

## CRITERIA FOR DEVELOPING BANKING INTERACTIVE VOICE RESPONSE USER INTERFACE

By:

Zulikha Jamaludin (zulie@uum.edu.my)

Abdullah Embong ([ae@cs.usm.my](mailto:ae@cs.usm.my))

*Abstract* - The goal of this paper was to facilitate the evolution of a usable and consistent style of user interface for IVR banking purpose. The idea was to design an IVR banking user interface to help the customers, the banks and other interested parties to access banking telephony services. In so doing, telephone-based user interface cases for banking purposes were gathered through far-reaching library search and on-line questionnaires. The results were used to develop draft guidelines. Following that, extensive structured interviews with audio-based user interface experts as well as experienced IVR banking users were carried out in order to validate the guidelines and to produce the user interface scripts. This method provides an effective way of collecting primary data by directly taking into account the target audiences' view, opinion and perspective. At the end of the project we manage to table most aspects of telephone-based user interface that should be considered for developing IVR banking user interface. The outcome was used in designing IVR banking user interface hypotheses. This paper also illustrates how the general hypotheses obtained, provides guidance for script development which then enables the translation of those hypotheses into actual scripts by categorizing them into three types of interactions, namely messages, prompts, and information. The hypotheses and the actual IVR banking scripts were significant contribution to the IVR banking systems developers, the banks, and certainly, the field of audio-based human-computer interactions (HCI).

*Keywords* - audio-based user interface, telephone-based user interface, IVR banking system, scripts development.

## 1. BACKGROUND

The success of any interactive voice response (IVR) system relies heavily on its user interface because it is the only way users 'see' the system. IVR systems that fails to perform, always being criticized in terms of its technology. However, according to Stringham (1999), in most cases the problem comes from the systems' user interface, as he quoted "the problems are usually blamed on the technology itself, but in most cases it's the design of the IVR user interface".

There are several design challenges faced by IVR banking user interface designers, and most of them are due to the large and varying population of IVR banking users (Essinger, 1999). These users may have never or only rarely experienced an automated banking system in the past. From a survey done by Zulikha & Abdullah (2000), most people only call occasionally. It is not common that people call two or three times a day for several days in a row. This means each time the user calls, they may not remember much from their previous call (Boyce & Gorin, 1999). Thus, we cannot assume that the callers have learned how to use the system. On top of that, an IVR banking system, willy-nilly, involves certain banking terminology in its user interface. These issues, in particular, create challenges in designing a user interface that is acceptable and suitable to all IVR banking users.

Many studies have been conducted in various aspect of audio-based user interface (such as those carried out by Stevens, 1996, Resnick & Virzi, 1995, Kamm, 1994, and Mosier & Smith, 1985) but not many concentrate on telephone users. IVR as a system that only use audio via telephone to execute any transaction (in this case banking transaction) very much relies on the audio-based user interface because this is the only way users can access the system.

A series of IVR user interface-related studies have been carried out by the American Institute of Research (AIR). From their studies as well as studies carried out by Schumacher et. al., (1995), and Dillow (1997), four main methods could be gathered towards better IVR user interface in general, The methods were 1) expert review by the researcher(s) themselves; 2) structured interviews with real users; 3) think aloud protocols); and 4) usability test using demonstration system (Stuart et. al, 1991, Albesano et. al., 1997, Boyce & Gorin 1999).

Those studies however, do not restrict their scope in any specific domain of implementation. Expert review of the scripts (i.e. the actual texts to be recorded into the IVR system) relies on the evaluation done by the scripts' developers themselves. It does not involve target users' view and opinion. Whereas structured interviews with real users takes into accounts users' view and opinion but lack input from experts. Each of the method has its own justification and motivation. Think aloud protocol and usability tests using a demonstration system focus towards scripts usability but do not involve methods in preparing the original scripts right from the very beginning.

