

9241-154— 2015

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(ISO 9241-154:2013, IDT)



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                                                                                                (IVR)»
(ISO 9241-154:2013 «Ergonomics of human-system interaction — Part 154: Interactive voice response (IVR)
applications», IDT).
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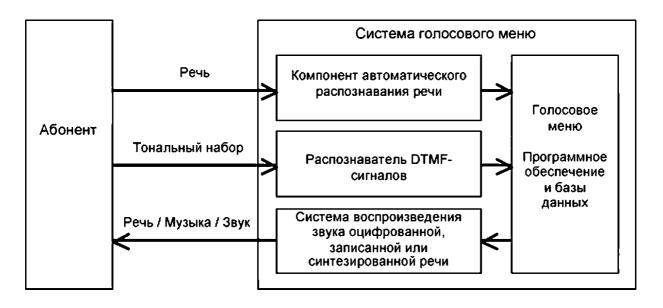
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IVR<sup>1</sup>>.
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 IVR — interactive voice response (
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ASR — automatic speech recognition (
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154 Ergonomics of human-system interaction. Part 154. Interactive voice response applications **— 2016—12—01** 1 IVR1)). IVR (ASR2)). IVR ( ). 13714. 13714, 2 13714 (ISO/IEC 13714:1995, Information technology — Document processing and related communication — User interface to telephone-based services — Voice messaging applications) E-161 . (ITU-T 161, Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network) 3 3.1 (announcement):

1> ) IVR — interactive voice response ( , ).
2> ASR —automatic speech recognition ( , ).

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      3.2
                                                  ; ASR (automatic speech recognition, automated speech
recognition, ASR):
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                                   3.43.
                                  (caller):
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      3.5
                                     ) (coaching):
      3.6
                                                  (concatenated prompts):
      3.7
                                    (confidence level):
                                                    (3.8).
      3.8
                                           (confidence score):
                                                                       ASR
                                                (continuous speech recognition):
      3.9
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      3.10
                                        (conversational repair):
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3.11
                                                       ) (deletion error):
3.12
                                                                                (dial-ahead):
   IVR
                                               (3.42).
3.13
                                                                                   (dial-through):
         IVR
                                                          (3.43)
                                                                              (3.3)
             2 -
                           (digitized speech):
3.14
                                                                                            (3.40),
  (3.35),
                                      (3.45).
                              ) (discourse marker):
3.15
3.16
                                          (discrete speech recognition):
                                   )
         » (3.9).
3.17
                                              ; DTMF (dual tone multiple frequency, DTMF):
3.18
                                    (dynamic grammar):
3.19
                                                (end-pointing):
3.20
                    (enrolment):
3.21
                               (explicit confirmation):
                                                                           (3.23).
3.22
                                              (grammar):
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3.23
                                (implicit confirmation):
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                                                                               ),
3.24
                       (insertion error):
3.25
                                                              ); IVR (interactive voice response, IVR):
3.26 (
                               (landmark):
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3.27
                  (message):
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                                    ).
                                (mixed initiative):
3.28
3.29
                                              (natural language understanding, NLU):
3.30
                         (open-ended dialogue):
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                 (persona): (
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                                    (priming):
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                  (prompt):
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                                       (recognition error):
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                              (recorded speech):
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                                  (rejection error):
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     3.39
                                 (substitution error):
                                    (synthesized speech):
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        (3.35)
3.41
                               (system initiative):
3.42
                                         (talk-ahead):
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3.43
                                          (talk-through):
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                                         ; TTY (text telephone, TTY):
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                                          (text-to-speech, TTS):
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                (time-out):
                           ) (tuning):
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3.48
                     (turn-taking):
3.49
                                 (voice recognition):
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1) t o d — telecommunication device for the deaf.

