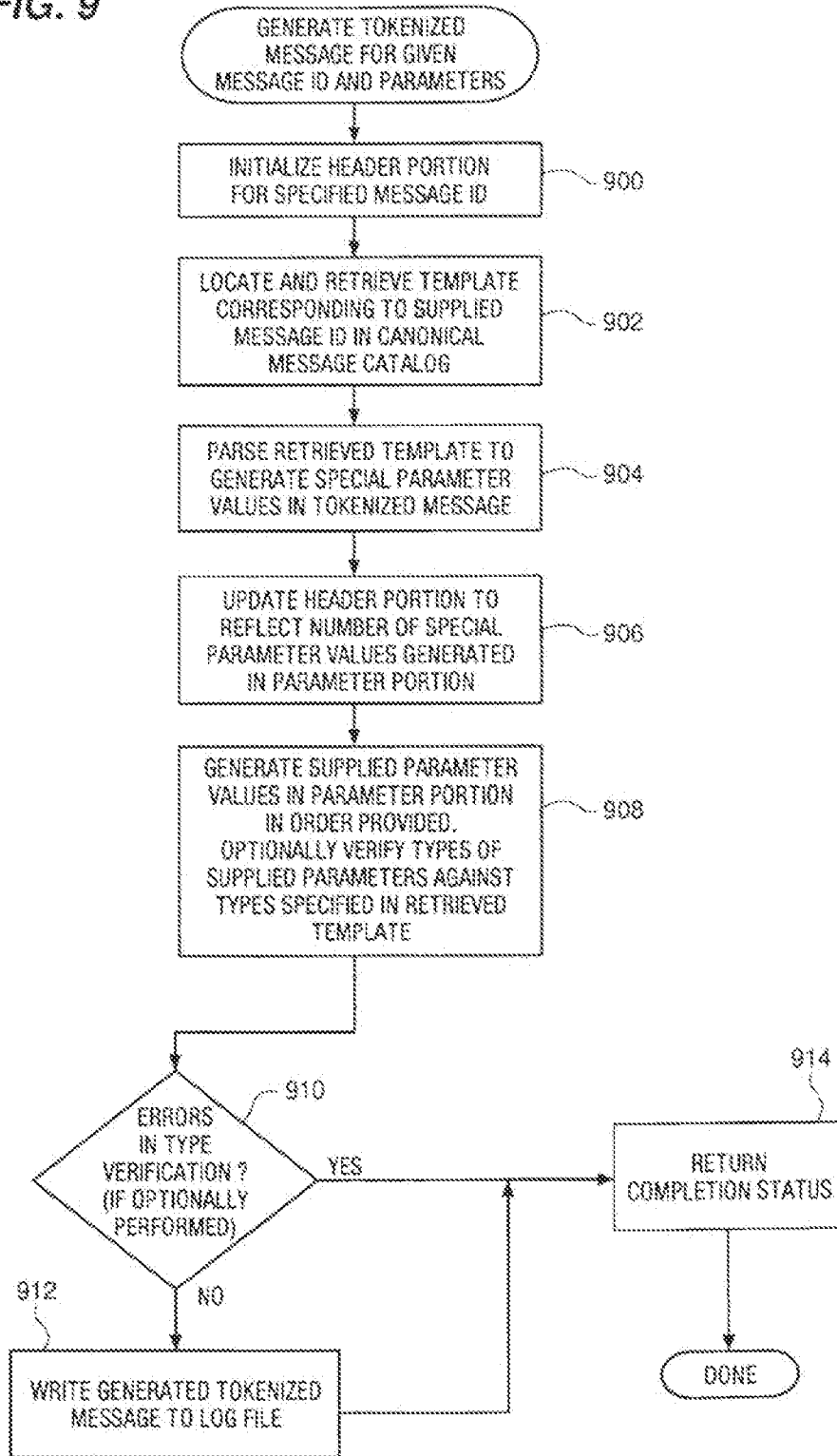


FIG. 9





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(72) Inventor: **MacRory, Simon**  
**Monkstown, County Dublin (IE)**

(74) Representative: **Weldon, Michael James et al**  
**c/o John O'Brien & Associates,**  
**Third Floor,**  
**Duncairn House,**  
**14 Carysfort Avenue**  
**Blackrock, Co. Dublin (IE)**

(71) Applicant: **Graphite HRM Developments Limited**  
**Dublin 2 (IE)**

(54) **A survey system and control method**

(57) A survey system comprises a supervisor station (1) and a respondent station (3). There are four distinct stages in which a survey is created (12), issued (14), executed on the respondent station (3), imported (15), and analysed (17). Questions relate to scales providing for quantitative responses and control programs are issued. The respondent's station exports the survey only when completed, and the respondent station takes an active role in controlling the manner in which responses are received and recorded and it also performs dynamic tests on the data. The questions are in a structured model format and this allows meaningful and clear survey results to be outputted from the analysis stage (17).

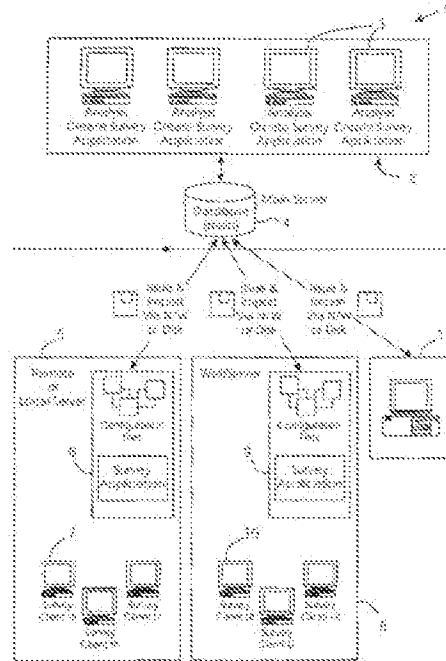


Fig. 1(a)

EP 1 035 490 A1

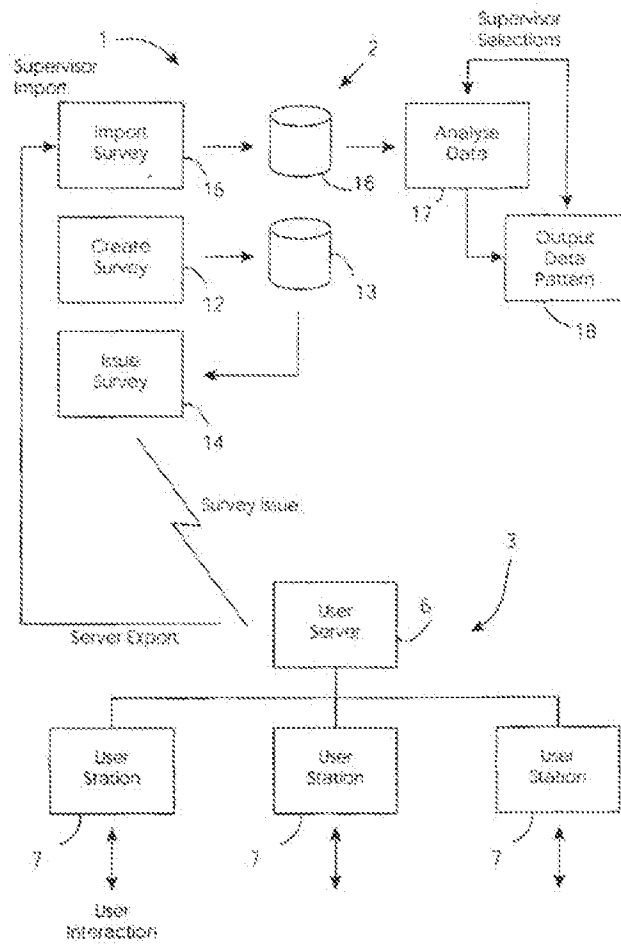


Fig. 1(b)

**Description**INTRODUCTIONField of the invention

[0001] The invention relates to a computerised survey system and control method, in which the survey system comprises a supervisor station which generates a survey and subsequently analyses the response and a respondent station which receives respondent replies.

Prior Art Discussions

[0002] Such a system is described in United States Patent Specification no. US5842195 (Dolphin Software Pty. Ltd.). In this system the supervisor station is used as an authoring tool to generate a succession of questions to provide a questionnaire. The links between questions are generated as they are authored, and the questions may have several different formats. The questionnaire is transmitted as an electronic mail document to each respondent, who uses his or her computer as a respondent station. A collector in the supervisor station collates responses as they are received and sends reminders if delays arise. The survey is deactivated by the supervisor when it is believed that sufficient responses have been received.

[0003] This system and method appears to allow transmission of questionnaires to a wide variety of respondents. However, it appears that it would be difficult to guarantee integrity of the responses. It also appears that it would be difficult and time-consuming to generate useful survey results for a large body of respondents such as employees in a large organisation.

Objects of the invention

[0004] The invention is directed towards providing a survey system and control method which provide improved co-ordination for large bodies of respondents such as employees in a large organisation.

[0005] Another object is to provide improved flexibility in the analysis of survey responses to generate survey results as require by a supervisor.

[0006] A still further object is to provide a survey system which gathers and processes data in a very comprehensive manner, sufficient to act as an organisational diagnosis profiler (ODP) which models behaviour and attitudes of personnel in a large organisation.

SUMMARY OF THE INVENTION

[0007] According to the invention, there is provide a method of controlling a computerised survey system comprising a supervisor station and at least one respondent station, the method comprising the steps of-

at the supervisor station generating a plurality of questions, and transmitting the questions to the respondent station,

at the respondent station outputting the questions, receiving responses, and transmitting the responses to the supervisor station, and

at the supervisor station analysing the responses and generating survey results, characterised in that

the questions are generated in groups of questions according to a model having a fixed structure, and a response scale comprising an interface for prompting respondent selection of a quantitative value on the scale is generated for each question,

the supervisor station issues a survey to the respondent station, the survey comprising the questions and associated scales and a control program,

the respondent station controls survey operation and generates respondent data files, and returns a complete survey only when all associated respondents have responded;

the complete survey is imported into the supervisor station, and

the supervisor station analyses the responses by calculating a statistical value for all valid responses to each question and outputs said value in the survey results.

[0008] The invention therefore provides for highly controlled capture of survey responses because the questions are generated in a pattern according to the model having a fixed structure, they each have a response scale, and the supervisor station issues a complete survey comprising both control programs and the questions and response scale. Another important aspect is that the respondent station performs an active role in ensuring that the survey has been completed before it is exported back to the supervisor station. For analysis, the supervisor station uses the response scales in order to generate comprehensive, meaningful and valuable survey results.

[0009] In one embodiment, the fixed structure is a hierarchy with questions grouped at terminations.

[0010] Preferably, the survey results are outputted in reports according to the model.

[0011] In another embodiment, the scale comprises discrete response values.

[0012] Preferably, the scale does not include a median value.

[0013] In another embodiment, the survey responses are stored by the supervisor station in a static database, and the analysis is performed dynamically using data



read from the static database in a plurality of cycles initiated by a supervisor.

[0014] In a further embodiment, the survey response data is filtered as it is imported to the supervisor station.

[0015] In another embodiment, the respondent station automatically, and transparently to the respondent, captures auxiliary data relating to the nature of the respondent's use of the respondent station.

[0016] Preferably, the respondent station automatically captures reply times.

[0017] In a further embodiment, the respondent station automatically captures data relating to the respondent use of a help facility.

[0018] In another embodiment, the respondent station automatically generates response validity data according to the paradox tests.

[0019] Preferably, the questions include respondent profile questions, and associated response interfaces for recording quantitative response values, and the analysis step sorts survey results according to selected profiles.

[0020] In another embodiment, the issued survey data is in flat file format and is retained in that format by the respondent station.

[0021] Preferably, the respondent station performs completion rate control by automatically monitoring the number of user data files created.

[0022] In a further embodiment, the survey is issued in folders having dedicated read/write access rights to provide security.

## DETAILED DESCRIPTION OF THE INVENTION

### Brief Descriptions of the Drawings

[0023] The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only with reference to the accompanying drawings in which:-

Fig. 1(a) is a diagram illustrating the architecture of a survey system of the invention, and Fig. 1(b) is a diagram illustrating the major components of the survey system in flow diagram form;

Fig. 2 is a diagram illustrating a structure providing a pattern for generating questions;

Fig. 3 is a flow diagram illustrating creation of a survey;

Fig. 4 is a flow diagram illustrating issuance of a survey;

Fig. 5(a) is a flow diagram illustrating execution of a survey a response station, and Fig. 5(b) is a diagram of a user data file which is generated;

Fig. 6(a) is a flow diagram illustrating a message for importing a completed survey into the supervisor station, and Fig. 6(b) and Fig. 6(c) are diagrams illustrating the structure of data files which are created;

Fig. 7 is a flow diagram showing an analysis stage for generation of survey results,

Fig. 8 is a sample display of profiles, and

Figs. 9 to 12 are sample display screens showing supervisor interactivity for analysis.

### Description of the Embodiments

[0024] Referring initially for Fig. 1(a), a survey system 1 is illustrated generally with alternatives for parts of the system shown. A supervisor station 2 comprises a number of workstations 3 connected via a network to a main database server 4. The supervisor station 2 issues a survey to respondent stations which may comprise a client/server system 5 which may be either local or remote. The respondent station controls operation of the survey and more particularly a server 6 controls using client workstations 7. A survey may also be issued to a Web server respondent station 8, in which a server 9 executes the survey application using workstations 10 of the respondents. Such a respondent station is implemented with Java and HTML code providing dynamic Web pages. Finally, a survey may be issued to a stand-alone PC respondent station 11.

[0025] In all cases, the respondent station executes the survey, actively monitors completion by respondents, closes the survey, and it is then imported into the supervisor station 2.

[0026] The major stages in a survey control method implemented by the system 1 are shown in Fig. 1(b). A survey is created by a module 12 and is stored in a database 13. Creation of the survey is according to a pattern set by a model having a fixed hierarchical structure. A module 14 issues the survey. An important aspect of this step is that it is not just questions which are transmitted, but also non-configurable associated response scales which provide for quantitative user responses. Another important aspect is that a control program is issued together with the questions so that if a full survey is issued, allowing the respondent station to take an active role in controlling the manner in which responses are given by a respondent and in providing a completed survey for subsequent import. All data at the respondent station site is in flat file format, independent of database technology.

[0027] The respondent station only returns the responses when it closes the survey and it is then imported into the supervisor station 2 by a module 15. The importing step involves filtering the response and generating a static database 16. This database is static in the

sense that the imported and filtered survey data does not change and is effectively locked. However, other data which is reloaded may change to some extent. Data is drawn from the static database 16 by an analysis module 17 to generate output data patterns 18 according to supervisor instructions.

[0028] Referring now to Fig. 2, the model for generating questions is indicated by the numeral 20. In this structure, there are six factors which in this embodiment relate to human resource management and the factors are Structure, Goals, Relationships, Climate, Leadership, and Process. Within each of the factors there are three criteria. In this embodiment, the Goal factor has Goal Agreement, Goal Clarity and Goal Fit criteria. Finally, each criterion has five questions. The factor level is indicated by the numeral 21, the criteria level by the numeral 22, and the correction level by the numeral 23. An example question is given in Fig. 2 and a response scale 24 is also illustrated. As is clear from Fig. 2, the response scale has six discrete quantitative values 1 to 6. To respond to a question, the respondent simply selects one of these values. Another important aspect is the fact that there is no median, thus forcing respondents to think more thoroughly about responses. In this embodiment, the scale 24 applies to all of the ninety questions across all of the criteria.