## 2. OBJECTIVE

What we would like to do is to find out to what extend could audio alone --without any other multimedia element -- be used to the maximum to help customers perform all kinds of banking transactions. Hence, the objective of this study was to facilitate the evolution of a usable and consistent IVR banking user interface. The idea was to gather as much input as possible that could support us in designing an IVR banking user interface that is as helpful as possible for the customers to access banking telephony services.

The approach discuss in this paper is an iterative design base on task analysis. Details of the methodology will be described later.

### *Why limit to banking domain?*

In solving user interface issue for IVR, it is more appropriate to choose a particular domain so that our study could be focused towards user interface issues in more specific domain and that we could limit the formation of general guidelines. Having concentrated on a particular domain would help us in developing precise scripts. Besides, in order to test and evaluate the hypotheses and scripts, we need a domain to operate on. Banking domain was selected because it begins to gain more popularity in this country, yet it does not have any standard guidelines for its IVR user interface design.

### *What is wrong with the present IVR banking User Interface?*

The design of any IVR user interface in general, needs to support basic elements of user interface and usability characteristics as much as possible (Stephen, 1998, Nielsen, 1992 & 1994). However, having had the IVR banking system running for almost a decade, it still amazes us how much such application violate basic user interface and

programming principles. An example can be seen from the number of options given in the menu choices. Users should not be presented with too many menu choices, yet it is still a very common practice.

## 3. METHODOLOGY

The approach used in this research is an iterative design based on task analysis which comprises of three main stages. The first stage is a process of collecting hard data which involved a far-reaching library search. This is followed by collecting data from an on-line questionnaires. Evaluations by users experienced in IVR banking are performed at the second stage. This stage produced draft scripts that can be evaluated by the audio-based user interface experts at the third stage of the task analysis. The result of experts' evaluation are reviewed hypotheses and scripts for IVR banking. Detail activities of each stage can be summarized as follows.

*Stage 1:* Library search & questionnaires. We begin with collecting hard data from user interface cases, statistics, and general guidelines published by international and national sources. Most data are in the form of user interface cases. A case, in this regard is either a piece of literature concerning IVR banking or a report on actual situation where a telebanking transaction is performed (telebanking events). Cases gave us a lot of raw material from which to mold the user interface. The cases were broken into parts, and were translated from time domain into the interface domain. We make a list of every decision the user has to make during the events. For each decision, notes were taken regarding the the information the user needs in order to make the decision wisely.

Other than library search, with the local banks cooperation, on line questionnaires were also distributed to 311 experienced IVR banking customers located almost in every state in Malaysia. There were also other 56 IVR banking users who responded to the on-line questionnaires, and from the demography they appeared to be experienced users (having had at least 6 months experienced in using IVR banking system). Thus, there were 367 participating users all together. The questionnaires target at obtaining opinion, suggestions and comments about IVR banking user interfaces from those experience users. The questionnaires consists of two parts. Part one

attended to the respondents' demography and experience (in relation to IVR banking). Part two consists of three open-ended questions as follows: (1) what factor do you think might make IVR banking user interface more appealing and usable? (2) what are the features that you find most helpful in any IVR banking systems that you have used? (3) On the other hand, what are the features that you find most confusing/annoying/difficult?

Output obtained from this stage was a set of IVR banking draft hypotheses (guiding principles). Figure 1 summarised *Stage 1*.