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- [1] ANSI/HFES 200.4, Human Factors Engineering of Software User Interfaces—Part 4: Interactive Voice Response (IVR) and Telephony
- [2] ISO 9241-920:2009, Ergonomics of human-system interaction Part 920: Guidance on tactile and haptic interactions
- [3] Baber C , & Noyes J.M eds Interactive speech technology: Human factors issues in the application of speech input/output to computers. Taylor & Francis, Bristol, PA. 1993
- [4] Balentine B., Morgan DP. (2001). (2ND Ed.). Howto build a speech recognition application. San Ramon, CA: Enterprise Integration Group, Inc.
- [5] Bernsen NO, Dybkjaer H., Dybkjaer L. Designing interactive speech systems: From first ideas to user testing. Springer Verlag, New York, 1998
- [6] Cohen M.H., Giangola J.P., Balogh J. Voice user interface design Addison Wesley, Boston, 2004
- [7] Commarford P.M., Lewis J R , Smither J A., Gentzler D A comparison of broad versus deep auditory menu structures. Hum. Factors. 2008, 50 pp. 70—89
- [8] Cowan N. The magical number 4 in short-term memory: A reconsideration of mental storage capacity. Behav. Brain Sci. 2001, 24 pp. 87—185
- [9] Deffner G.P., Melder K. (1990). User acceptance and preference for advanced voice services features and dialogue styles. Proceedings of the Human Factors Society 34th Annual Meeting (pp. 194—197). Santa Monica, CA: Human Factors Society
- [10] ETSI ES 202-076 Generic spoken command vocabulary for ICT devices and services v.2.1.1:2009-08
- [11] Fay D. (1993). Interfeces to automated telephone services: Do users prefer touchtone or automatic speech recognition? In Proceedings of the 14th International Symposium on Human Factors in Telecommunications (pp 339—349). Darmstadt. Germany: R.v. Decker s Veriag
- [12] Frankish C., & Noyes J. Sources of human error in data entry tasks using speech input. Hum. Factors. 1990, 32 (6) pp. 697—716
- [13] Gardner-Bonneau D J . & Blanchard HE.eds Human factors and voice interactive systems. Springer. 8oston, 2008
- [14] Harris R.A. Voice interaction design. Morgan Kaufmann, Amsterdam, 2005
- [15] Kortum Ped. HCl beyond the GUI: Design for haptic, speech, olfactory, and other non-traditional interfaces. Morgan Kaufmann, Amsterdam, 2008
- [16] Halstead-Nussloch R. (1989). The design of phone-based interfaces for consumers. Proceedings of CHI-89: Human Factors in Computing Systems (pp. 347—352). New York: ACM
- [17] Han S.H.. Williges B.H.. Williges R C. (1991). Quantitative guidelines for telephone information systems. Proceedings of the Human Factors Society 35th Annual Meeting (pp 225—229). Santa Monica, CA: Human Factors Society
- [18] Jones D., Hapeshi ., Frankish C. Design guidelines for speech recognition interfaces. Appl. Ergon. 1989, 20 (1) pp. 47—52
- [19] Knott B.A., Bushey R., Martin J.M (2004). Natural language prompts for an automated call router: Examples increase the clarity of user responses. Proceedings of the Human Factors and Ergonomics Society 48th Annual Meeting (pp. 736—739). Santa Monica, CA: Human Factors and Ergonomics Society
- [20] McCauley M E.Human factors in voice technology. In: Human factors review, (Muckier F.A.ed ). Human Factors Society, Santa Monica. CA. 1984, pp. 131—66.
- [21] Maries M.A, & Englebeck G.Designing voice menu applications for telephones In: Handbook of human-computer interaction, (Helander M.G., Landauer T.K., Prabhu Peds.). Elsevier, New York, Second Edition, 1998, pp. 1085—102.
- [22] Martin MM. Williges B.H., Williges R.C. (1990). Improving the design of telephone-based systems Proceedings of the Human Factors Society 34th Annual Meeting (pp. 198—202). Santa Monica, CA: Human Factors Society

- [23] Marx , Schmandt . (1996) MailCall: Message presentation and navigation in a non-visual environment. Proceedings of CHI-96: Human Factors in Computing Systems (pp. 165—172). New York: ACM
- [24] Miller M.A., Elias J.W. (1991). Using menus to access computers via phone-based interfaces. Proceedings of the Human Factors Society 35th Annual Meeting (pp. 235—239). Santa Monica, CA: Human Factors Society
- [25] Reeves B.. & Nass C. The media equation Cambridge University Press, New York, 1996
- [26] Resnick R, Virzi R.A. (1992). Skip and scan: Cleaning up telephone interfaces. In Proceedings of CHI-92: Human Factors in Computing Systems (pp. 419—426). New York: ACM
- [27] Rodman R D. Computer speech technology. Artech House, Norwood, MA. 1999
- [28] Rosenfeld R., Olsen D., Rudnicky A. Universal speech interfaces. Interaction. 2001, 8 pp. 34—44
- [29] Schmandt C. Voice communication with computers: Conversational systems. Van Nostrand Reinhold, New York, 1994
- [30] Schumacher R.M. (1992). Phone-based interfaces: Research and guidelines. Proceedings of the Human Factors Society 36th Annual Meeting (pp. 1051—1055). Santa Monica, CA: Human Factors Society
- [31] Schumacher R M. Jr., Hardzinski M.L.. Schwartz A. L. Increasing the usability of interactive voice response systems: Research and guidelines for phone-based interfaces Hum. Factors 1995, 37 (2) pp. 251—264
- [32] Stuart R., Desurvire H., Dews S. (1991). The truncation of prompts in phone-based interfaces: Using TOTT in evaluations. Proceedings of the Human Factors Society 35th Annual Meeting (pp. 230—234). Santa Monica, CA: Human Factors Society
- [33] Syrdal A, Bennett R., Greenspan S.eds. Applied speech technology. CRC Press, Boca Raton, FL, 1995
- [34] Virzi R.A., Huitema J.S. (1997). Telephone-based menus: Evidence that broader is better than deeper. Proceedings of the Human Factors and Ergonomics Society 41st Annual Meeting (pp. 315—319). Santa Monica. CA: Human Factors and Ergonomics Society
- [35] Virzi R.A. (1991). A preference evaluation of three dialing plans for a residential, phone-based information service. Proceedings of the Human Factors Society 35th Annual Meeting (pp. 240—243). Santa Monica, CA: Human Factors Society
- [36] Virzi R.A , Resnick R, Ottens D. (1992). Skip and scan telephone menus: User performance as a function of experience. Proceedings of the Human Factors Society 36th Annual Meeting (pp. 211—215). Santa Monica, CA: Human Factors Society

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