[0029] Referring now to Fig. 3, a stage 30 of creating a survey is illustrated. In step 31 various survey details are edited such as the name of the survey, the date etc. In step 32 profiles are edited. The profiles are questions and are associated response displays to receive information regarding the profile of the respondent. These questions are intended to gather information such as the gender, age, education level, current employment position, position level, time with organisation, and work area information. In step 33, comments are edited. These are to allow a respondent make additional comments in addition to responding to the questions in the model. Further settings are provided in step 34 in which the supervisor edits the locations at which responses are to be gathered. Typically a location is a respondent station. In a large organisation this would typically be a respondent workstation or a server which caters for a number of respondents each using his or her workstation 15. In step 35 the supervisor station creates the static database 16 for subsequently receiving filtered response data. Various files are written in step 35, including QSTAT.ODP and SURVDATA.ODP, both of which are subsequently used for the static database 16. A file SURVINFO.ODP is also generated from subsequently received information regarding the survey. A file QSET.ODP contains the questions which have been generated, and files PROFILES.ODP, COMMENTS.ODP, and LOCATION.ODP contain survey settings.

[0030] Referring now to Fig. 4, a stage 40 of issuance of the survey is described. In step 41 the respondent locations are updated the files created in the stage 30 are outputted. In particular, the following files are out-

putted:-

QSET.ODP  
 PROFILES.ODP  
 COMMENTS.ODP  
 LOCATION.ODP

[0031] In step 43 the respondent station creates a file called DISKINFO.ODP. This is a control file which indicates the status of the survey and once it is created, the survey may be executed on the respondent station. The program files are copied in step 44 and in step 45 the respondent station creates read me README.TXT, STARTUP.TXT, and SETUP.TXT.

[0032] For security purposes, the survey is issued as there main folders. A main application file folder has read and execute access rights only. A folder for incomplete user data files has read, write, and delete access rights. Finally, a folder for complete user data files has read and write access rights only. This ensures that completed survey files cannot be deleted. This is important when the survey is issued to a public access server, which is exposed to possible mis-use and accidental file deletion.

[0033] Referring now to Fig. 5(a), execution of the survey on the respondent station is now described.

[0034] A title screen displayed in step 51 allows a survey to be opened in step 52. The respondent station uses the program file to set up the survey and it reads the profile names. As shown by the step 53, the files used are PROFILE.ODP, COMMENTS.ODP, and QSET.ODP. In steps 54 and 55, user licence data is checked and the program exits if not available. In step 56, the station determines if the user is new and if not, in step 57 it continues with the survey by controlling access using a password, writing a new user data file, and setting a statement number. The user data file is described in more detail below.

[0035] In step 58, the station displays a survey introduction and in step 59 it displays questions to prompt input of user profile information and in step 60 it displays a questionnaire guide.

[0036] The sequence for each of the ninety questions or statements is illustrated in step 61. The station fetches the statement from QSET.ODP in step 62, subsequently receives a response and automatically on-the-fly carries out a paradox test. The paradox test arises from the structure of the statement pattern in that for each criteria there is a number of statements and the control program in the issued survey recognises paradox's in answers given to related questions. Suspect responses are flagged as such.

[0037] In addition, the respondent station automatically records the time taken for the response to be given according to a real time clock. Finally, the respondent station also automatically captures data relating to usage of house facilities by the respondent.

[0038] Comments as prompted by the COMMENTS.ODP file 65 are captured in step 64. The program exits in step 65 with a final display message.

[0039] Because responses are dynamically processed and saved, problems do not arise if the system crashes or is accidentally switched off.

[0040] Referring now to Fig. 5(b), the user data file which is generated by the respondent station is illustrated. As is clear from this diagram, the user data file contains some general information such as the survey directory and version. It also data indicating users respondents which are eliminated. Profile data is included such as the respondent's gender, age, education, time in organisation, time in the current position, work area, and position level. The survey answers are given in an array of single value for each response, the value being that selected on the scale 24. The last two rows provide data on the number of times help was requested from each statement and the time taken to answer.

[0041] An important aspect of the operation of the respondent station is that it performs completion rate control according to the program files received in the survey. This involves plotting completion rates by monitoring completion of data files. Also, it sorts according to department of the user (respondent) so that managers may ensure completion according to deadlines. This is another important example of the active manner in which the respondent station operates.

[0042] Referring now to Fig. 6(a), a stage 80 of importing the survey to the supervisor station is illustrated. The stage is instructed in step 81 and a decision step 82 indicates if there is data to process. In step 83 the supervisor station counts the user data files and records the numbers which are complete, incomplete and empty, and eliminated. This is part of a filtering process. These filtering operations are used to update the files LOCATION.ODP and SURVINFO.ODP in step 84. In step 85 the supervisor station extracts the user profile data for the respondent. A decision step 86 indicates if the questions for each response have all been processed. For each respondent the response is extracted in step 87, the time is extracted in step 88 and at the average calculated. The help level is extracted at step 89. In steps 87, 88, and 89 are repeated at each statement. When all statements have been processed means are calculated on a per criteria basis in step 90 and the data is saved to the SURVDATA.ODP file in step 91. The comments are extracted in step 92. The program sequence then goes back to step 82 for the next respondent. When the responses for all respondents has been processed the supervisor station writes the processed data to the files SURVDATA.ODP, SURVINFO.ODP, QSTAT.ODP, and LOCATION.ODP. The importing stage ends in step 94.

[0043] Referring to Fig. 6(b), a SURVINFO.ODP file 100 is described. As is clear from this diagram, this file records information of a general nature relating to the survey. This is of benefit to management. Referring to Fig. 6(c), a SURVDATA.ODP file 105 is illustrated. Again, it will be clear that the data is in quantitative format, namely an integer which indicates the location,

eliminated data, the profile data, and the statement responses. Respondent textual comments are also recorded in six Comment rows.

[0044] The SURVDATA.ODP file provides a static database of survey responses which have been filtered during the import stage. This data is then used in an analysis stage 110 illustrated in Figs. 7, 8, and 9. Referring initially to Fig. 7, a title screen is displayed in step 111 and in steps 112 and 113 access is controlled according to the supervisor licence. If access is gained, the survey is opened in step 114 and in step 115 a profile display 125 (see Fig. 3) is illustrated. As is clear from this diagram, the values for each of the profile items is given. This information is retrieved from the SURVDATA.ODP file. An important aspect of this display is that it allows a supervisor to select subsets of the responses according to the profiles. In step 116, the analysis module performs a zoom function.

[0045] In step 118 reports are generated in various formats. An important aspect of the invention is the fact that the model shown in Fig. 2 provides a structure for generation of data in a meaningful manner. For example, referring to Fig. 9 the responses on the scales are consolidated to give overall results after each criteria. This is very important because it provides information at a glance, which information is meaningful and generated with excellent integrity because of use of the scales and the model. As shown in Fig. 7, the displays are made in step 119, reports are printed in step 120 and are saved to disk in step 121. Average calculation analysis operations are performed in step 122.

[0046] In more detail, a number of different analysis outputs are possible. A display 125 (shown in Fig. 8) allows selection of respondent profiles for analysis. Different analyses are performed and different outputs generated. The outputs include line graphs, spread analysis, statistical analysis, spread profiling, and comparisons.

[0047] The screen 130 of Fig. 9 is a default analysis screen. The average criteria percentage is displayed here in six different strengths, from Strongly Disagree to Strongly Agree. The percentage values are shown in block format and are colour coded to help ease of viewing. A spread analysis display 135 is shown in Fig. 10, a line analysis display 140 in Fig. 11, and a percentage analysis display 145 in Fig. 12. The analysis module 17 also simultaneously displays multiple reports, one each of a number of different profiles. The default display is block analysis.

[0048] The analysis module 17 also uses profile categories which have been selected and inserted into a temporary table analysis file. This process is used for both inclusive and exclusive analysis. The process is as follows:-

```
//Find all the users that match the selected profile for
this survey
//Inclusive Analysis
FOR ALL Users LOOP
```

IF (User belongs to the category items that are currently selected) AND (Belongs to one of the Group that are currently selected) AND (Belongs to this survey) THEN

• Add these users to the tmp\_odp\_analysis list

END IF

NEXT

IF Mode = Inclusive THEN

Select all the users from the list who have ALL the categories selected (i.e. not just one of)

Calculate the average percentage value per criteria from each user.

[0049] For inclusive analysis the supervisor selects category items to be included in the analysis. For example, if the supervisor selects "Male" and "Managers", the process selects all respondents who are both male and managers. On the other hand, if these options are selected for exclusive analysis, the process selects all respondents who are NOT male OR NOT managers.

[0050] A zoom process recalculates the total user count per category for the current analysis profile, in which supervisor selection is on an exclusive basis. The process flow is as follows:-

[0051] The process recalculates the category item totals excluding the category items that have been selected for exclusion when in Zoom mode.

[0052] Insert new record into the Category\_Profile\_temp table for the new category item selected (with type Exclusive).

[0053] Selected Category Items from analysis profile temp table where the type is Exclusive.

//EXCLUSIVE Analysis

FOR ALL Users LOOP

IF (User does not belong to ANY of the category items in the temp table) AND (Belongs to one of the Org Group that are currently selected) AND (Belongs to this survey) THEN

• Add this user to the current user list

END IF

END LOOP

FOR ALL the categories LOOP

FOR ALL the CATEGORY ITEMS in THE CATEGORIES

Count the users from the current user list who belong to this category item.

END LOOP

END LOOP

[0054] Another process analyses an individual statement and provides a display (such as a piechart) of the proportion for each of the six possible answers.

[0055] In a still further process, the module overlays results from a number of different reports and displays the results with in the line graph format of Fig. 11.

[0056] It will be appreciated that the invention provides excellent data integrity because of the dynamic tests performed by the responded station and the auxiliary data which is recorded.

[0057] The model which terminates with the state-

ments and the fixed response scale allow for comprehensive analysis of results in a meaningful and versatile manner, as described above. Also, the survey issue, execution, and import steps allow excellent control at the respondent side. This control achieves both improved integrity of respondent replies and overall control of timing up to the stage of analysis of all returns. The survey import filtration and static database completion allow a wide variety of analysis reports. It will also be appreciated that the sequence of survey creation, issuance, execution and importing together allow very comprehensive data capture and analysis, sufficient to provide an organisational diagnosis profiler (ODP) which models behaviour and attitudes of personnel in a large organisation.

[0058] The invention is not limited to the embodiments described but may be varied in construction and detail within the scope of the claims.

#### Claims

1. A method of controlling a computerised survey system comprising a supervisor station and at least one respondent station, the method comprising the steps of:-

at the supervisor station generating a plurality of questions, and transmitting the questions to the respondent station,

at the respondent station outputting the questions, receiving responses, and transmitting the responses to the supervisor station, and

at the supervisor station analysing the responses and generating survey results, characterised in that,

the questions are generated in groups of questions according to a model having a fixed structure, and a response scale comprising an interface for prompting respondent selection of a quantitative value on the scale is generated for each question,

the supervisor station issues a survey to the respondent station, the survey comprising the questions and associated scales and a control program,

the respondent station controls survey operation and generates respondent data files, and returns a complete survey only when all associated respondents have responded;

the complete survey is imported into the supervisor station, and

the supervisor station analyses the responses by calculating a mean value for all valid responses to each question and outputs the mean value in the survey results.

- 2. A method as claimed in claim 1, wherein the model fixed structure is a hierarchy with questions grouped at terminations. 5
- 3. A method as claimed in claim 2, wherein the survey results are outputted in reports according to the model. 10
- 4. A method as claimed in any preceding claim, wherein scale comprises discrete response values. 15
- 5. A method as claimed in claim 4, wherein the scale does not include a median value.
- 6. A method as claimed in any preceding claim, wherein the survey responses are stored by the supervisor station in a static database, and the analysis is performed dynamically using data read from the static database in a plurality of cycles initiated by a supervisor. 20
- 7. A method as claimed in any preceding claim, wherein the survey response data is filtered as it is imported to the supervisor station. 25
- 8. A method as claimed in claims 6 or 7, wherein the analysis step includes searching respondent profile data captured during the survey to create sub-sets of the response data. 30
- 9. A method as claimed in any preceding claim, wherein the respondent station automatically, and transparently to the respondent, captures auxiliary data relating to the nature of the respondent's use of the respondent station. 35
- 10. A method as claimed in claim 9, wherein the respondent station automatically captures reply times. 40
- 11. A method as claimed in claims 9 or 10, wherein respondent station automatically captures data relating to the respondent use of a help facility. 45
- 12. A method as claimed in any of claims 9 to 11, wherein the respondent station automatically generates response validity data according to paradox tests. 50
- 13. A method as claimed in any preceding claim, wherein the questions include respondent profile questions, and associated response interfaces for recording quantitative response values, and the analysis step sorts survey results according to selected 55

profiles.

- 14. A method as claimed in any preceding claim, wherein the issued survey data is in flat file format and is retained in that format by the respondent station.
- 15. A method as claimed in any preceding claim, wherein the respondent station performs completion rate control by automatically monitoring the number of user data files created.
- 16. A method as claimed in any preceding claim, wherein the survey is issued in folders having dedicated read/write access rights to provide security.

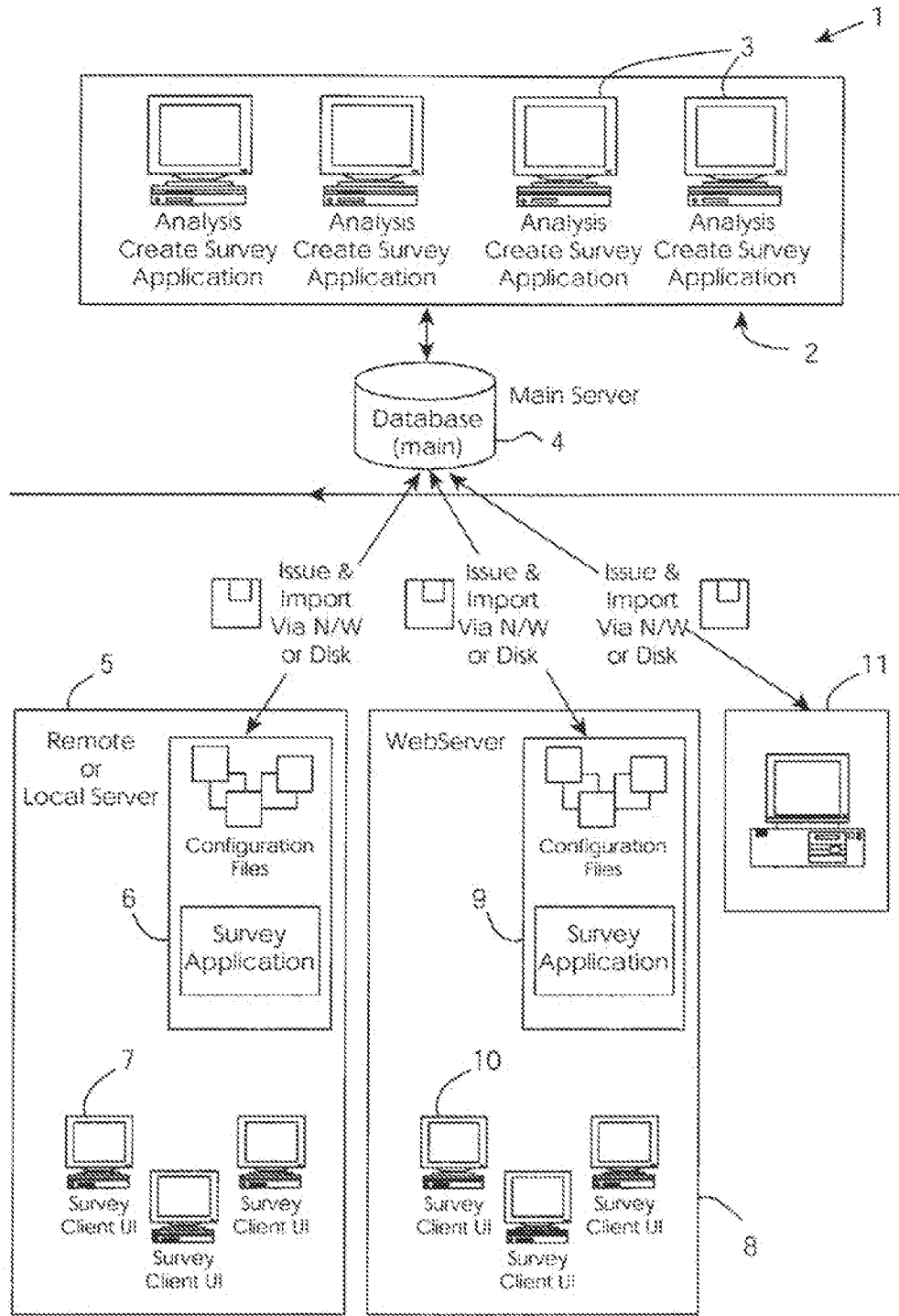


Fig. 1(a)