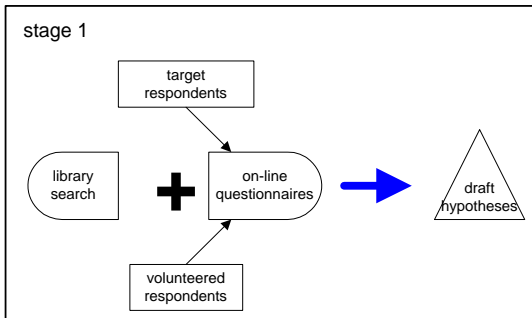


Figure 1: *Stage 1* of feedback-response task analysis

*Stage 2:* Figure 2 shows the steps taken in this stage. Using the draft hypotheses as a guide, a series of structured interview sessions with experienced users were carried out, attempting at obtaining their reviews, comments, recommendations and other additional input regarding IVR banking user interface. Out of 367 participating users, a total of 55 experienced users (i.e. 15%) agreed to be interviewed. Those users were assumed to have gone through hard times during their early experience performing banking transactions via IVR systems. Thus, based on those experiences, they were able to give directions in divulging the user interface unanticipated problems, drawing out silent problems or just confirming suspected problems. This direct contact with users have lead to specific, constructive suggestions. Output obtained from this step was a set of draft IVR banking scripts.

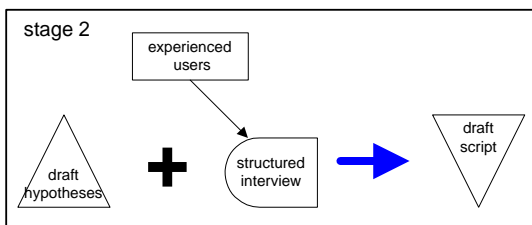


Figure 2: *Stage 2* of feedback-response task analysis

*Stage 3:* Following *stage 2*, structured interviews with experts in the field of telephone-based/audio-based user interface (TBUI) were carried out in order to validate the draft hypotheses and scripts obtained from the earlier stages. Figure 3 illustrates this stage.

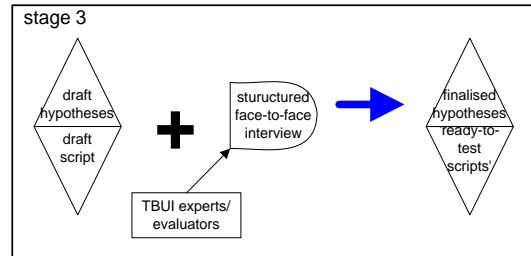


Figure 3: *Stage 3* of feedback-response task analysis

This stage was actually concerned with evaluating the draft scripts. Thus the experts involved could be considered as evaluators. They were selected based on their writing and publications in the field of audio/telephone-based user interface. A total of five evaluators (local and overseas) were identified and interviewed. We limit the number to five since it is the best number of evaluators according to studies carried out by Nielsen (1994) and Nielsen & Landauer, (1993). Due to its criticality, the interviews were carried out face-to-face. The interface hypotheses and scripts were checked for conformance with TBUI user interface rules, audio-based user interface principles, experts' knowledge and experiences. The experts were given time to review the hypotheses and scripts prior to the interview. Studies that have been conducted by Jeffries et al., (1991) and Karat et al., (1992) provide evidence for the benefits of this kind of expert reviews.

Figure 4 summarised the method described in *Stage 1, 2 and 3* above.

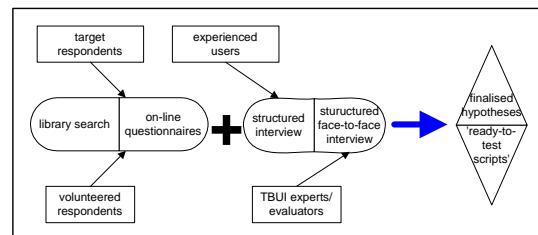


Figure 4: Steps taken and the result obtained from the task analysis.

**Why is this method used?**

Benefits of using this approach, include:

- a) This method provides an effective way of collecting primary data by directly taking

into account the target audiences' view, opinion and perspective.

- b) Experts' judgment and opinion in relation to the hypotheses could be evaluated, rationalized and modified in a scope that do not incur changes to the hypotheses characteristics that matches the users view. This way, the modifications were performed within the 'boundary' of the hypotheses main features. Therefore, it could not change the characteristics of the hypotheses but could complement it according to the users view and the telephone-based user interface principles and guidelines.
- c) All relevant hypotheses and scripts, including the hypotheses related to errors made by users, could be attended to systematically by the experienced users as well as the field experts.
- d) Two-way course of action help us in determining underlying reasons for errors and confusion in the scripts.

