile phone, press 4.* *At this number, press 5* *Or to de-register, press 6*".
NOTE:	No name is used to identify this menu since the first announcement makes it obvious it is the incoming call registration menu. The choices in this menu are related to each other, so the menu can have up to 6 choices (as well as the generic command to invoke the control menu). The first sentence providing information on the current registration is better than a prompt in the menu "to know your current registration, press ..." because although it is as long as this latter prompt, the user is spared one command to get this information.
User input	**Dials 1**
SVS response	"*From now on your incoming calls will be directed to your home.*"
SVS response	"*UPT Main menu, For outgoing call, press 1,* *For incoming call registration, press 2,* *For voice mail, press 3,* *Or for other UPT choices, press 4.*"
NOTE:	After choosing a registration the UPT user is automatically returned to the main menu.
User input	**Goes on-hook**

6.2.4 Dial-ahead on a UPT call setup

Within a UPT service cut-through and dial-ahead should be possible from the start of the PUI and through all levels of the menu hierarchy. Therefore the user can dial a full call set-up sequence (or use a DTMF device that sends the sequence for him) as soon as he recognizes he is connected to the UPT service.

User input	**Dial the UPT access number**
SVS response	"*Welcome to the UPT Service. Enter your Personal User Identity followed by square.*"
User input	**Dials PUI#PIN#1012345678#,**
SVS response	"*Please hold on, your number is being called. To cancel this call, press star twice.*"
NOTE:	The phone number 012345678# should then be called less than 1 second after the last square is received by the system. Since the square is not used after the prompt to enter the telephone number, the sequence PUI#PIN#1#012345678# will be interpreted by the system exactly as the sequence PUI#PIN#1012345678#: thus a user who delimits his choice of 1 in the main menu by adding the square from habit of delimiting his entries will not be penalized.

History

Document history	
December 1996	First Edition