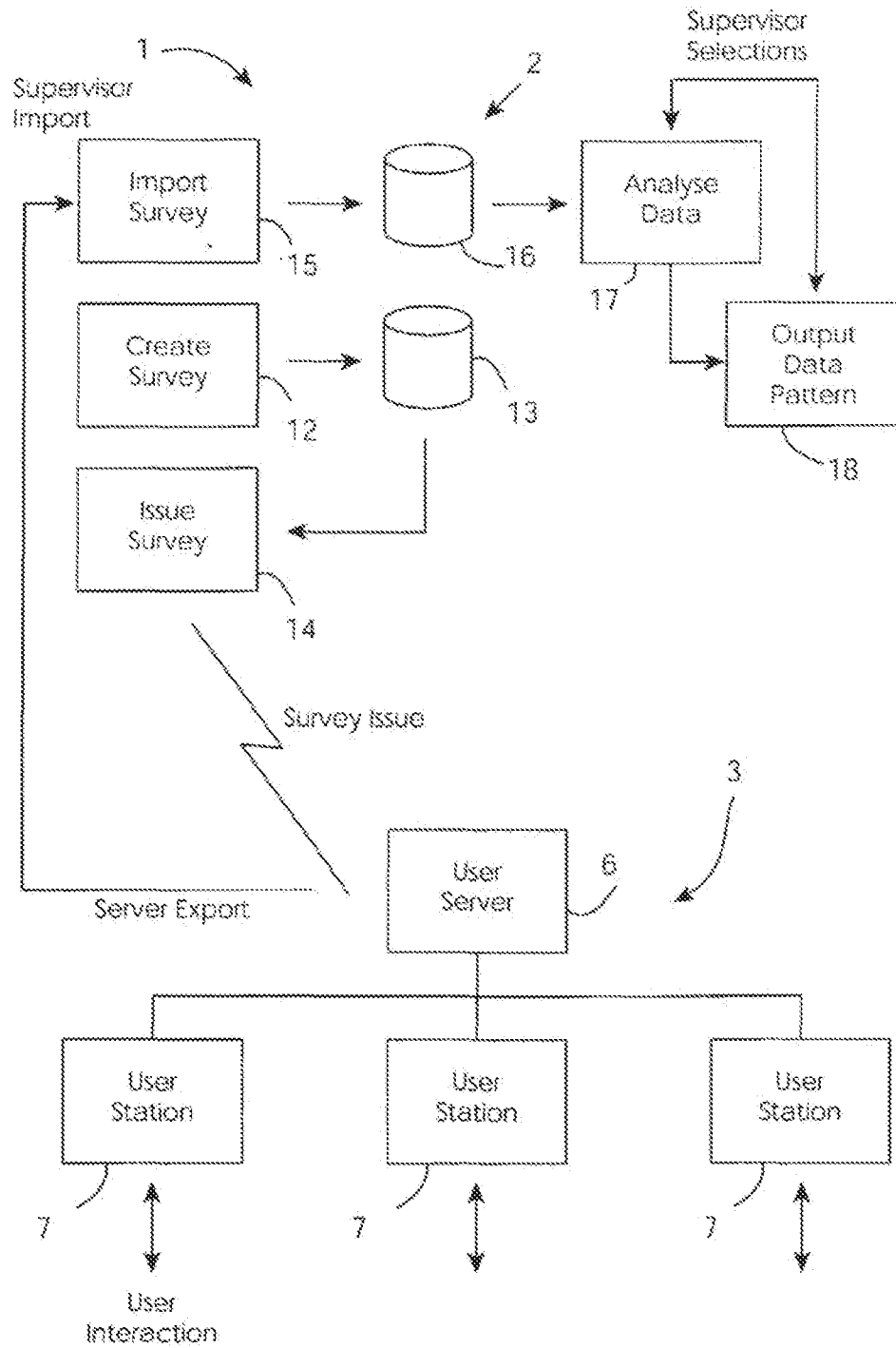


Fig. 1(b)

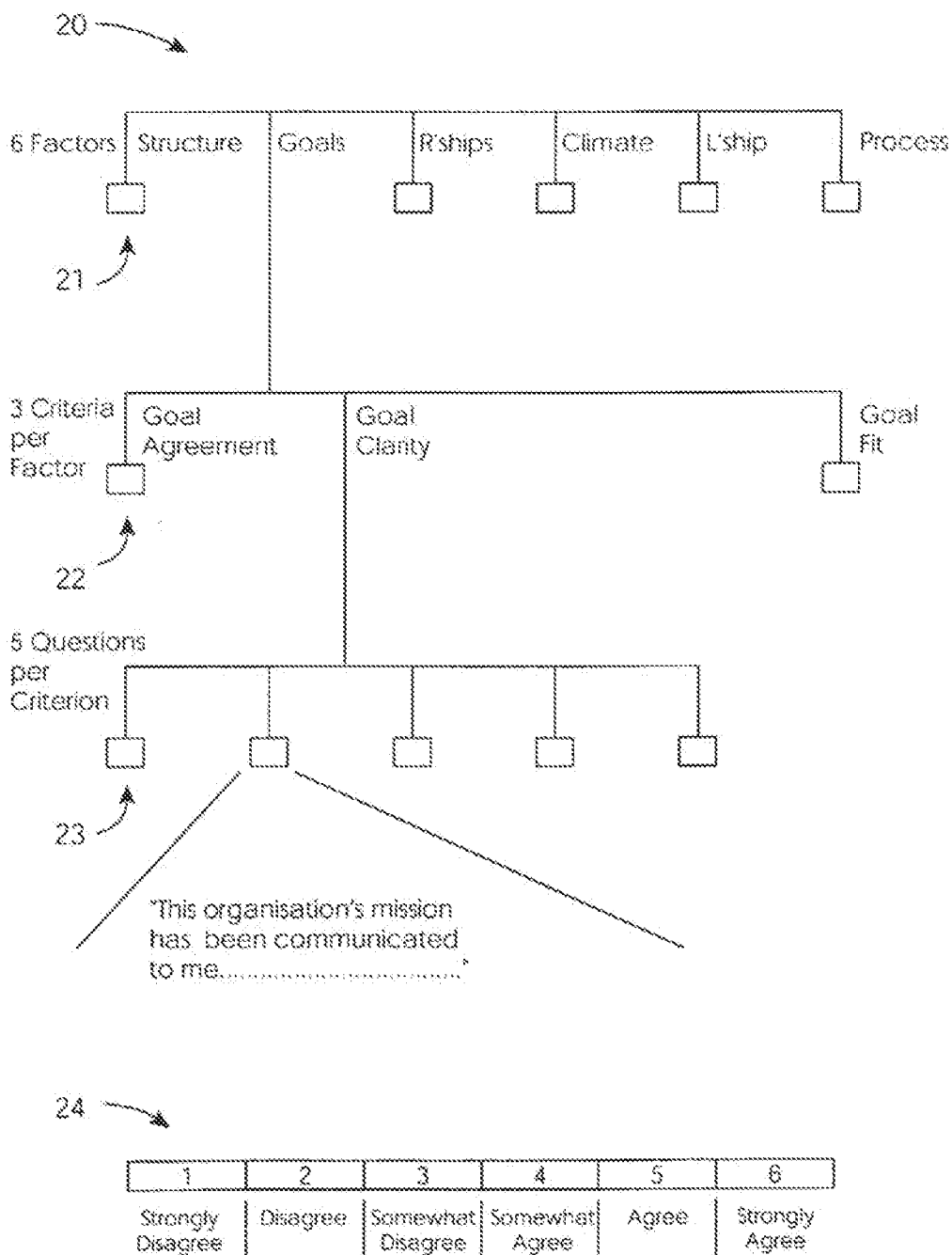


Fig. 2



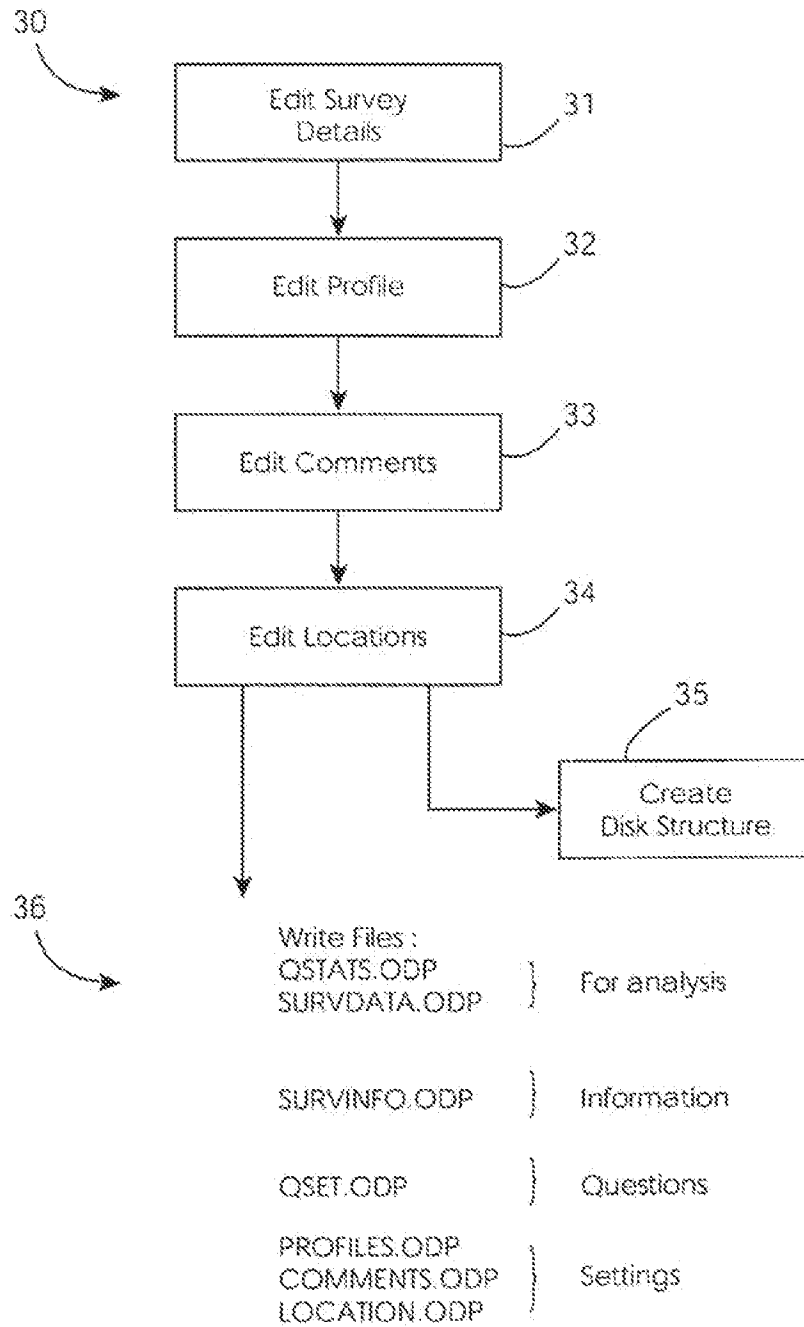


Fig. 3

Issue Survey

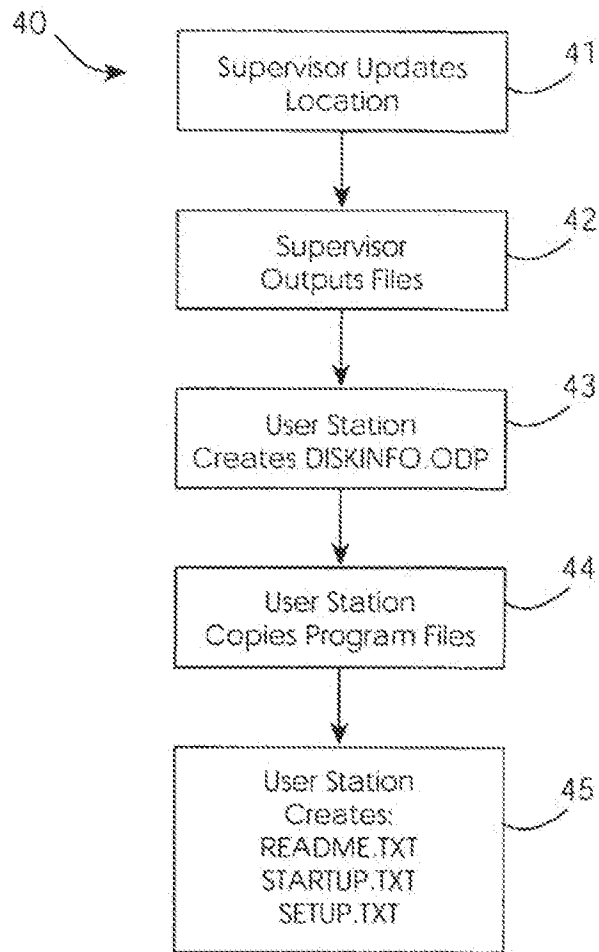


Fig. 4

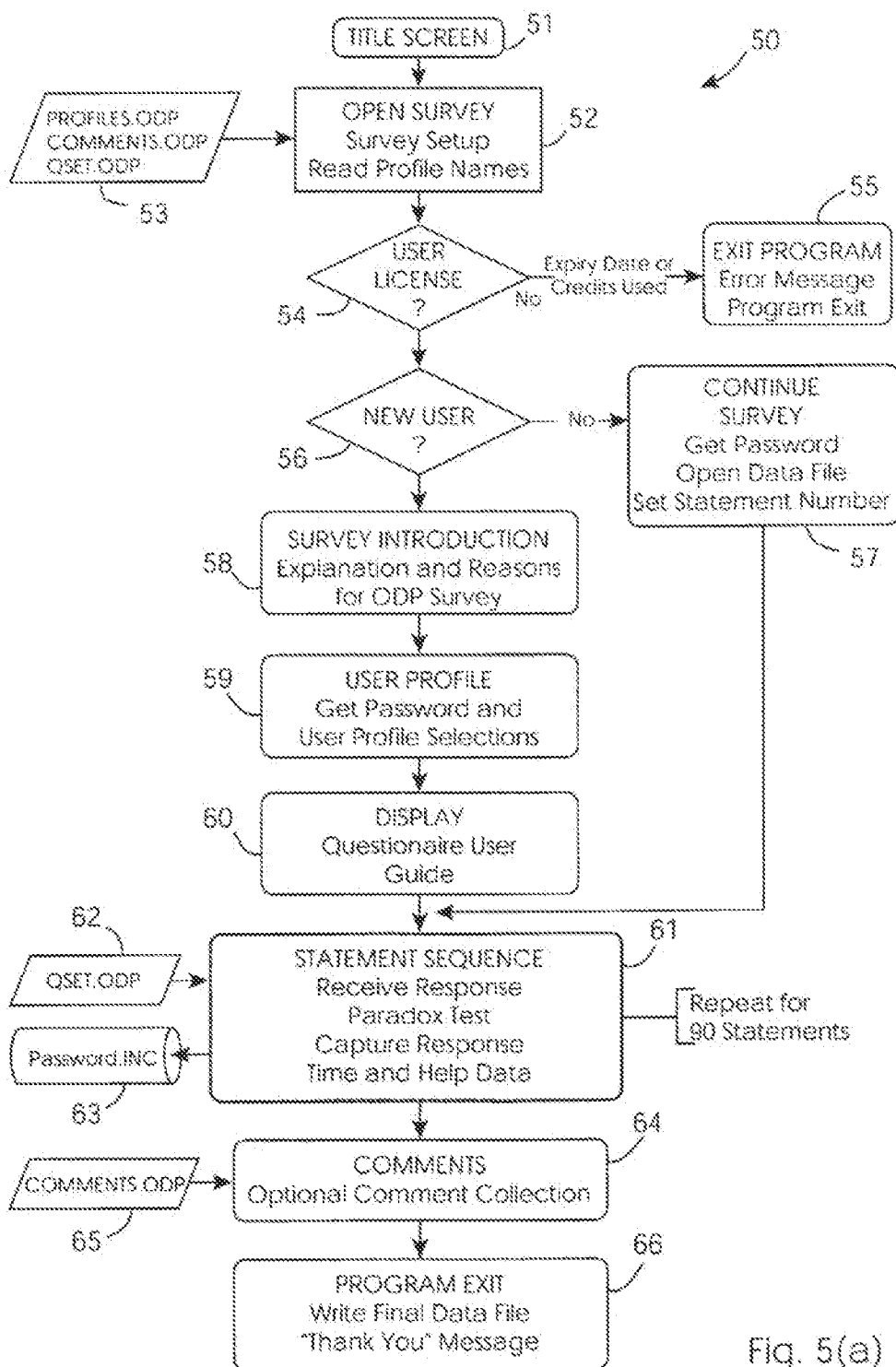
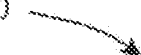