#### 4. RESULT

From the literature review and the questionnaires filled-up by the respondent we have gathered more than 300 cases<sup>1</sup> of IVR banking user interface problems and issues all together. However, some cases, though seemed different, were actually redundant or referring to similar user interface problems. For each hypothesis there exist a few related user interface cases. Thus, out of the total, we manage to draw out 98 hypotheses.

The hypotheses were used in our interviews with 55 expert users in the *Stage 2* of the research method. Based on those users' experienced, many were able to give directions in divulging the user interface unanticipated problems, drawing out silent problems or just confirming suspected problems. Listed in Appendix 1 are the general hypotheses deduced after completing *Stage 1* of the feedback-response task analysis. Those hypotheses are grouped into different categories according to the IVR user interface attributes namely user input, accessing the customer service representative (CSR), response time and wait message, assistance, language, translation, menu choices and cancelled services, systems response, information delivery, confirmation of data entry,

<sup>1</sup> The cases could be obtained from the authors upon request.

terminology, method and tenet of prompts, key allocation, voice, and terminating calls.

Going through stage 2, 15 hypotheses were were modified by the expert users. The interviews were productive because the interviewer can pursue specific issues of concern. Most hypotheses are readily acceptable by the respondents. 5 contradictory hypotheses were obtained from this interview, they were (1).....and (2).....(4)....(5)....These contradictions were then resolved by the experts, who agreed to settle with these hypotheses: (1)....(2)....(3)...(4).

No experts has come out with any contadictory outcome. The experts' also removed 10 others hypotheses, by claiming that they are general knowledge and are treated as common sense. Those hypotheses were:.....

The final hypotheses obtained are as follows:...

#### 5. TRANSFORMING GENERAL HYPOTHESES INTO SCRIPTS

After performing *Stage 2*, we managed to come out with the draft scripts<sup>2</sup>. An IVR banking system flow was designed for six major banking services as identified by Zulikha & Abdullah, (2000) in order to get actual scripts for those services. Thus in this phase, only scripts for those six services will be finalised.

These scripts were brought to *Stage 3* for evaluations by the filed experts. In-depth analyses of the scripts were conducted. This analysis generates proper hypotheses about the overall IVR banking system user interface and about the difficulties that might be encountered by users as well as suggestions for overcoming the difficulties. The analysis were performed to analyze, among others:

- e) each and every individual script in terms of its vocabulary, terminology, sentence structures, length, anticipated recording style (sounds, intonation, and emphasis), and clarity;
- f) relationship of one script to another and to any written materials that user might

<sup>2</sup> The actual draft scripts (main script and their pool of scripts) can be obtained from the authors.

- refer to while performing a banking transactions;
- g) sequence of scripts that users would hear when accessing any banking services;
- h) error messages that user would hear if they made errors; and
- i) follow on prompts when time out occurs.

For (c) and (d), specific attentions were given to the conciseness and amount of info the messages provide in assisting users. In conjunction with these analyses, the interview results obtained from experienced users were used to help us formulate the result.

Also at this stage (*Stage 3*), we modified the drafts scripts to produce actual scripts. To assist us in developing, modifying scripts, and to get down to the nitty-gritty of the problems in scripts development, we divided the scripts into three main categories based on their characteristics and their influence on the anticipated users' action. The categories are message, prompt, and output.

Each type of the script could be further divided into a particular message, prompt, and output as illustrated in table 1.

