

This is a preview of "ISO 9241-154:2013". [Click here to purchase the full version from the ANSI store.](#)

First edition
2013-02-01

Ergonomics of human-system interaction —

Part 154: Interactive voice response (IVR) applications

Ergonomie de l'interaction homme-système —

Partie 154: Applications de réponse vocale interactive (RVI)



Reference number
ISO 9241-154:2013(E)

© ISO 2013



COPYRIGHT PROTECTED DOCUMENT

© ISO 2013

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

This is a preview of "ISO 9241-154:2013". Click here to purchase the full version from the ANSI store.

Contents

	Page
Foreword	v
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Conformance	7
5 Voice messaging systems	8
6 Information input	8
6.1 General.....	8
6.2 Informing text telephone users of acceptable input types.....	8
6.3 Non-duplication of information input.....	8
6.4 Using system information to improve efficiency.....	8
6.5 Changing information that has been entered.....	9
7 Speech input	9
7.1 Vocabulary choices for speech-enabled IVRs.....	9
7.2 Phonetically distinct vocabulary in speech-enabled IVR applications.....	9
7.3 State-specific grammar.....	9
7.4 Synonyms in grammars.....	9
7.5 Use of dynamic grammars.....	10
7.6 Enrolment.....	10
7.7 End-pointing and turn-taking.....	10
7.8 Handling time-outs for speech input.....	10
7.9 Speech IVRs with touchtone.....	11
8 Touchtone input	11
8.1 Indicating touchtone capability.....	11
8.2 Key assignment for delimiters.....	11
8.3 Pound (“#”) key in fixed length data entry.....	11
8.4 Handling time-outs for variable length touchtone input.....	11
8.5 Key assignments for affirmative and negative responses.....	11
8.6 Key assignment for the human “help” function.....	12
8.7 Minimization of caller key presses.....	12
9 Information output	12
9.1 General provisions for prompts and announcements.....	12
9.2 Construction of prompts and announcements.....	15
10 Navigation	19
10.1 Skip-forward function.....	19
10.2 Dial-through and talk-through.....	19
10.3 Dial-ahead and talk-ahead.....	20
10.4 Global commands.....	20
10.5 Barge-in as a default.....	20
10.6 Restricting barge-in.....	20
11 Help	20
11.1 Context-sensitive help.....	20
11.2 Caller-selectable help.....	20
11.3 Referencing help in initial prompt.....	21
11.4 Help commands.....	21
11.5 System-initiated help.....	21
12 Access to human representatives	21
12.1 General.....	21

This is a preview of "ISO 9241-154:2013". Click here to purchase the full version from the ANSI store.

12.2	Equal access.....	21
12.3	Prompting access.....	21
12.4	Initiating transfer.....	22
12.5	Delays in access.....	22
12.6	Assistance from human representatives.....	22
12.7	Human help not available.....	23
13	Feedback.....	23
13.1	General.....	23
13.2	Feedback to caller input.....	23
13.3	Feedback following selection of unavailable options.....	23
13.4	System response time.....	23
13.5	Appropriate context for feedback messages.....	23
13.6	Landmarks.....	24
13.7	Confirmation dialogues.....	24
13.8	Intelligent use of confirmation rejections.....	25
13.9	Additional feedback in delay situations.....	26
13.10	Managing extended hold situations.....	26
13.11	Suggesting that the caller call back.....	26
14	Errors.....	26
14.1	General.....	26
14.2	Unavailability of service.....	26
14.3	Input prompt repetitions.....	27
14.4	Error message content.....	27
14.5	Two consecutive input entry errors in touchtone-based IVRs.....	27
14.6	Two or more consecutive input entry errors in speech-enabled IVRs.....	27
14.7	Handling of numerous errors.....	27
14.8	Avoiding pejorative wording in error messages.....	27
14.9	Critical messages.....	28
14.10	Error recovery.....	28
14.11	Disconnection messages.....	28
14.12	Exiting due to exceeding error limit.....	28
14.13	Referencing help.....	28
14.14	Error prompt wording.....	28
14.15	Cueing the caller about desired speech input.....	28
14.16	Conversational repair.....	28
14.17	Handling too much speech input.....	29
14.18	Mentioning touchtone options for speech IVRs.....	29
Annex A (informative) Overview of the ISO 9241 series.....		30
Annex B (informative) The role of speech recognition errors in IVR design.....		31
Bibliography.....		34

This is a preview of "ISO 9241-154:2013". [Click here to purchase the full version from the ANSI store.](#)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9241-154 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*.