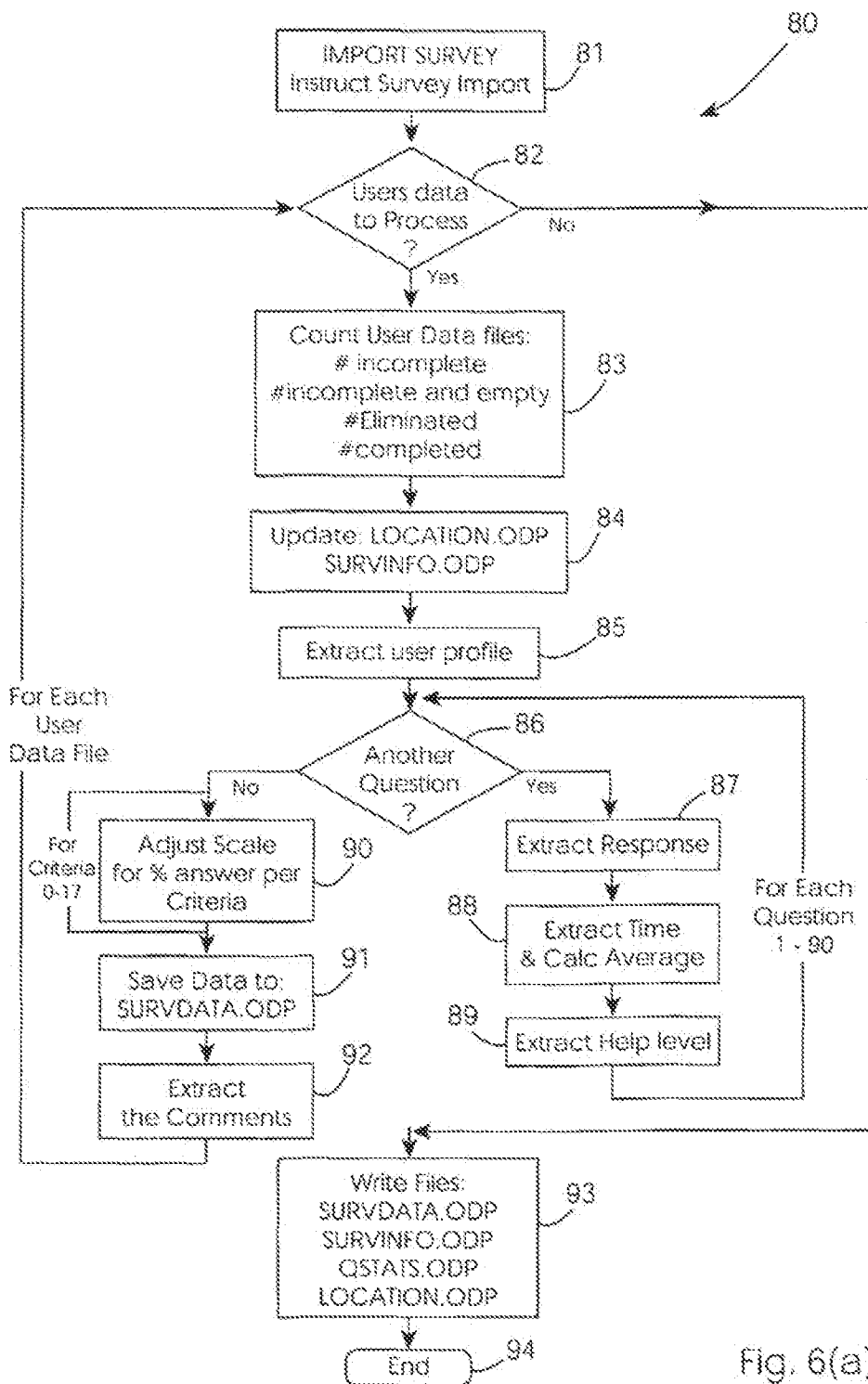
Fig. 5(a)

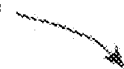
70 

## Data Fields

Field Name	Array Position	Description	Format	Default Value
Survey Directory	1	e.g Surv-010	Text 8	
Version	2	Software version of survey	Text 40	
Eliminated	3	0 - not eliminated 1 - Eliminated user	integer	
Gender	4		integer	
Age	5		integer	
Education	6		integer	
Time Org	7	Time with Organisation	integer	
Time cur	8	Time in current position	integer	
Work Area	9		integer	
Position level	10		integer	
Date of survey	11		integer	
Survey Answers	12 - (1)	Answers to Survey statement 1 - 90	integer	
Help	(12 - 21)	Nr times Help was requested for each statement	integer	
Time	212 - 311	Time taken to answer each statement	integer	

Fig. 5(b)

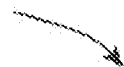


100 

Data Fields

Field Name	Array Position	Description	Format	Default Value
SURVEY_dir	1	Full Directory path of where the survey was created. E.g. C:\ODP	Text 255	
SURVEY_title	2	Title of the Survey	Text 40	
SURVEY_company	3	Company Name for Survey	Text 40	
SURVEY_created by	4	Name of person who created the survey	Text 40	
SURVEY_Password	5	Survey Supervisor Password	Text 8	
SURVEY_StartDate	6	Start date of survey	Integer	
SURVEY_EndDate	7	End Date of the survey	Integer	
SURVEY_Total	8	Total number of sets issued for this survey	Integer	
SURVEY_Complete	9	Number of users who completed the survey for ALL locations	Integer	
SURVEY_Incomplete	10	Number of users who left the survey incomplete for ALL locations	Integer	
SURVEY_Eliminated	11	Number of users who were eliminated from the survey for ALL locations	Integer	
SURVEY_LocTotal	12	Total number locations	Integer	
SURVEY_LoPassword	13	Password for the Location Supervisor	Text 8	

Fig. 6(b)

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## Data Fields

Field Name	Array Position	Description	Format	Default Value
Flag	1	This field is not used but could be useful in the future. Defines if the user data is not to be used.	Integer (x)	
Location Number	2	Location number that the user data is from	Integer	
Eliminated	3	Flags whether this data was eliminated	Integer	0-False 1-True
Gender	4		Integer	
Age	5		Integer	
Education	6		integer	
Time in Org	7		integer	
Time in Curr Pos	8		integer	
Workarea	9		integer	
Position Lvl	10		integer	
Average % per Criteria	(11-28)	Average % per criteria 5 Questions per criteria 18 criteria for all users	Integer	
Comment 1	29		Text 80	
Comment 2	30		Text 80	
Comment 3	31		Text 80	
Comment 4	32		Text 80	
Comment 5	33		Text 80	
Comment 6	34		Text 80	
Answers	35-124	Users Responses to the Survey Questions. NB These are in correct order 1-90	Integer * 90	

Fig. 6(c)

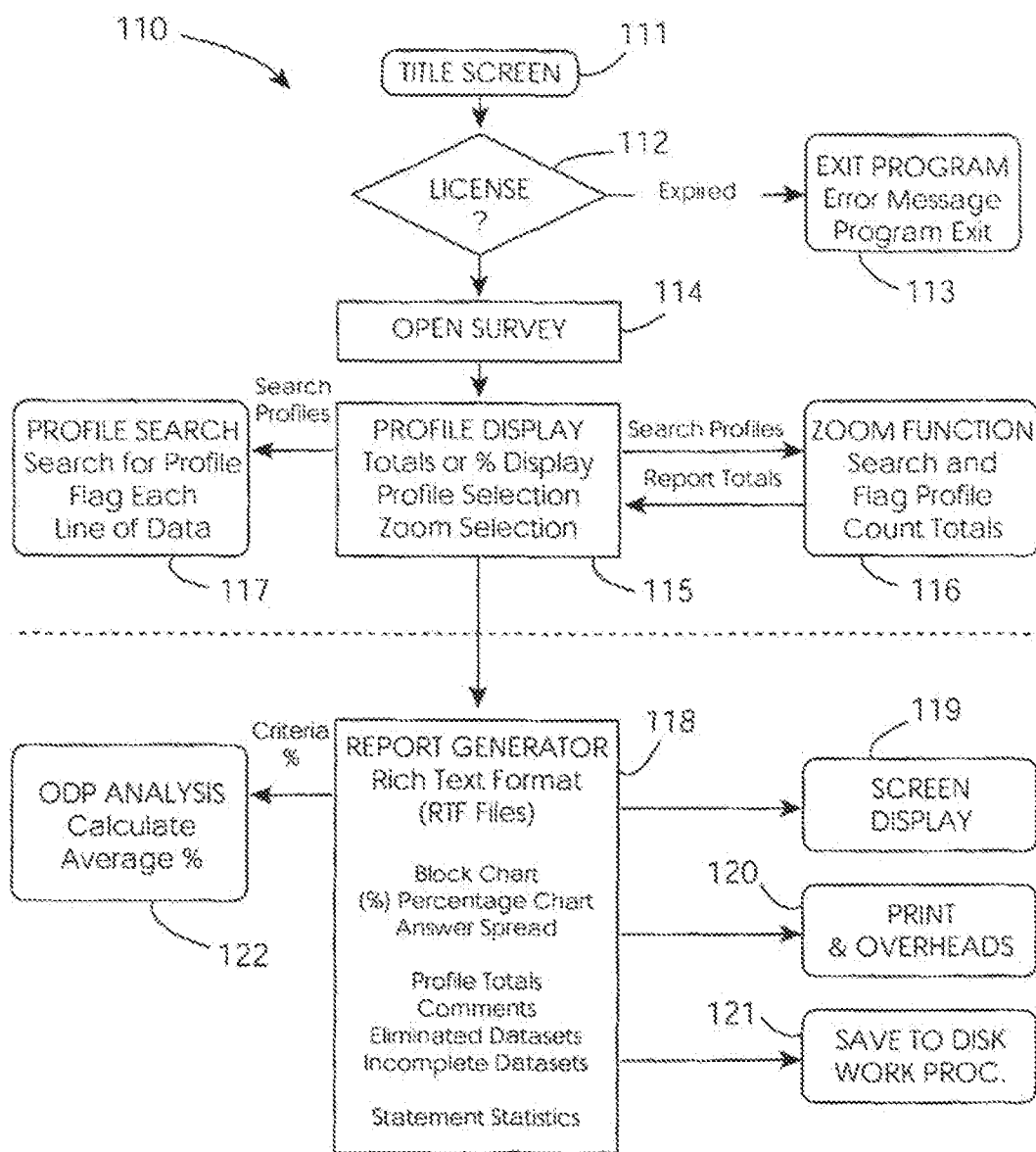
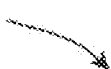


Fig. 7



125 

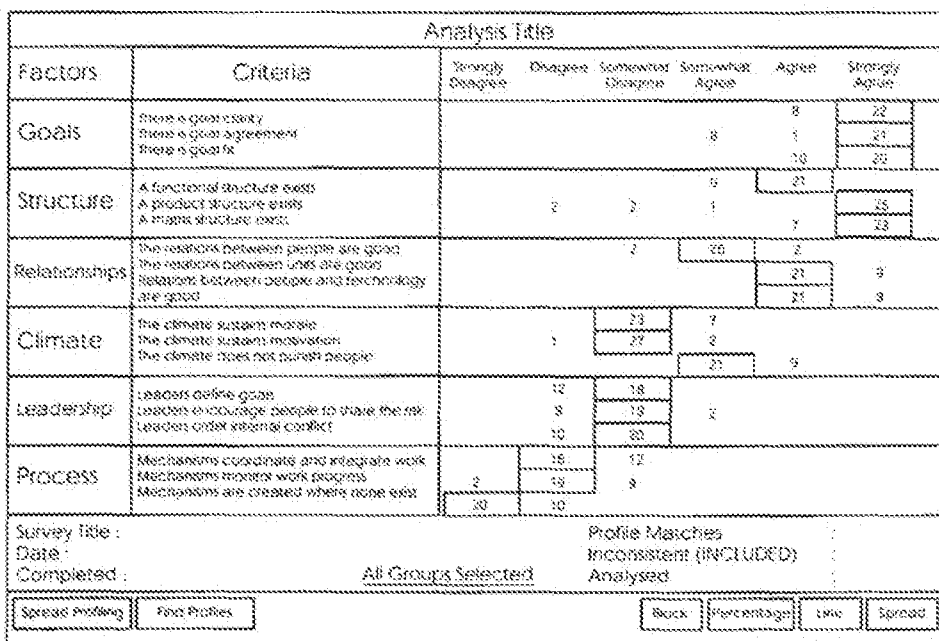
All Locations Selected					
Gender	Age		Education		
15	Male	19 or under			
18	Female	4	20-29	5	Secondary
		22	30-39	8	Diploma
		6	40-49	6	Degree
		1	50 or over	2	Post Grad Diploma
				11	Master Degree
				1	PHD
Time with Organisation			Time in Current Position		
5	Less than 1 year		13	less than 1 year	
27	1-5 years		18	1-5 years	
1	6-10 years		2	6-10 years	
	11-20 years			11-20 years	
	Over 20 years			Over 20 years	
Work Area			Position Level		
3	Directorate		1	Director	
5	Corporate Services		8	Head of Function	
4	Finance		6	Manager	
3	Media & MIS		3	Senior Investment	
4	Investment		4	Investment Officer	
4	Manufacturing		5	Admin Assist.	
5	Natural Resources		5	Ex. Secretary	
4	General Promotion		3	Other Positions	
1	Regional Centres				