Category	Script type	Code	Examples
Message	Error message	EM	<i>Maaaf, nombor tersebut belum diimplement oleh system. We are sorry. The number is not yet implemented by the system.</i>
	Wait message	WM	<i>Harap bersabar, masukan anda sedang disemak. Please hold on, your entry is being verified.</i>
	Response message	RM	<i>Selamat datang. Welcome Panggilan anda disambungkan ke wakil jualan kami. Your call is being forwarded to our sales representative.</i>
Prompt	Key in prompt	KP	<i>Untuk ke menu utama, tekan 3. Untuk mendapatkan bantuan pegawai, tekan 0. For main menu, press 3, for our staff assistance, press 0.</i>
	Enter prompt	EP	<i>Sila masukkan jumlah pindahan dana Please enter the amount to be transferred</i>
	Confirmation prompt	CP	<i>RM (anda telah memasukkan 123) + adakah masukan ini betul? + KP (jika ya tekan 1, jika tidak, tekan 2) RM ( you have entered 123) + is the number entered correct? + KP (if it is correct, press 1, otherwise press 2)</i>
Output	Needed information	NI	<i>Baki akaun anda pada hari ni, 21 Jun, ialah satu ribu tiga ratus ringgit. Your account balance as on June 21<sup>st</sup> is one thousand and three hundred ringgit.</i>
	Confirmation information	CI	<i>Akaun anda telah dikemaskini Your account has been updated Buku cek akan dikirimkan ke alamat anda The checkbook will be sent to your address.</i>

Table 1: The category, type, code and examples of the scripts.

For each script type, there are a main script and a pool of other scripts of the same category, for example, EM consists of main EM + pool of EM.

The output of *Stage 3* was a set of polished hypotheses and scripts. The result was tabulated, forming actual scripts for six most popular banking services that will be put forward for usability test. These scripts are being embedded in the design of IVR banking call flow that we are working on.

With the result obtained, it is hoped that the IVR banking user interface problems such as confusing language, overly complex banking transactions, and even flaws in system flow, could be solved as early as possible, i.e. before recording the scripts into the system because at this stage (i.e before prototype or actual system development stage) , changes and modification are easiest and cheapest to do.

## 6. PROGRESS AND FURTHER RESEARCH

For further research, it is suggested that the demonstration system be used in a series of close laboratory experiments with real users. This kind of usability test, preferably using heuristics evaluation and usability inspections (Nielsen, 1994), should be carried out in order to validate and corroborate the findings. The corroborated user interface could then be proposed as IVR banking user interface theory.

A demonstration IVR banking system is being developed incorporating the findings of this study into its user interface. User interface intelligence characteristic has also being set in the prototype. Intelligent flow and smart scripts selections from the script pools are also another important aspect of an informative and useful IVR banking system. This characteristic could also be embedded into the design.

## 7. CONCLUSION

Good user interface has enormous potential for changing and improving our interactions with machines. Thus Human-Computer Interaction research need to specify the difficulties and errors to which human and other factors give rise, so that user interface can be designed to anticipate their

occurrence and ameliorate their effects. IVR banking user interface problems stem from a variety of causes, and there are at least two methods that can be identified as being of particular importance in identifying those causes and in ameliorating the problems. One way is by involving actual users directly in forming user interface hypotheses, and the other way is by proper scripts development approach. This course of action helps us determine underlying reasons for errors and confusion in the scripts. This research implements those methods in its feedback-response task analysis.

The feedback-response task analysis introduced two stages of feedback-response activities and a stage on task analysis. The major benefit of this approach was that we were able to have a two-way course of action guided by both beneficiaries, that is the users and the experts. The analysis was performed on the specific task (in this case, banking transactions) so that the data collected were more concrete and focused. Without a specific domain, we will not be able to gather concrete data and this would lead to formation of general hypotheses and guidelines, which were similar to conclude without an answer. The three-stages task analysis approach performed during the study nevertheless has a drawback in that it takes longer to complete as compared to expert review or think aloud protocols. This is due to its serial nature where the next stage has to wait for the result of the previous stage. If one stage stuck, it could mean the next stage has to wait forever.

However, to a certain extent, this approach had divulges unanticipated problems inculcated in IVR banking user interface, confirms suspected problems, draws out silent problems, spells out various underlying causes of problems and provide insights into possible solutions.