ISO/TS 9241 consists of the following parts, under the general title *Ergonomic requirements for office work with visual display terminals (VDTs)*:

- *Part 1: General introduction*
- *Part 2: Guidance on task requirements*
- *Part 5: Workstation layout and postural requirements*
- *Part 6: Guidance on the work environment*
- *Part 11: Guidance on usability*
- *Part 12: Presentation of information*
- *Part 13: User guidance*
- *Part 14: Menu dialogues*
- *Part 15: Command dialogues*
- *Part 16: Direct manipulation dialogues*

ISO 9241 also consists of the following parts, under the general title *Ergonomics of human-system interaction*:

- *Part 20: Accessibility guidelines for information/communication technology (ICT) equipment and services*
- *Part 100: Introduction to standards related to software ergonomics [Technical Report]*
- *Part 110: Dialogue principles*
- *Part 129: Guidance on software individualization*
- *Part 143: Forms*
- *Part 151: Guidance on World Wide Web user interfaces*
- *Part 154: Interactive voice response (IVR) applications*
- *Part 171: Guidance on software accessibility*

This is a preview of "ISO 9241-154:2013". [Click here to purchase the full version from the ANSI store.](#)

- *Part 210: Human-centred design for interactive systems*
- *Part 300: Introduction to electronic visual display requirements*
- *Part 302: Terminology for electronic visual displays*
- *Part 303: Requirements for electronic visual displays*
- *Part 304: User performance test methods for electronic visual displays*
- *Part 305: Optical laboratory test methods for electronic visual displays*
- *Part 306: Field assessment methods for electronic visual displays*
- *Part 307: Analysis and compliance test methods for electronic visual displays*
- *Part 308: Surface-conduction electron-emitter displays (SED) [Technical Report]*
- *Part 309: Organic light-emitting diode (OLED) displays [Technical Report]*
- *Part 310: Visibility, aesthetics and ergonomics of pixel defects [Technical Report]*
- *Part 331: Optical characteristics of autostereoscopic displays [Technical Report]*
- *Part 391: Requirements, analysis and compliance test methods for the reduction of photosensitive seizures*
- *Part 400: Principles and requirements for physical input devices*
- *Part 410: Design criteria for physical input devices*
- *Part 411: Evaluation methods for the design of physical input devices [Technical Specification]*
- *Part 420: Selection of physical input devices*
- *Part 910: Framework for tactile and haptic interaction*
- *Part 920: Guidance on tactile and haptic interactions*

The following parts are under preparation:

- *Part 940: Evaluation of tactile and haptic interactions*

User-interface elements, ergonomic requirements for the reduction of visual fatigue from stereoscopic images, and framework and guidance for gesture interactions are to form the subjects of future parts 161, 392 and 960.

This is a preview of "ISO 9241-154:2013". [Click here to purchase the full version from the ANSI store.](#)

Introduction

This part of ISO 9241 contains provisions specific to interactive voice response (IVR) systems, which may involve a combination of voice technologies, but are distinguished by the use of the telephone as the information transfer mechanism. These provisions assume no visual displays of information to the user beyond the labels on the telephone's keypad, with the notable exception of text telephones (TTYs), which have a visual feedback display.

Although it is extremely important that IVR user interface designers take into account the cultural and linguistic aspects of the user interface that impact the intended user population, these aspects are beyond the scope of this part of ISO 9241 and are not addressed in this part of ISO 9241. Similarly, because automatic speech recognition (ASR) performs differently for different languages and the technology continues to improve, it is beyond the scope of this document to provide detailed provisions on ASR user interface design generally. Rather, this part of ISO 9241 focuses on the design of IVR dialogues and discusses only those ASR user interface design issues that impact dialogue design.

Many current IVR systems pose significant accessibility challenges to callers with disabilities. Some of the provisions in this part of ISO 9241 were developed specifically to accommodate callers with special needs, particularly those who are deaf or who have hearing impairments.

The provisions in this document are intended to be compatible with ISO/IEC 13714.

Interactive voice response (IVR) systems became a common means of delivering customer service in the late 1980s. These systems are designed to reduce or eliminate the need for human-in-the-loop customer support by automating many of the functions that human customer service representatives typically provide over the telephone with respect to processing of customer transactions. Thus, users (i.e. callers) can now engage in such activities as checking train schedules, ordering a book or reporting problems with their television cable service by interacting with an IVR system. In addition, IVRs often automate call-routing functions so that the caller can be connected with the right assistance to handle their specific request.