Fig. 8

130 

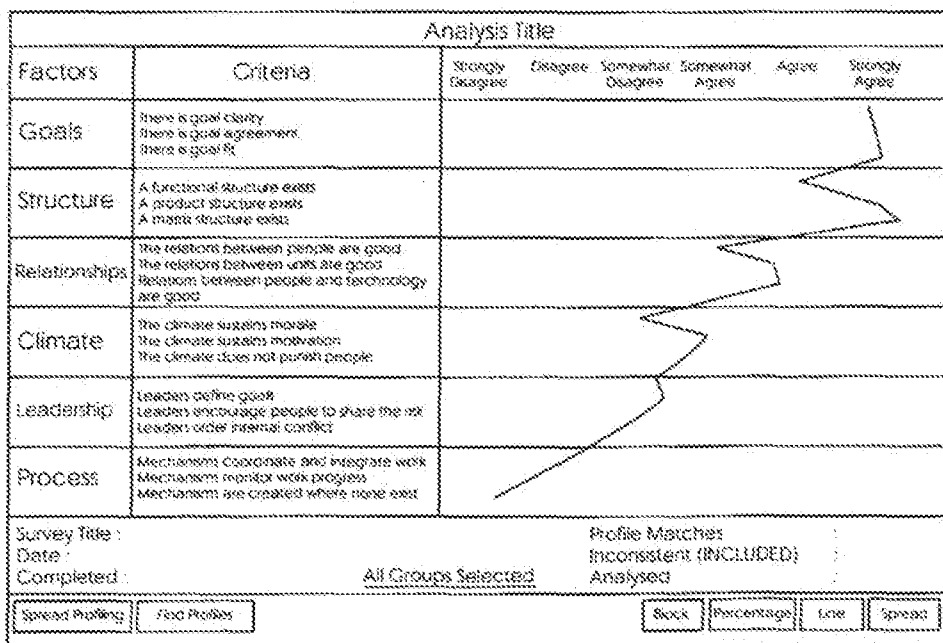
		Degree					
Factors	Criteria	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
Goals	There is a goal clarity There is goal agreement There is a goal fit						
Structure	A function structure exists A product structure exists A matrix structure exists						
Relationships	The relations between people are good The relations between units are good Relations between people and technology are good						
Climate	The climate sustains morale The climate sustains motivation The climate does not punish people						
Leadership	Leaders define goals Leaders encourage people to share the risk Leaders order internal conflicts						
Process	Mechanisms coordinate and integrate work Mechanisms monitor work progress Mechanisms are created where none exist						
Survey Title	: XYZ Beta Survey 1997	Profile Matches				: 33	
Date	: 21 October 1998	Eliminated (INCLUDED)				: 6	
Completed	: 33 All Locations Selected	Analysed				: 33	

Fig. 9



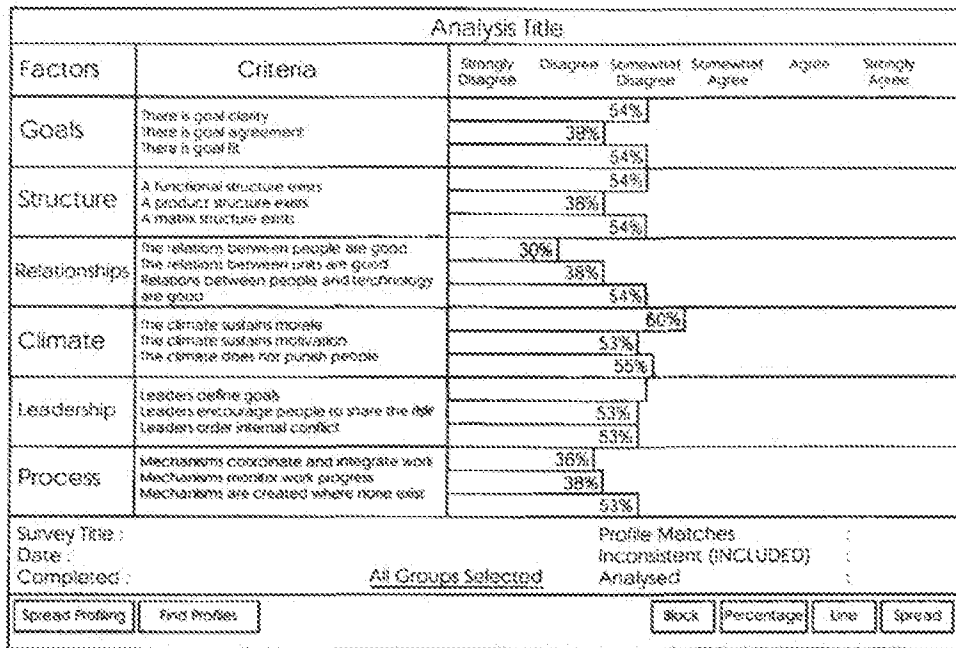
Spread Analysis

Fig. 10



Line Analysis

Fig. 11



Percentage Analysis

Fig. 12



European Patent Office

EUROPEAN SEARCH REPORT

Application Number  
EP 99 65 0023

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION
Y A	WO 91 05307 A (IMAGE ENGINEERING INC) 19 April 1991 (1991-04-18)  * abstract; claims 1-16; figures 1-3 * * page 4, line 8 - page 14, line 8 *	1-8, 13, 15, 16 9-12, 14	G06F17/60
Y A	US 5 842 195 A (BARWELL PETER ET AL) 24 November 1998 (1998-11-24)  * abstract; claims 18-25; figures 12-16 * * column 1, line 8 - column 11, line 11 *	1-8, 13, 15, 16 9-12, 14	
A	WO 98 26571 A (AT & T CORP) 18 June 1998 (1998-06-18) * abstract; claims 1-12 * * page 1, line 8 - page 8, line 15 *	9-16	
A	PITKOW J E ET AL: "RESULTS FROM THE FIRST WORLD-WIDE WEB USER SURVEY" COMPUTER NETWORKS AND ISDN SYSTEMS, 25 May 1994 (1994-05-25), pages 1-15, XF002073755 ISSN: 0169-7552 * page 1, column 2, paragraph 2 - paragraph 3 * * page 2, column 1, paragraph 3 - paragraph 4; table 9 *	9-16	TECHNICAL FIELDS SEARCHED G06F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		19 August 1999	Gardiner, A
CATEGORY OF CITED DOCUMENTS			
X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document		I: theory or principle underlying the invention E: earlier patent document, but published on or after the filing date O: document cited in the application L: document cited for other reasons & : member of the same patent family, corresponding document	

EP 1 035 490 A1 (1999-08-19)

ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 99 65 0023

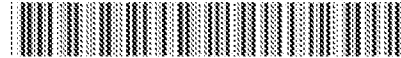
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19-08-1999

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For more details about this annex : see Official Journal of the European Patent Office, No. 1280



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(72) Inventor: Bardy, Gust H.  
 Seattle, WA 98111-3017 (US)

(74) Representative:  
 Hanna, Peter William Derek et al  
 Tomkins & Co.,  
 5 Dartmouth Road  
 Dublin 8 (IE)

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(71) Applicant:  
 Cardiac Intelligence Corporation  
 Seattle, Washington 98199-3017 (US)

(54) **System and method for providing normalized voice feedback from an individual patient in an automated collection and analysis patient care system**

(57) A system 200 and a method for providing normalized voice feedback from an individual patient 11 in an automated collection and analysis patient care system 10 are described. A set of collected measures 50 retrieved on a substantially regular basis is periodically received from a medical device 12 having a sensor for monitoring at least one physiological measure of an individual patient 11. The collected measures set includes individual measures which each relate to patient information recorded by the medical device. The collected measures set 50 are stored into a patient care record for the individual patient within a database 17. The database is organized to store one or more patient care records which each include a plurality of the collected measures sets. Voice feedback is spoken by the individual patient into a remote client 18 substantially contemporaneous to the collection of an identifiable device measures set. The voice feedback is processed into a set of quality of life measures which each relate to patient self-assessment indicators. The identified collected device measures set and the quality of life measures set are received and stored into the patient care record for the individual patient within the database. The identified collected device measures set, the quality of life measures set, and one or more of the collected device measures sets in the patient care record for the individual patient are analyzed relative to one or more other collected device measures sets stored in the database server to determine a patient status indicator 54.

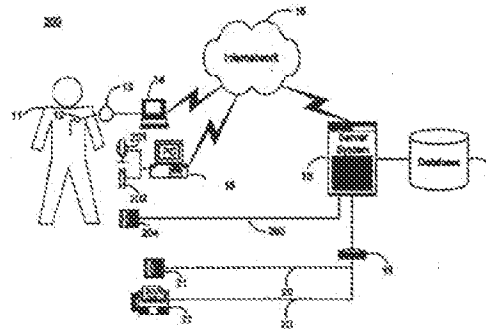


FIGURE 12

EP 1 072 994 A2

## Description

Field of the Invention

5 [0001] The present invention relates in general to automated data collection and analysis, and, in particular, to a system and method for providing normalized voice feedback from an individual patient in an automated collection and analysis patient care system.

Background of the Invention

10 [0002] A broad class of medical subspecialties, including cardiology, endocrinology, hematology, neurology, gastroenterology, urology, ophthalmology, and otolaryngology, to name a few, rely on accurate and timely patient information for use in aiding health care providers in diagnosing and treating diseases and disorders. Often, proper medical diagnosis requires information on physiological events of short duration and sudden onset, yet these types of events are often occur infrequently and with little or no warning. Fortunately, such patient information can be obtained via external, implantable, cutaneous, subcutaneous, and manual medical devices, and combinations thereof. For example, in the area of cardiology, implantable pulse generators (IPGs) are medical devices commonly used to treat irregular heartbeats, known as arrhythmias. There are three basic types of IPGs. Cardiac pacemakers are used to manage bradycardia, an abnormally slow or irregular heartbeat. Bradycardia can cause symptoms such as fatigue, dizziness, and fainting. Implantable cardioverter defibrillators (ICDs) are used to treat tachycardia, heart rhythms that are abnormally fast and life threatening. Tachycardia can result in sudden cardiac death (SCD). Finally, implantable cardiovascular monitors and therapeutic devices are used to monitor and treat structural problems of the heart, such as congestive heart failure, as well as rhythm problems.

15 [0003] Pacemakers and ICDs, as well as other types of implantable and external medical devices, are equipped with an on-board, volatile memory in which telemetered signals can be stored for later retrieval and analysis. In addition, a growing class of cardiac medical devices, including implantable heart failure monitors, implantable event monitors, cardiovascular monitors, and therapy devices, are being used to provide similar stored device information. These devices are able to store more than thirty minutes of per heartbeat data. Typically, the telemetered signals can provide patient device information recorded on a per heartbeat, binned average basis, or derived basis from, for example, atrial electrical activity, ventricular electrical activity, minute ventilation, patient activity score, cardiac output score, mixed venous oxygen score, cardiovascular pressure measures, time of day, and any interventions and the relative success of such interventions. In addition, many such devices can have multiple sensors, or several devices can work together, for monitoring different sites within a patient's body.

20 [0004] Presently, stored device information is retrieved using a proprietary interrogator or programmer, often during a clinic visit or following a device event. The volume of data retrieved from a single device interrogation "snapshot" can be large and proper interpretation and analysis can require significant physician time and detailed subspecialty knowledge, particularly by cardiologists and cardiac electrophysiologists. The sequential logging and analysis of regularly scheduled interrogations can create an opportunity for recognizing subtle and incremental changes in patient condition otherwise undetectable by inspection of a single "snapshot." However, present approaches to data interpretation and understanding and practical limitations on time and physician availability make such analysis impracticable.

25 [0005] Similarly, the determination and analysis of the quality of life issues which typically accompany the onset of a chronic yet stable diseases, such as coronary-artery disease, is a crucial adjunct to assessing patient wellness and progress. However, unlike in a traditional clinical setting, physicians participating in providing remote patient care are not able to interact with their patients in person. Consequently, quality of life measures, such as how the patient subjectively looks and feels, whether the patient has shortness of breath, can work, can sleep, is depressed, is sexually active, can perform activities of daily life, and so on, cannot be implicitly gathered and evaluated.

30 [0006] A prior art system for collecting and analyzing pacemaker and ICD telemetered signals in a clinical or office setting is the Model 8790 Programmer, manufactured by Medtronic, Inc., Minneapolis, MN. This programmer can be used to retrieve data, such as patient electrocardiogram and any measured physiological conditions, collected by the IPG for recordation, display and printing. The retrieved data is displayed in chronological order and analyzed by a physician. Comparable prior art systems are available from other IPG manufacturers, such as the Model 2901 Programmer Recorder Monitor, manufactured by Guidant Corporation, Indianapolis, IN, which includes a removable floppy diskette mechanism for patient data storage. These prior art systems lack remote communications facilities and must be operated with the patient present. These systems present a limited analysis of the collected data based on a single device interrogation and lack the capability to recognize trends in the data spanning multiple episodes over time or relative to a disease specific peer group.

35 [0007] A prior art system for locating and communicating with a remote medical device implanted in an ambulatory patient is disclosed in U.S. Patent No. 5,752,976 ('976). The implanted device includes a telemetry transceiver for com-



communicating data and operating instructions between the implanted device and an external patient communications device. The communications device includes a communication link to a remote medical support network, a global positioning satellite receiver, and a patient activated link for permitting patient initiated communication with the medical support network. Patient voice communications through the patient link include both actual patient voice and manually actuated signaling which may convey an emergency situation. The patient voice is converted to an audio signal, digitized, encoded, and transmitted by data bus to a system controller.

**[0008]** Related prior art systems for remotely communicating with and receiving telemetered signals from a medical device are disclosed in U.S. Patent Nos. 5,113,869 ('869) and 5,336,245 ('245). In the '869 patent, an implanted AECG monitor can be automatically interrogated at preset times of day to telemeter out accumulated data to a telephonic communicator or a full disclosure recorder. The communicator can be automatically triggered to establish a telephonic communication link and transmit the accumulated data to an office or clinic through a modem. In the '245 patent, telemetered data is downloaded to a larger capacity, external data recorder and is forwarded to a clinic using an auto-dialer and fax modem operating in a personal computer-based programmer/interrogator. However, the '869 telemetry transceiver, '869 communicator, and '245 programmer/interrogator are limited to facilitating communication and transfer of downloaded patient data and do not include an ability to automatically track, recognize, and analyze trends in the data itself. Moreover, the '876 telemetry transceiver facilitates patient voice communications through transmission of a digitized audio signal and does not perform voice recognition or other processing to the patient's voice.

**[0009]** In addition, the uses of multiple sensors situated within a patient's body at multiple sites are disclosed in U.S. Patent No. 5,040,536 ('536) and U.S. Patent 5,987,352 ('352). In the '536 patent, an intravascular pressure posture detector includes at least two pressure sensors implanted in different places in the cardiovascular system, such that differences in pressure with changes in posture are differentially measurable. However, the physiological measurements are used locally within the device, or in conjunction with any implantable device, to effect a therapeutic treatment. In the '352 patent, an event monitor can include additional sensors for monitoring and recording physiological signals during arrhythmia and syncopal events. The recorded signals can be used for diagnosis, research or therapeutic study, although no systematic approach to analyzing these signals, particularly with respect to peer and general population groups, is presented.

**[0010]** Thus, there is a need for a system and method for providing continuous retrieval, transferal, and automated analysis of retrieved medical device information, such as telemetered signals, retrieved in general from a broad class of implantable and external medical devices. Preferably, the automated analysis would include recognizing a trend indicating disease onset, progression, regression, and status quo and determining whether medical intervention is necessary.

**[0011]** There is a further need for a system and method that would allow consideration of sets of collected measures, both actual and derived, from multiple device interrogations. These collected measures sets could then be compared and analyzed against short and long term periods of observation.

**[0012]** There is a further need for a system and method that would enable the measures sets for an individual patient to be self-referenced and cross-referenced to similar or dissimilar patients and to the general patient population. Preferably, the historical collected measures sets of an individual patient could be compared and analyzed against those of other patients in general or of a disease specific peer group in particular.

**[0013]** There is a further need for a system and method for accepting and normalizing live voice feedback spoken by an individual patient while an identifiable set of telemetered signals is collected by a implantable medical device. Preferably, the normalized voice feedback a semi-quantitative self-assessment of an individual patient's physical and emotional well being at a time substantially contemporaneous to the collection of the telemetered signals.

#### Summary of the Invention

**[0014]** The present invention provides a system and method for automated collection and analysis of patient information retrieved from an implantable medical device for remote patient care. The patient device information relates to individual measures recorded by and retrieved from implantable medical devices, such as IECGs and monitors. The patient device information is received on a regular, e.g., daily, basis as sets of collected measures which are stored along with other patient records in a database. The information can be analyzed in an automated fashion and feedback provided to the patient at any time and in any location.