## 8. REFERENCES

- Albesano, D., Baggia, P., Danieli, M., Gemello, R., Gerbino, E., & Rullent, C. (1997), A robust system for human machine dialogue in telephony-based applications, **International Journal of Speech Technology**, 2, pp 101 – 111, Kluwer Academic Publishers.
- Boyce J. Susan & Gorin L. Allen, (1999), **User Interface Issues for Natural Spoken Dialog Systems**, AT&T Laboratories Research Group.
- Dillow, S.,(1997), Using Think Aloud Protocols in Formative evaluation of IVR system, **International Journal of Speech technology**, 2, no 2, 1997, 165, 12 pages, Kluwer Academic Publishers.
- Essinger, James (1999), **The Virtual Banking Revolution: The Customer, The Bank and The Future**, ITP: London.
- ITU-T Rec. F.902 (02/1995), **Interactive services design guidelines**, International Telecommunication Union: Geneva.
- Jeffries, R., Miller, J. R., Wharton, C., and Uyeda, K.M., (1991) User interface evaluation in the real world: A comparison of four techniques, **Proc. ACM CHI91 Conf.** 119-124.
- Kamm, C. (1994). User Interfaces for voice applications. In D. B. Roe & J. G. Wilpon, Eds. **Voice Communication between Humans and Machines**, pp. 422 – 442. Washington, DC:National Academy Press.
- Karat, Clarie-Marie, Campbell, Robert, and Fiegel, T., (1992), Comparison of Empirical Testing and walkthrough methods in user interface evaluation, **Proc CHI'92 – Human Factors In Computing Systems**, ACM, New York, 397-404.
- Mosier, Jane N.dan Smith, Sidney L. (1985), **Application of Guidelines for Designing User Interface Software**, In G. Perlman, G. K. Green, & M. S. Wogalter, Eds. Human Factors Perspectives on Human-Computer Interaction: Selections from Proceedings of Human Factors and Ergonomics Society Annual Meetings, 1983-1994, Santa Monica, CA: HFES, 1995, pp. 34-37.  
(<http://www.acm.org/~perlman/hfeshci/Abstracts/85:946-949.html>).
- Nielsen, J. & Landauer, T. K. (1993), A mathematical model of the finding of usability problems. **Proceeding ACM.IFIP INTERCHI'93 Conference**,

(Amsterdam, The Netherlands, April 24-29), 206-213.

2000, Colorado, United States, 11 April, 2000.

Nielsen, J. (1992), Finding usability problems through heuristics evaluation. **Proceeding ACM CHI'92 Conference**, (Monterey, CA, May 3-7), 373-380.

Nielsen, J. (1994), Heuristic evaluation. In Nielsen, J., and Mack, R.L. (Eds.), **Usability Inspection Methods**, John Wiley & Sons: New York.

Resnick, Paul and Virzi, Robert, (1995), **Relief from the Audio Interface Blues: An Expanded Spectrum of Menu, List, and Form Styles**, **ACM Transactions on CHI**, 1995, vol. 2(2), pp. 146-177.

Schumacher, J. R., Hardzinski, M. L. & Schwartz, A. L. (1995). Increasing the usability of interactive voice response system: research and guidelines for phone-based interfaces. **Human factors**, 37, 251-264.

Stephen Marshall, (1998), **IVR / VRU User Interface Design Best Practices**, Vanguard Communications, available at [http://www.prosci.com/ivr\\_news.htm](http://www.prosci.com/ivr_news.htm).

Stevens, R. (1996) **Principles for the Design of Auditory Interfaces to Present Complex Information to Blind People**, PhD Thesis, University of York, UK. (Also available at <http://www.dcs.gla.ac.uk/~stephen/research.shtml>)

Stringham, R., President of EIG Inc. (1999), **IVR system**, available at [http://telecomlibrary.com/content/features/112399\\_ivr.html](http://telecomlibrary.com/content/features/112399_ivr.html).