This part of ISO 9241 is concerned with the design of the human-IVR system dialogue and related topics. As shown in [Figure 1](#), callers typically interact with the IVR system through one of two methods: speech or touchtone (DTMF) input via the telephone keypad. If an IVR system is speech-enabled, it employs an ASR engine that recognizes the speech input from the caller. If it is not speech-enabled, it typically recognizes only touchtone input from the telephone keypad or, sometimes, TTY input. Speech-enabled IVR systems are a relatively recent development and many systems are now designed to accept both touchtone and speech within a given dialogue with a caller. The IVR system responds via hardware and/or software that presents synthesized, digitized or recorded speech to the caller and that may also present non-speech audio. The fact that there is no assumed visual display of information to the caller in these applications poses a challenge to dialogue designers because of the burden placed on the caller to navigate the application and process and remember the relevant information without the aid of any visual display.

This is a preview of "ISO 9241-154:2013". Click here to purchase the full version from the ANSI store.

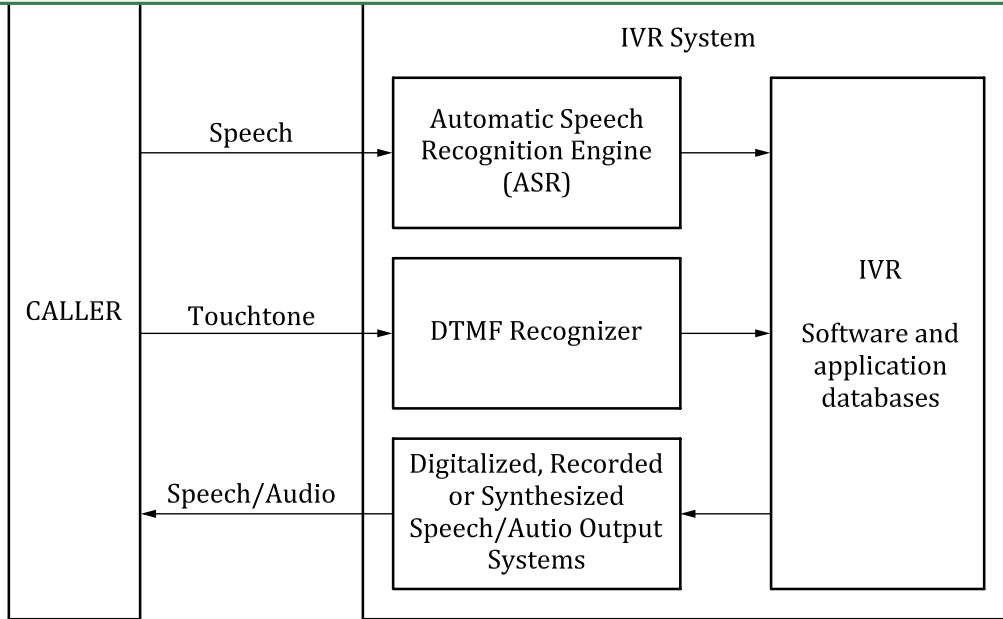


Figure 1 — IVR system representation

This part of ISO 9241 provides provisions for the design of IVR dialogues in speech-enabled and touchtone-based IVR systems. Therefore, its focus is on the interface between the caller and IVR software and application databases, which is mediated by the hardware and software that recognize speech and/or touchtones, and which present speech output to the caller. Both ASR systems and DTMF recognizers place constraints on the design of IVR dialogues and those constraints have been considered in developing the provisions of this part of ISO 9241. However, this document is not intended to address the design of ASR or DTMF user interfaces generally, for two reasons: first, the technology, particularly for ASR systems, is still evolving, and second, many ASR user interfaces are designed to include a visual display (e.g. ASR dictation applications), which IVR applications are not assumed to have.

Lastly, most of the provisions for speech-enabled dialogues are intended for use with grammar-based IVRs. Although some of the same principles apply to natural language systems (i.e. applications that use statistical language models), detailed design provisions are not included for these applications in this part of ISO 9241 because natural language understanding is implemented via a distinct technology and the use of natural language in speech-enabled IVRs is still evolving. There are also some aspects of applications design that are different for natural language dialogues, relative to grammar-based ones, in addition to the differences in dialogue design that relate to speech recognizers specifically.