**[0015]** The present invention also provides a system and method for providing normalized voice feedback from an individual patient in an automated collection and analysis patient care system. As before, patient device information is received on a regular, e.g., daily, basis as sets of collected measures which are stored along with other patient records in a database. Voice feedback spoken by an individual patient is processed into a set of quality of life measures by a remote client substantially contemporaneous to the recordation of an identifiable set of collected device measures by the implantable medical device. The processed voice feedback and identifiable collected device measures set are both received and stored into the patient record in the database for subsequent evaluation.

[0016] An embodiment of the present invention is a system and method for providing normalized voice feedback from an individual patient in an automated collection and analysis patient care system. A set of device measures from a medical device adapted to be implanted is collected. The collected device measures set includes individual device measures which each relate to patient information recorded by the medical device adapted to be implanted for the individual patient. The collected device measures set from the medical device adapted to be implanted are periodically received over a communications link which is interfaced to a network server. The collected device measures set are stored into a patient care record for the individual patient within a database server. The database server is organized to store one or more patient care records which each include a plurality of the collected device measures sets. Voice feedback is spoken by the individual patient into a remote client substantially contemporaneous to the collection of an identifiable device measures set. The voice feedback is processed into a set of quality of life measures which each relate to patient self-assessment indicators. The identified collected device measures set and the quality of life measures set are received over the communications link interfaced to the network server respectively from the medical device adapted to be implanted and the remote client. The identified collected device measures set and the quality of life measures set are stored into the patient care record for the individual patient within the database server. The identified collected device measures set, the quality of life measures set, and one or more of the collected device measures sets in the patient care record for the individual patient are analyzed relative to one or more other collected device measures sets stored in the database server to determine a patient status indicator.

[0017] A further embodiment of the present invention is a system and method for providing normalized voice feedback from an individual patient in an automated collection and analysis patient care system. A set of collected measures retrieved on a substantially regular basis is periodically received from a medical device having a sensor for monitoring at least one physiological measure of an individual patient. The collected measures set includes individual measures which each relate to patient information recorded by the medical device. The collected measures set are stored into a patient care record for the individual patient within a database. The database is organized to store one or more patient care records which each include a plurality of the collected measures sets. Voice feedback is spoken by the individual patient into a remote client, which can include the medical device itself, whether implantable, external or otherwise, substantially contemporaneous to the collection of an identifiable device measures set. The voice feedback is processed into a set of quality of life measures which each relate to patient self-assessment indicators. The identified collected device measures set and the quality of life measures set are received and stored into the patient care record for the individual patient within the database. The identified collected device measures set, the quality of life measures set, and one or more of the collected device measures sets in the patient care record for the individual patient are analyzed relative to one or more other collected device measures sets stored in the database server to determine a patient status indicator.

[0018] The present invention facilitates the gathering, storage, and analysis of critical patient information obtained on a routine basis and analyzed in an automated manner. Thus, the burden on physicians and trained personnel to evaluate the volumes of information is significantly minimized while the benefits to patients are greatly enhanced.

[0019] The present invention also enables the simultaneous collection of both physiological measures from implantable medical devices and quality of life measures spoken in the patient's own words. Voice recognition technology enables the spoken patient feedback to be normalized to a standardized set of semi-quantitative quality of life measures, thereby facilitating holistic remote, automated patient care.

[0020] Still other embodiments of the present invention will become readily apparent to those skilled in the art from the following detailed description, wherein is described embodiments of the invention by way of illustrating the best mode contemplated for carrying out the invention. As will be realized, the invention is capable of other and different embodiments and its several details are capable of modifications in various obvious respects, all without departing from the spirit and the scope of the present invention. Accordingly, the drawings and detailed description are to be regarded as illustrative in nature and not as restrictive.

#### Brief Description of the Drawings

[0021]

FIGURE 1 is a block diagram showing a system for automated collection and analysis of patient information retrieved from an implantable medical device for remote patient care in accordance with the present invention;

FIGURE 2 is a block diagram showing the hardware components of the server system of the system of FIGURE 1;

FIGURE 3 is a block diagram showing the software modules of the server system of the system of FIGURE 1;

FIGURE 4 is a block diagram showing the analysis module of the server system of FIGURE 3;

FIGURE 5 is a database schema showing, by way of example, the organization of a cardiac patient care record stored in the database of the system of FIGURE 1;

FIGURE 6 is a record view showing, by way of example, a set of partial cardiac patient care records stored in the

database of the system of FIGURE 1;

FIGURE 7 is a flow diagram showing a method for automated collection and analysis of patient information retrieved from an implantable medical device for remote patient care in accordance with the present invention;

FIGURE 8 is a flow diagram showing a routine for analyzing collected measures sets for use in the method of FIGURE 7;

FIGURE 9 is a flow diagram showing a routine for comparing sibling collected measures sets for use in the routine of FIGURE 8;

FIGURES 10A and 10B are flow diagrams showing a routine for comparing peer collected measures sets for use in the routine of FIGURE 8;

FIGURE 11 is a flow diagram showing a routine for providing feedback for use in the method of FIGURE 7;

FIGURE 12 is a block diagram showing a system for providing normalized voice feedback from an individual patient in an automated collection and analysis patient care system;

FIGURE 13 is a block diagram showing the software modules of the remote client of the system of FIGURE 12;

FIGURE 14 is a block diagram showing the software modules of the server system of the system of FIGURE 12;

FIGURE 15 is a database schema showing, by way of example, the organization of a quality of life record for cardiac patient care stored as part of a patient care record in the database of the system of FIGURE 12;

FIGURES 16A-16B are flow diagrams showing a method for providing normalized voice feedback from an individual patient in an automated collection and analysis patient care system;

FIGURE 17 is a flow diagram showing a routine for processing voice feedback for use in the method of FIGURES 16A-16B;

FIGURE 18 is a flow diagram showing a routine for requesting a quality of life measure for use in the routine of FIGURE 17;

FIGURE 19 is a flow diagram showing a routine for recognizing and translating individual spoken words for use in the routine of FIGURE 17;

FIGURE 20 is a block diagram showing the software modules of the server system in a further embodiment of the system of FIGURE 12;

FIGURE 21 is a block diagram showing a system for providing normalized voice feedback from an individual patient in an automated collection and analysis patient care system in accordance with a further embodiment of the present invention;

FIGURE 22 is a block diagram showing the analysis module of the server system of FIGURE 21;

FIGURE 23 is a database schema showing, by way of example, the organization of a quality of life and symptom measures set record for care of patients stored as part of a patient care record in the database of the system of FIGURE 21;

FIGURE 24 is a record view showing, by way of example, a set of partial cardiac patient care records stored in the database of the system of FIGURE 21;

FIGURE 25 is a Venn diagram showing, by way of example, peer group overlap between the partial patient care records of FIGURE 24; and

FIGURES 26A-26B are flow diagrams showing a method for providing normalized voice feedback from an individual patient in an automated collection and analysis patient care system in accordance with a further embodiment of the present invention.

### Detailed Description

[0022] FIGURE 1 is a block diagram showing a system 10 for automated collection and analysis of patient information retrieved from an implantable medical device for remote patient care in accordance with the present invention. A patient 11 is a recipient of an implantable medical device 12, such as, by way of example, an IPG or a heart failure or event monitor, with a set of leads extending into his or her heart. The implantable medical device 12 includes circuitry for recording into a short-term, volatile memory telemetered signals, which are stored as a set of collected measures for later retrieval.

[0023] For an exemplary cardiac implantable medical device, the telemetered signals non-exclusively present patient information recorded on a per heartbeat, binned average or derived basis and relating to: atrial electrical activity, ventricular electrical activity, minute ventilation, patient activity score, cardiac output score, mixed venous oxygenation score, cardiovascular pressure measures, time of day, the number and types of interventions made, and the relative success of any interventions, plus the status of the batteries and programmed settings. Examples of pacemakers suitable for use in the present invention include the Discovery line of pacemakers, manufactured by Guidant Corporation, Indianapolis, IN. Examples of ICDs suitable for use in the present invention include the Gem line of ICDs, manufactured by Medtronic Corporation, Minneapolis, MN.

[0024] In the described embodiment, the patient 11 has a cardiac implantable medical device. However, a wide

range of related implantable medical devices are used in other areas of medicine and a growing number of these devices are also capable of measuring and recording patient information for later retrieval. These implantable medical devices include monitoring and therapeutic devices for use in metabolism, endocrinology, hematology, neurology, muscular disorders, gastroenterology, urology, ophthalmology, otolaryngology, orthopedics, and similar medical subspecialties. One skilled in the art would readily recognize the applicability of the present invention to these related implantable medical devices.

**[0025]** On a regular basis, the telemetered signals stored in the implantable medical device 12 are retrieved. By way of example, a programmer 14 can be used to retrieve the telemetered signals. However, any form of programmer, interrogator, recorder, monitor, or telemetered signals transceiver suitable for communicating with an implantable medical device 12 could be used, as is known in the art. In addition, a personal computer or digital data processor could be interfaced to the implantable medical device 12, either directly or via a telemetered signals transceiver configured to communicate with the implantable medical device 12.

**[0026]** Using the programmer 14, a magnetized reed switch (not shown) within the implantable medical device 12 closes in response to the placement of a wand 13 over the location of the implantable medical device 12. The programmer 14 communicates with the implantable medical device 12 via RF signals exchanged through the wand 13. Programming or interrogating instructions are sent to the implantable medical device 12 and the stored telemetered signals are downloaded into the programmer 14. Once downloaded, the telemetered signals are sent via an internetwork 15, such as the Internet, to a server system 16 which periodically receives and stores the telemetered signals in a database 17, as further described below with reference to FIGURE 2.

**[0027]** An example of a programmer 14 suitable for use in the present invention is the Model 2901 Programmer Recorder Monitor, manufactured by Guidant Corporation, Indianapolis, IN, which includes the capability to store retrieved telemetered signals on a proprietary removable floppy diskette. The telemetered signals could later be electronically transferred using a personal computer or similar processing device to the internetwork 15, as is known in the art.

**[0028]** Other alternate telemetered signals transfer means could also be employed. For instance, the stored telemetered signals could be retrieved from the implantable medical device 12 and electronically transferred to the internetwork 15 using the combination of a remote external programmer and analyzer and a remote telephonic communicator, such as described in U.S. Patent No. 5,113,869, the disclosure of which is incorporated herein by reference. Similarly, the stored telemetered signals could be retrieved and remotely downloaded to the server system 16 using a world-wide patient location and data telemetry system, such as described in U.S. Patent No. 5,752,976, the disclosure of which is incorporated herein by reference.

**[0029]** The received telemetered signals are analyzed by the server system 16, which generates a patient status indicator. The feedback is then provided back to the patient 11 through a variety of means. By way of example, the feedback can be sent as an electronic mail message generated automatically by the server system 16 for transmission over the internetwork 15. The electronic mail message is received by a remote client 18, such as a personal computer (PC), situated for local access by the patient 11. Alternatively, the feedback can be sent through a telephone interface device 19 as an automated voice mail message to a telephone 21 or as an automated facsimile message to a facsimile machine 22, both also situated for local access by the patient 11. In addition to a remote client 18, telephone 21, and facsimile machine 22, feedback could be sent to other related devices, including a network computer, wireless computer, personal data assistant, television, or digital data processor. Preferably, the feedback is provided in a tiered fashion, as further described below with reference to FIGURE 3.

**[0030]** FIGURE 2 is a block diagram showing the hardware components of the server system 16 of the system 10 of FIGURE 1. The server system 16 consists of three individual servers: network server 31, database server 34, and application server 35. These servers are interconnected via an intranetwork 33. In the described embodiment, the functionality of the server system 16 is distributed among these three servers for efficiency and processing speed, although the functionality could also be performed by a single server or cluster of servers. The network server 31 is the primary interface of the server system 16 onto the internetwork 15. The network server 31 periodically receives the collected telemetered signals sent by remote implantable medical devices over the internetwork 15. The network server 31 is interfaced to the internetwork 15 through a router 32. To ensure reliable data exchange, the network server 31 implements a TCP/IP protocol stack, although other forms of network protocol stacks are suitable.

**[0031]** The database server 34 organizes the patient care records in the database 17 and provides storage of and access to information held in those records. A high volume of data in the form of collected measures sets from individual patients is received. The database server 34 frees the network server 31 from having to categorize and store the individual collected measures sets in the appropriate patient care record.

**[0032]** The application server 35 operates management applications and performs data analysis of the patient care records, as further described below with reference to FIGURE 3. The application server 35 communicates feedback to the individual patients either through electronic mail sent back over the internetwork 15 via the network server 31 or as automated voice mail or facsimile messages through the telephone interface device 19.

[0033] The server system 16 also includes a plurality of individual workstations 36 (WS) interconnected to the intranetwork 33, some of which can include peripheral devices, such as a printer 37. The workstations 36 are for use by the data management and programming staff, nursing staff, office staff, and other consultants and authorized personnel.

5 [0034] The database 17 consists of a high-capacity storage medium configured to store individual patient care records and related health care information. Preferably, the database 17 is configured as a set of high-speed, high capacity hard drives, such as organized into a Redundant Array of Inexpensive Disks (RAID) volume. However, any form of volatile storage, non-volatile storage, removable storage, fixed storage, random access storage, sequential access storage, permanent storage, erasable storage, and the like would be equally suitable. The organization of the  
10 database 17 is further described below with reference to FIGURE 3.

[0035] The individual servers and workstations are general purpose, programmed digital computing devices consisting of a central processing unit (CPU), random access memory (RAM), non-volatile secondary storage, such as a hard drive or CD ROM drive, network interfaces, and peripheral devices, including user interfacing means, such as a keyboard and display. Program code, including software programs, and data are loaded into the RAM for execution and  
15 processing by the CPU and results are generated for display, output, transmittal, or storage. In the described embodiment, the individual servers are Intel Pentium-based server systems, such as available from Dell Computers, Austin, Texas, or Compaq Computers, Houston, Texas. Each system is preferably equipped with 128MB RAM, 10GB hard drive capacity, data backup facilities, and related hardware for interconnection to the intranetwork 33 and internetwork 15. In addition, the workstations 36 are also Intel Pentium-based personal computer or workstation systems, also available from Dell Computers, Austin, Texas, or Compaq Computers, Houston, Texas. Each workstation is preferably  
20 equipped with 64MB RAM, 10GB hard drive capacity, and related hardware for interconnection to the intranetwork 33. Other types of server and workstation systems, including personal computers, minicomputers, mainframe computers, supercomputers, parallel computers, workstations, digital data processors and the like would be equally suitable, as is known in the art.

[0036] The telemetered signals are communicated over an internetwork 15, such as the Internet. However, any type of electronic communications link could be used, including an intranetwork link, serial link, data telephone link, satellite link, radio-frequency link, infrared link, fiber optic link, coaxial cable link, television link, and the like, as is known in the art. Also, the network server 31 is interaced to the internetwork 15 using a T-1 network router 32, such as manufactured by Cisco Systems, Inc., San Jose, California. However, any type of interfacing device suitable for intercon-  
25 necting a server to a network could be used, including a data modem, cable modem, network interface, serial connection, data port, hub, frame relay, digital PBX, and the like, as is known in the art.

[0037] FIGURE 3 is a block diagram showing the software modules of the server system 16 of the system 10 of FIGURE 1. Each module is a computer program written as source code in a conventional programming language, such as the C or Java programming languages, and is presented for execution by the CPU as object or byte code, as is  
30 known in the arts. The various implementations of the source code and object and byte codes can be held on a computer-readable storage medium or embodied on a transmission medium in a carrier wave. There are three basic software modules, which functionally define the primary operations performed by the server system 16: database module 51, analysis module 53, and feedback module 55. In the described embodiment, these modules are executed in a distributed computing environment, although a single server or a cluster of servers could also perform the functionality of the modules. The module functions are further described below in more detail beginning with reference to FIGURE 7.