Stuart, R., Desurvire, H., & Dews, S. (1991). The truncation of prompts in phone based interfaces: Using TOTT in evaluations. **Proc. of the Human Factors Society 35<sup>th</sup> Annual Meeting**. Santa Monica, CA: Human Factors Society, pp230 – 234.

Zulikha Jamaludin & Abdullah Embong, (2000), **IVR Banking In Malaysia As A Measurement of Preparedness For E-Commerce**, presented at COLLECTeR

## APPENDIX 1

### User input

- H1: In a normal situation, entry from callers should only be input once.
- H2: Input based on menu selection should be single key press.
- H3: If a customer have to call back, they need not repeat (by choosing the options again) the purpose of the call.

### Accessing the Customer Service Representative (CSR)

- H4: Customer should be able to reach the CSR from any point in the system flow.
- H5: Customers should be informed about method (or key press) for accessing the CSR
- H6: While waiting for the CSR, customers should be informed about the wait status and other alternatives they could choose.
- H7: While waiting for the CSR, customers should not be played with busy tone.
- H8: Any call transfers (to CSR or to other users/bank officers) must be accompanied by its associated data (collected during the call/ IVR transactions).

### Response time & wait message

- H9: Waiting period should be filled with periodical wait response.
- H10: Response should be given after every 8 second, with maximum wait period of 24 second.
- H11: For expired wait period, call should be transferred to the CSR together with the data collected.
- H12: Wait response must not be the repetition of the same message (it should be another 'clearer' message)
- H13: Customers should be informed about the way to exit from a certain path and other alternatives while they are waiting.
- H14: Waiting period for the second time (in a different path) should not be filled with previously similar wait message.

### Assistance

- H15: Assistance must be given when a caller is unable to make a valid selection.
- H16: When 2 consecutive wrong input were received, call should be transferred to the CSR.
- H17: When 2 consecutive wrong input were received, the caller should be given additional information.

- H18: When 2 consecutive wrong input were received, the caller should be given option to quit from the system.
- H19: Assistance must relate to the latest task chosen/made by the caller.
- H20: A set of additional command containing various kind of help should be made available in the main menu.
- H21: Assistance should provide more detail information if mistakes continues to happen.
- H22: Help prompt should be offered, whenever 2 consecutive waiting time expires, or 2 consecutive errors were made.

### Language

- H23: Language options available must be informed at the very beginning of the system flow.
- H24: If one language option has been made, the language should be maintained in all system flow including intervals, commercials, product promotions etc.
- H25: Other than the main language, user interface with dialects should also be introduced.
- H26: The use of dialects should be considered very important to a certain group of customers.
- H27: Other than national language, user interface language should include the language used by most international customers'.
- H28: The language must tend toward daily speaking language and not the language used for writing.

### Translation

- H29: If translation is required, the user interface must be translated by the qualified translators.
- H30: Only experts in the field should do the script and dialogue manipulation.
- H31: The translated version of the interface should sound as natural as possible (i.e. as if being spoken by the native speaker).
- H32: The translation of time, date and amount must take into account cultural factors of the target language.

### Menu choices

- H33: Task should be structured to become smaller parts (less menu options)
- H34: Menu options should not exceed 5 tasks/ applications/ services.



- H35: Each submenu must have option to go back to additional command set in the main menu.
- H36: Each submenu must have option to reach the CSR.
- H37: Each preceding menu should only be used to offer the next relevant menu options.
- H38: For the services that could not be offered, its menu must be excluded (not played).
- H39: Option that is placed in the very top of the list should be the most frequently accessed option.
- H40: Each menu option must be unique for one particular action.
- H41: A menu option must not have two (or more) tasks in one (2 or more task in one menu option).
- H42: The maximum step to complete a transaction should not exceed 7 steps (the depth of the menu).
- H43: Options in the main menu should not be changed unless extremely necessary.
- H44: The frequency in changing options in the main menu should be minimised.
- H45: Changes in the submenu should be announced in the main menu.

**Error messages**

- H46: Negative words should be avoided even in the error messages.
- H47: Error message should not reflect customers' mistakes.
- H48: Warning should only be used in genuinely critical events.
- H49: For wrong entry numbers, the numbers should be read back to the customers.

**Error repair**

- H50: Customers should not be frequently informed about the system's ability to overcome error.
- H51: Customers must be allowed to recover from small mistakes without having to repeat from the beginning.
- H52: Customers must be allowed to modify certain information during the call.
- H53: Calls from customers who refuse assistance should be transferred to the CSR/ closing message.
- H54: Errors that lead to call termination (closing message) should only be of critical errors.

**Interruptibility**

- H55: Critical information or error messages should be non-interruptible.

- H56: Any non-critical prompt/information should be interruptible.
- H57: Uninterruptible messages must be as short and as clear as possible.
- H58: Interruptible prompt should allow system to process the keyed-in input.

**System response**

- H59: Customers must be played with a related response after each entry.
- H60: Any administration action taken must not be made known to the customers.
- H61: Response message must be relevant to the contexts.
- H62: In case of any unordinary transaction delay, customers must be informed about the problem and the alternatives available.
- H63: Response must be in the form of assistance and not flaunting.
- H64: Flaunting messages could only be used in critical events.
- H65: Response must assist customers in their tasks.
- H66: Customers should be addressed by their name once they are identified by the system.

**Information delivery**

- H67: Information about the date must be as clear as possible.
- H68: Commercial and new services announcement should not be included in the default information.
- H69: Commercial and new services announcement should be made available in one of the menu options.

**Confirmation of data entry**

- H70: Data entry confirmation must be requested from the customers in a critical situation.
- H71: Prompts for critical commands' confirmation must be followed by explanation on the consequences and effects of the commands.
- H72: A sequence of non-critical input numbers of not more than three digits should be replay (for confirmation) by the system.

**Terminology**

- H73: Terminology used must be consistent in all applications in the main system and other related integrated system.
- H74: Prompts must only use vocabulary/terminology understood by the target customers.

- H75: Modern and latest terminology can be used to gain certain competitive advantage in terms of the banks' image.
- H76: Sophisticated terminology could highlight the banks' as professional.
- H77: Scripts with terminology must be viewed and evaluated by the IVR banking user interface expert.

**Method and tenet of prompts**

- H78: Arrangement of sentence in the prompts should be in the form of objective-action.
- H79: Polite terms must be used proportionately, not too much or too little.
- H80: The word "press" should be used when asking for a single key-press.
- H81: The word "enter" should be used when asking for a sequence of input numbers.
- H82: The same input prompts should not be repeated more than twice (consecutively).
- H83: Input prompt for the third time should be clearer and different from the previous two, but with the same objective.

**Key allocation**

- H84: In confirmation menu, the key "1" should always be used for "yes" and "2" for "no".
- H85: The key "0" should always be used for default assistance or CSR assistance.
- H86: The key "9" should always be used for terminating a call.
- H87: The "#" key should always be used for ending mark.
- H88: Ending mark "#" for input of fix number of key presses could be ignored.
- H89: Options should be organized with their keys sorted in ascending order.
- H90: As much as possible, keys should be consistently allocated to their associate functions.

**Cancelled services**

- H91: Option that could not be offered should not be included in the menu choices.
- H92: Key for option that could not be offered should not be played as one of the menu choices.
- H93: Option that is frequently suspended or aborted should be placed as the last option.

**Voice**

- H94: Male voice should be used in all prompts for the religious-related services.
- H95: Female voice should be used in all prompts except those religious-related services.

- H96: Voice prompt should use human recording and not synthesised voice.
- H97: Voice pitch for the last word in the last option should be lower (ending pitch) than the last word in other menu options.

**Ending calls**

- H98: No call should be disconnected until a clear ending message be played.