[0038] For each patient being provided remote patient care, the server system 16 periodically receives a collected measures set 50 which is forwarded to the database module 51 for processing. The database module 51 organizes the individual patient care records stored in the database 52 and provides the facilities for efficiently storing and accessing the collected measures sets 50 and patient data maintained in those records. An exemplary database schema for use  
35 in storing collected measures sets 50 in a patient care record is described below, by way of example, with reference to FIGURE 5. The database server 34 (shown in FIGURE 2) performs the functionality of the database module 51. Any type of database organization could be utilized, including a flat file system, hierarchical database, relational database, or distributed database, such as provided by database vendors, such as Oracle Corporation, Redwood Shores, California.

[0039] The analysis module 53 analyzes the collected measures sets 50 stored in the patient care records in the database 52. The analysis module 53 makes an automated determination of patient wellness in the form of a patient status indicator 54. Collected measures sets 50 are periodically received from implantable medical devices and main-  
40 tained by the database module 51 in the database 52. Through the use of this collected information, the analysis module 53 can continuously follow the medical well being of a patient and can recognize any trends in the collected information that might warrant medical intervention. The analysis module 53 compares individual measures and derived measures obtained from both the care records for the individual patient and the care records for a disease specific group of patients or the patient population in general. The analytic operations performed by the analysis module 53 are further described below with reference to FIGURE 4. The application server 35 (shown in FIGURE 2) performs the  
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functionality of the analysis module 53.

[0040] The feedback module 55 provides automated feedback to the individual patient based, in part, on the patient status indicator 54. As described above, the feedback could be by electronic mail or by automated voice mail or facsimile. Preferably, the feedback is provided in a tiered manner. In the described embodiment, four levels of automated feedback are provided. At a first level, an interpretation of the patient status indicator 54 is provided. At a second level, a notification of potential medical concern based on the patient status indicator 54 is provided. This feedback level could also be coupled with human contact by specially trained technicians or medical personnel. At a third level, the notification of potential medical concern is forwarded to medical practitioners located in the patient's geographic area. Finally, at a fourth level, a set of reprogramming instructions based on the patient status indicator 54 could be transmitted directly to the implantable medical device to modify the programming instructions contained therein. As is customary in the medical arts, the basic tiered feedback scheme would be modified in the event of bona fide medical emergency. The application server 35 (shown in FIGURE 2) performs the functionality of the feedback module 55.

[0041] FIGURE 4 is a block diagram showing the analysis module 53 of the server system 16 of FIGURE 3. The analysis module 53 contains two functional submodules: comparison module 62 and derivation module 63. The purpose of the comparison module 62 is to compare two or more individual measures, either collected or derived. The purpose of the derivation module 63 is to determine a derived measure based on one or more collected measures which is then used by the comparison module 62. For instance, a new and improved indicator of impending heart failure could be derived based on the exemplary cardiac collected measures set described with reference to FIGURE 5. The analysis module 53 can operate either in a batch mode of operation wherein patient status indicators are generated for a set of individual patients or in a dynamic mode wherein a patient status indicator is generated on the fly for an individual patient.

[0042] The comparison module 62 receives as inputs from the database 17 two input sets functionally defined as peer collected measures sets 60 and sibling collected measures sets 61, although in practice, the collected measures sets are stored on a per sampling basis. Peer collected measures sets 60 contain individual collected measures sets that all relate to the same type of patient information, for instance, atrial electrical activity, but which have been periodically collected over time. Sibling collected measures sets 61 contain individual collected measures sets that relate to different types of patient information, but which may have been collected at the same time or different times. In practice, the collected measures sets are not separately stored as "peer" and "sibling" measures. Rather, each individual patient care record stores multiple sets of sibling collected measures. The distinction between peer collected measures sets 60 and sibling collected measures sets 61 is further described below with reference to FIGURE 6.

[0043] The derivation module 63 determines derived measures sets 64 on an as-needed basis in response to requests from the comparison module 62. The derived measures 64 are determined by performing linear and non-linear mathematical operations on selected peer measures 60 and sibling measures 61, as is known in the art.

[0044] FIGURE 5 is a database schema showing, by way of example, the organization of a cardiac patient care record stored 70 in the database 17 of the system 10 of FIGURE 1. Only the information pertaining to collected measures sets are shown. Each patient care record would also contain normal identifying and treatment profile information, as well as medical history and other pertinent data (not shown). Each patient care record stores a multitude of collected measures sets for an individual patient. Each individual set represents a recorded snapshot of telemetered signals data which was recorded, for instance, per heartbeat or binned average basis by the implantable medical device 12. For example, for a cardiac patient, the following information would be recorded as a collected measures set: atrial electrical activity 71, ventricular electrical activity 72, time of day 73, activity level 74, cardiac output 75, oxygen level 76, cardiovascular pressure measures 77, pulmonary measures 78, interventions made by the implantable medical device 78, and the relative success of any interventions made 80. In addition, the implantable medical device 12 would also communicate device specific information, including battery status 81 and program settings 82. Other types of collected measures are possible. In addition, a well-documented set of derived measures can be determined based on the collected measures, as is known in the art.

[0045] FIGURE 6 is a record view showing, by way of example, a set of partial cardiac patient care records stored in the database 17 of the system 10 of FIGURE 1. Three patient care records are shown for *Patient 1*, *Patient 2*, and *Patient 3*. For each patient, three sets of measures are shown, X, Y, and Z. The measures are organized into sets with Set 0 representing sibling measures made at a reference time  $t=0$ . Similarly, Set  $n-2$ , Set  $n-1$  and Set  $n$  each represent sibling measures made at later reference times  $t=n-2$ ,  $t=n-1$  and  $t=n$ , respectively.

[0046] For a given patient, for instance, *Patient 1*, all measures representing the same type of patient information, such as measure X, are peer measures. These are measures, which are monitored over time in a disease-matched peer group. All measures representing different types of patient information, such as measures X, Y, and Z, are sibling measures. These are measures which are also measured over time, but which might have medically significant meaning when compared to each other within a single set. Each of the measures, X, Y, and Z, could be either collected or derived measures.

[0047] The analysis module 53 (shown in FIGURE 4) performs two basic forms of comparison. First, individual

measures for a given patient can be compared to other individual measures for that same patient. These comparisons might be peer-to-peer measures projected over time, for instance,  $X_n, X_{n-1}, X_{n-2}, \dots, X_0$ , or sibling-to-sibling measures for a single snapshot, for instance,  $X_n, Y_n$ , and  $Z_n$ , or projected over time, for instance,  $X_n, Y_n, Z_n, X_{n-1}, Y_{n-1}, Z_{n-1}, X_{n-2}, Y_{n-2}, Z_{n-2}, \dots, X_0, Y_0, Z_0$ . Second, individual measures for a given patient can be compared to other individual measures for a group of other patients sharing the same disease-specific characteristics or to the patient population in general. Again, these comparisons might be peer-to-peer measures projected over time, for instance,  $X_n, X_{n-1}, X_{n-2}, X_{n-3}, X_{n-4}, X_{n-5}, X_{n-6}, X_{n-7}, X_{n-8}, X_{n-9}, X_{n-10}, X_{n-11}, X_{n-12}, X_{n-13}, X_{n-14}, X_{n-15}, X_{n-16}, X_{n-17}, X_{n-18}, X_{n-19}, X_{n-20}, \dots, X_0, X_0, X_0$ , or comparing the individual patient's measures to an average from the group. Similarly, these comparisons might be sibling-to-sibling measures for single snapshots, for instance,  $X_n, X_n, X_n, Y_n, Y_n, Y_n$ , and  $Z_n, Z_n, Z_n$ , or projected over time, for instance,  $X_n, X_n, X_n, Y_n, Y_n, Y_n, Z_n, Z_n, Z_n, X_{n-1}, X_{n-1}, X_{n-1}, Y_{n-1}, Y_{n-1}, Y_{n-1}, Z_{n-1}, Z_{n-1}, Z_{n-1}, X_{n-2}, X_{n-2}, X_{n-2}, Y_{n-2}, Y_{n-2}, Y_{n-2}, Z_{n-2}, Z_{n-2}, Z_{n-2}, \dots, X_0, X_0, X_0, Y_0, Y_0, Y_0$ , and  $Z_0, Z_0, Z_0$ . Other forms of comparisons are feasible.

[0048] FIGURE 7 is a flow diagram showing a method 80 for automated collection and analysis of patient information retrieved from an implantable medical device 12 for remote patient care in accordance with the present invention. The method 80 is implemented as a conventional computer program for execution by the server system 16 (shown in FIGURE 1). As a preparatory step, the patient care records are organized in the database 17 with a unique patient care record assigned to each individual patient (block 91). Next, the collected measures sets for an individual patient are retrieved from the implantable medical device 12 (block 92) using a programmer, interrogator, telemetered signals transceiver, and the like. The retrieved collected measures sets are sent, on a substantially regular basis, over the internetwork 15 or similar communications link (block 93) and periodically received by the server system 16 (block 94). The collected measures sets are stored into the patient care record in the database 17 for that individual patient (block 95). One or more of the collected measures sets for that patient are analyzed (block 96), as further described below with reference to FIGURE 8. Finally, feedback based on the analysis is sent to that patient over the internetwork 15 as an email message, via telephone line as an automated voice mail or facsimile message, or by similar feedback communications link (block 97), as further described below with reference to FIGURE 11.

[0049] FIGURE 8 is a flow diagram showing the routine for analyzing collected measures sets 96 for use in the method of FIGURE 7. The purpose of this routine is to make a determination of general patient wellness based on comparisons and heuristic trends analyses of the measures, both collected and derived, in the patient care records in the database 17. A first collected measures set is selected from a patient care record in the database 17 (block 100). If the measures comparison is to be made to other measures originating from the patient care record for the same individual patient (block 101), a second collected measures set is selected from that patient care record (block 102). Otherwise, a group measures comparison is being made (block 101) and a second collected measures set is selected from another patient care record in the database 17 (block 103). Note the second collected measures set could also contain averaged measures for a group of disease specific patients or for the patient population in general.

[0050] Next, if a sibling measures comparison is to be made (block 104), a routine for comparing sibling collected measures sets is performed (block 105), as further described below with reference to FIGURE 9. Similarly, if a peer measures comparison is to be made (block 106), a routine for comparing sibling collected measures sets is performed (block 107), as further described below with reference to FIGURES 10A and 10B.

[0051] Finally, a patient status indicator is generated (block 108). By way of example, cardiac output could ordinarily be approximately 5.0 liters per minute with a standard deviation of  $\pm 1.0$ . An actionable medical phenomenon could occur when the cardiac output of a patient is  $\pm 2.0$ - $4.0$  standard deviations out of the norm. A comparison of the cardiac output measures 75 (shown in FIGURE 5) for an individual patient against previous cardiac output measures 75 would establish the presence of any type of downward health trend as to the particular patient. A comparison of the cardiac output measures 75 of the particular patient to the cardiac output measures 75 of a group of patients would establish whether the patient is trending out of the norm. From this type of analysis, the analysis module 53 generates a patient status indicator 54 and other metrics of patient wellness, as is known in the art.

[0052] FIGURE 9 is a flow diagram showing the routine for comparing sibling collected measures sets 105 for use in the routine of FIGURE 8. Sibling measures originate from the patient care records for an individual patient. The purpose of this routine is either to compare sibling derived measures to sibling derived measures (blocks 111-113) or sibling collected measures to sibling collected measures (blocks 115-117). Thus, if derived measures are being compared (block 110), measures are selected from each collected measures set (block 111). First and second derived measures are derived from the selected measures (block 112) using the derivation module 63 (shown in FIGURE 4). The first and second derived measures are then compared (block 113) using the comparison module 62 (also shown in FIGURE 4). The steps of selecting, determining, and comparing (blocks 111-113) are repeated until no further comparisons are required (block 114), whereupon the routine returns.

[0053] If collected measures are being compared (block 110), measures are selected from each collected measures set (block 115). The first and second collected measures are then compared (block 116) using the comparison module 62 (also shown in FIGURE 4). The steps of selecting and comparing (blocks 115-116) are repeated until no further comparisons are required (block 117), whereupon the routine returns.



[0054] FIGURES 10A and 10B are a flow diagram showing the routine for comparing peer collected measures sets 107 for use in the routine of FIGURE 8. Peer measures originate from patient care records for different patients, including groups of disease specific patients or the patient population in general. The purpose of this routine is to compare peer derived measures to peer derived measures (blocks 122-125), peer derived measures to peer collected measures (blocks 126-129), peer collected measures to peer derived measures (block 131-134), or peer collected measures to peer collected measures (blocks 135-137). Thus, if the first measure being compared is a derived measure (block 120) and the second measure being compared is also a derived measure (block 121), measures are selected from each collected measures set (block 122). First and second derived measures are derived from the selected measures (block 123) using the derivation module 63 (shown in FIGURE 4). The first and second derived measures are then compared (block 124) using the comparison module 62 (also shown in FIGURE 4). The steps of selecting, determining, and comparing (blocks 122-124) are repeated until no further comparisons are required (block 115), whereupon the routine returns.

[0055] If the first measure being compared is a derived measure (block 120) but the second measure being compared is a collected measure (block 121), a first measure is selected from the first collected measures set (block 126). A first derived measure is derived from the first selected measure (block 127) using the derivation module 63 (shown in FIGURE 4). The first derived and second collected measures are then compared (block 128) using the comparison module 62 (also shown in FIGURE 4). The steps of selecting, determining, and comparing (blocks 126-128) are repeated until no further comparisons are required (block 129), whereupon the routine returns.

[0056] If the first measure being compared is a collected measure (block 120) but the second measure being compared is a derived measure (block 121), a second measure is selected from the second collected measures set (block 131). A second derived measure is derived from the second selected measure (block 132) using the derivation module 63 (shown in FIGURE 4). The first collected and second derived measures are then compared (block 133) using the comparison module 62 (also shown in FIGURE 4). The steps of selecting, determining, and comparing (blocks 131-133) are repeated until no further comparisons are required (block 134), whereupon the routine returns.

[0057] If the first measure being compared is a collected measure (block 120) and the second measure being compared is also a collected measure (block 120), measures are selected from each collected measures set (block 135). The first and second collected measures are then compared (block 136) using the comparison module 62 (also shown in FIGURE 4). The steps of selecting and comparing (blocks 135-136) are repeated until no further comparisons are required (block 137), whereupon the routine returns.

[0058] FIGURE 11 is a flow diagram showing the routine for providing feedback 97 for use in the method of FIGURE 7. The purpose of this routine is to provide tiered feedback based on the patient status indicator. Four levels of feedback are provided with increasing levels of patient involvement and medical care intervention. At a first level (block 150), an interpretation of the patient status indicator 54, preferably phrased in lay terminology, and related health care information is sent to the individual patient (block 151) using the feedback module 55 (shown in FIGURE 3). At a second level (block 152), a notification of potential medical concern, based on the analysis and heuristic trends analysis, is sent to the individual patient (block 153) using the feedback module 55. At a third level (block 154), the notification of potential medical concern is forwarded to the physician responsible for the individual patient or similar health care professionals (block 155) using the feedback module 55. Finally, at a fourth level (block 156), reprogramming instructions are sent to the implantable medical device 12 (block 157) using the feedback module 55.

[0059] FIGURE 12 is a block diagram showing a system 200 for providing normalized voice feedback from an individual patient 11 in an automated collection and analysis patient care system, such as the system 10 of FIGURE 1. The remote client 18 includes a microphone 201 and a speaker 202 which is interfaced internally within the remote client 18 to sound recordation and reproduction hardware. The patient 11 provides spoken feedback into the microphone 201 in response to voice prompts reproduced by the remote client 18 on the speaker 202, as further described below with reference to FIGURE 13. The raw spoken feedback is processed into a normalized set of quality of life measures which each relate to uniform self-assessment indicators, as further described below with reference to FIGURE 15. Alternatively, in a further embodiment of the system 200, the patient 11 can provide spoken feedback via a telephone network 203 using a standard telephone 203, including a conventional wired telephone or a wireless telephone, such as a cellular telephone, as further described below with reference to FIGURE 20. In the described embodiment, the microphone 201 and the speaker 202 are standard, off-the-shelf components commonly included with consumer personal computer systems, as is known in the art.

[0060] The system 200 continuously monitors and collects sets of device measures from the implantable medical device 12. To augment the on-going monitoring process with a patient's self-assessment of physical and emotional well-being, a quality of life measures set can be recorded by the remote client 18. Importantly, each quality of life measures set is recorded substantially contemporaneous to the collection of an identified collected device measures set. The date and time of day at which the quality of life measures set was recorded can be used to correlate the quality of life measures set to the collected device measures set recorded closest in time to the quality of life measures set. The pairing of the quality of life measures set and an identified collected device measures set provides medical practitioners with a



more complete picture of the patient's medical status by combining physiological "hard" machine-recorded data with semi-quantitative "soft" patient-provided data.

[0061] FIGURE 13 is a block diagram showing the software modules of the remote client 18 of the system 200 of FIGURE 12. As with the software modules of the system 10 of FIGURE 1, each module here is also a computer program written as source code in a conventional programming language, such as the C or Java programming languages, and is presented for execution by the CPU as object or byte code, as is known in the arts. There are two basic software modules, which functionally define the primary operations performed by the remote client 18 in providing normalized voice feedback: audio prompter 210 and speech engine 214. The remote client 18 includes a secondary storage 219, such as a hard drive, a CD ROM player, and the like, within which is stored data used by the software modules. Conceptually, the voice reproduction and recognition functions performed by the audio prompter 210 and speech engine 214 can be described separately, but those same functions could also be performed by a single voice processing module, as is known in the art.

[0062] The audio prompter 210 generates voice prompts 226 which are played back to the patient 11 on the speaker 202. Each voice prompt is in the form of a question or phrase seeking to develop a self-assessment of the patient's physical and emotional well being. For example, the patient 11 might be prompted with, "Are you short of breath?" The voice prompts 226 are either from a written script 220 reproduced by speech synthesizer 211 or pre-recorded speech 221 played back by playback module 212. The written script 220 is stored within the secondary storage 219 and consists of written quality of life measure requests. Similarly, the pre-recorded speech 221 is also stored within the secondary storage 219 and consists of sound "bites" of recorded quality of life measure requests in either analog or digital format.

[0063] The speech engine 214 receives voice responses 227 spoken by the patient 11 into the microphone 201. The voice responses 227 can be unstructured, natural language phrases and sentences. A voice grammar 222 provides a lexical structuring for use in determining the meaning of each spoken voice response 227. The voice grammar 222 allows the speech engine 214 to "normalize" the voice responses 227 into recognized quality of life measures 228. Individual spoken words in each voice response 227 are recognized by a speech recognition module 213 and translated into written words. In turn, the written words are parsed into tokens by a parser 216. A lexical analyzer 217 analyzes the tokens as complete phrases in accordance with a voice grammar 222 stored within the secondary storage 219. Finally, if necessary, the individual words are normalized to uniform terms by a lookup module 218 which retrieves synonyms maintained as a vocabulary 223 stored within the secondary storage 219. For example, in response to the query, "Are you short of breath?" a patient might reply, "I can hardly breath," "I am panting," or "I am breathless." The speech recognition module 213 would interpret these phrases to imply dyspnea with a corresponding quality of life measure indicating an awareness by the patient of abnormal breathing. In the described embodiment, the voice reproduction and recognition functions can be performed by the various natural voice software programs licensed by Dragon Systems, Inc., Newton, MA. Alternatively, the written script 220, voice grammar 222, and vocabulary 223 could be expressed as a script written in a voice page markup language for interpretation by a voice browser operating on the remote client 18. Two exemplary voice page description languages include the VoxML markup language, licensed by Motorola, Inc., Chicago, IL, and described at <http://www.voxml.com>, and the Voice eXtensible Markup Language (VXML), currently being jointly developed by AT&T, Motorola, Lucent Technologies, and IBM, and described at <http://www.vxmlforum.com>. The module functions are further described below in more detail beginning with reference to FIGURES 16A-16B.

[0064] FIGURE 14 is a block diagram showing the software modules of the server system 16 of the system 200 of FIGURE 12. The database module 51, previously described above with reference to FIGURE 3, also receives the collected quality of life measures set 228 from the remote client 18, which the database module 51 stores into the appropriate patient care record in the database 52. The date and time of day 236 (shown in FIGURE 15) of the quality of life measures set 228 is matched to the date and time of day 73 (shown in FIGURE 5) of the collected measures set 50 recorded closest in time to the quality of life measures set 228. The matching collected measures set 50 is identified in the patient care record and can be analyzed with the quality of life measures set 228 by the analysis module 53, such as described above with reference to FIGURE 6.

[0065] FIGURE 15 is a database schema showing, by way of example, the organization of a quality of life record 230 for cardiac patient care stored as part of a patient care record in the database 17 of the system 200 of FIGURE 12. A quality of life score is a semi-quantitative self-assessment of an individual patient's physical and emotional well being. Non-commercial, non-proprietary standardized automated quality of life scoring systems are readily available, such as provided by the Duke Activities Status Indicator. For example, for a cardiac patient, the quality of life record 230 stores the following information: health wellness 231, shortness of breath 232, energy level 233, chest discomfort 235, time of day 234, and other quality of life measures as would be known to one skilled in the art. Other types of quality of life measures are possible.

[0066] A quality of life indicator is a vehicle through which a patient can remotely communicate to the patient care system how he or she is subjectively feeling. The quality of life indicators can include symptoms of disease. When tied to machine-recorded physiological measures, a quality of life indicator can provide valuable additional information to

medical practitioners and the automated collection and analysis patient care system 200 not otherwise discernible without having the patient physically present. For instance, a scoring system using a scale of 1.0 to 10.0 could be used with 10.0 indicating normal wellness and 1.0 indicating severe health problems. Upon the completion of an initial observation period, a patient might indicate a health wellness score 231 of 5.0 and a cardiac output score of 5.0. After one month of remote patient care, the patient might then indicate a health wellness score 231 of 4.0 and a cardiac output score of 4.0 and a week later indicate a health wellness score 231 of 3.5 and a cardiac output score of 3.5. Based on a comparison of the health wellness scores 231 and the cardiac output scores, the system 200 would identify a trend indicating the necessity of potential medical intervention while a comparison of the cardiac output scores alone might not lead to the same prognosis.

**[0067]** FIGURES 16A-16B are flow diagrams showing a method 239 for providing normalized voice feedback from an individual patient 11 in an automated collection and analysis patient care system 200. As with the method 90 of FIGURE 7, this method is also implemented as a conventional computer program and performs the same set of steps as described with reference to FIGURE 7 with the following additional functionality. First, voice feedback spoken by the patient 11 into the remote client 18 is processed into a quality of life measures set 228 (block 240), as further described below with reference to FIGURE 17. The voice feedback is spoken substantially contemporaneous to the collection of an identified device measures set 50. The appropriate collected device measures set 50 can be matched to and identified with (not shown) the quality of life measures set 228 either by matching their respective dates and times of day or by similar means, either by the remote client 18 or the server system 16. The quality of life measures set 228 and the identified collected measures set 50 are sent over the internetwork 15 to the server system 16 (block 241). Note the quality of life measures set 228 and the identified collected measures set 50 both need not be sent over the internetwork 15 at the same time, so long as the two sets are ultimately paired based on, for example, date and time of day. The quality of life measures set 228 and the identified collected measures set 50 are received by the server system 16 (block 242) and stored in the appropriate patient care record in the database 52 (block 243). Finally, the quality of life measures set 228, identified collected measures set 50, and one or more collected measures sets 50 are analyzed (block 244) and feedback, including a patient status indicator 54 (shown in FIGURE 14), is provided to the patient (block 245).

**[0068]** FIGURE 17 is a flow diagram showing the routine for processing voice feedback 240 for use in the method of FIGURES 16A-16B. The purpose of this routine is to facilitate a voice interactive session with the patient 11 during which is developed a normalized set of quality of life measures. Thus, the remote client 18 requests a quality of life measure via a voice prompt (block 250), played on the speaker 202 (shown in FIGURE 13), as further described below with reference to FIGURE 18. The remote client 18 receives the spoken feedback from the patient 11 (block 251) via the microphone 201 (shown in FIGURE 13). The remote client 18 recognizes individual words in the spoken feedback and translates those words into written words (block 252), as further described below with reference to FIGURE 19. The routine returns at the end of the voice interactive session.

**[0069]** FIGURE 18 is a flow diagram showing the routine for requesting a quality of life measure 251 for use in the routine 240 of FIGURE 17. The purpose of this routine is to present a voice prompt 226 to the user via the speaker 202. Either pre-recorded speech 221 or speech synthesized from a written script 220 can be used. Thus, if synthesized speech is employed by the remote client 18 (block 260), a written script, such as a voice markup language script, specifying questions and phrases which with to request quality of life measures is stored (block 261) on the secondary storage 219 of the remote client 18. Each written quality of life measure request is retrieved by the remote client 18 (block 262) and synthesized into speech for playback to the patient 11 (block 263). Alternatively, if pre-recorded speech is employed by the remote client 18 (block 260), pre-recorded voice "bites" are stored (block 264) on the secondary storage 219 of the remote client 18. Each pre-recorded quality of life measure request is retrieved by the remote client 18 (block 265) and played back to the patient 11 (block 266). The routine then returns.

**[0070]** FIGURE 19 is a flow diagram showing the routine for recognizing and translating individual spoken words 252 for use in the routine 240 of FIGURE 17. The purpose of this routine is to receive and interpret a free-form voice response 227 from the user via the microphone 201. First, a voice grammar consisting of a lexical structuring of words, phrases, and sentences is stored (block 270) on the secondary storage 219 of the remote client 18. Similarly, a vocabulary of individual words and their commonly accepted synonyms is stored (block 271) on the secondary storage 219 of the remote client 18. After individual words in the voice feedback are recognized (block 272), the individual words are parsed into tokens (block 273). The voice feedback is then lexically analyzed using the tokens and in accordance with the voice grammar 222 (block 274) to determine the meaning of the voice feedback. If necessary, the vocabulary 222 is referenced to lookup synonyms of the individual words (block 275). The routine then returns.

**[0071]** FIGURE 20 is a block diagram showing the software modules of the server system in a further embodiment of the system 200 of FIGURE 12. The functionality of the remote client 18 in providing normalized voice feedback is incorporated directly into the server system 16. The system 200 of FIGURE 12 requires the patient 11 to provide spoken feedback via a locally situated remote client 18. However, the system 200 enables a patient 11 to alternatively provide spoken feedback via a telephone network 203 using a standard telephone 203, including a conventional wired

telephone or a wireless telephone, such as a cellular telephone. The server system 16 is augmented to include the audio prompter 210, the speech engine 214, and the data stored in the secondary storage 219. A telephonic interface 260 interfaces the server system 16 to the telephone network 203 and receives voice responses 227 and sends voice prompts 226 to and from the server system 16. Telephonic interfacing devices are commonly known in the art.

5 [0072] FIGURE 21 is a block diagram showing a system for providing normalized voice feedback from an individual patient in an automated collection and analysis patient care system 300 in accordance with a further embodiment of the present invention. The system 300 provides remote patient care in a manner similar to the system 200 of FIGURE 12, but with additional functionality for diagnosing and monitoring multiple sites within a patient's body using a variety of patient sensors for diagnosing one or more disorder. The patient 301 can be the recipient of an implantable medical  
10 device 302, as described above, or have an external medical device 303 attached, such as a Holter monitor-like device for monitoring electrocardiograms. In addition, one or more sites in or around the patient's body can be monitored using multiple sensors 304a, 304b, such as described in U.S. Patents 4,987,897; 5,040,536; 5,113,859; and 5,987,382, the disclosures of which are incorporated herein by reference. One automated system and method for collecting and analyzing retrieved patient information suitable for use with the present invention is described in the related, commonly-  
15 owned European Patent application, Application No. , entitled "System And Method For Automated Collection And Analysis Of Regularly Retrieved Patient Information For Remote Patient Care," the disclosure of which is incorporated herein by reference. Other types of devices with physiological measure sensors, both heterogeneous and homogenous, could be used, either within the same device or working in conjunction with each other, as is known in the art.

20 [0073] As part of the system 300, the database 17 stores patient care records 305 for each individual patient to whom remote patient care is being provided. Each patient care record 305 contains normal patient identification and treatment profile information, as well as medical history, medications taken, height and weight, and other pertinent data (not shown). The patient care records 305 consist primarily of monitoring sets 306 storing device and derived measures (D&DM) sets 307 and quality of life and symptom measures (QOLM) sets 308 recorded and determined thereafter on a regular, continuous basis. The organization of the device and derived measures sets 306 for an exemplary cardiac  
25 patient care record is described above with reference to FIGURE 5. The organization of the quality of life and symptom measures sets 308 is further described below with reference to FIGURE 23.

[0074] Optionally, the patient care records 305 can further include a reference baseline 309 storing a special set of device and derived reference measures sets 310 and quality of life and symptom measures sets 311 recorded and determined during an initial observation period, such as described in the related, commonly-owned European Patent  
30 application, Application No. , entitled "System And Method For Determining A Reference Baseline Of Individual Patient Status For Use In An Automated Collection And Analysis Patient Care System," the disclosure of which is incorporated herein by reference. Other forms of database organization are feasible.

[0075] Finally, simultaneous notifications can also be delivered to the patient's physician, hospital, or emergency medical services provider 312 using feedback means similar to that used to notify the patient. As described above, the  
35 feedback could be by electronic mail or by automated voice mail or facsimile. Furthermore, the spoken voice feedback from the patient and the feedback provided by the system 200 can be communicated by means of or in combination with the medical device itself, whether implantable, external or otherwise.

[0076] FIGURE 22 is a block diagram showing the analysis module 53 of the server system 16 of FIGURE 21. The peer collected measures sets 60 and sibling collected measures sets 61 can be organized into site specific groupings based on the sensor from which they originate, that is, implantable medical device 302, external medical device 303, or  
40 multiple sensors 304a, 304b. The functionality of the analysis module 53 is augmented to iterate through a plurality of site specific measures sets 315 and one or more disorders.

[0077] As described above, as an adjunct to remote patient care through the monitoring of measured physiological data via implantable medical device 302, external medical device 303 and multiple sensors 304a, 304b, quality of life and symptom measures sets 308 can also be stored in the database 17 as part of the monitoring sets 306. A quality of  
45 life measure is a semi-quantitative self-assessment of an individual patient's physical and emotional well-being and a record of symptoms, such as provided by the Duke Activities Status Indicator. These scoring systems can be provided for use by the patient 11 on the personal computer 18 (shown in FIGURE 1) to record his or her quality of life scores for both initial and periodic download to the server system 16.

[0078] FIGURE 23 is a database schema which augments the database schema described above with reference to FIGURE 15 and showing, by way of example, the organization of a quality of life and symptom measures set record 320 for care of patients stored as part of a patient care record 305 in the database 17 of the system 300 of FIGURE 21. The following exemplary information is recorded for a patient: overall health wellness 321, psychological state 322,  
50 chest discomfort 323, location of chest discomfort 324, palpitations 325, shortness of breath 326, exercise tolerance 327, cough 328, sputum production 329, sputum color 330, energy level 331, syncope 332, near syncope 333, nausea 334, diaphoresis 335, time of day 31, and other quality of life and symptom measures as would be known to one skilled in the art.

[0079] Other types of quality of life and symptom measures are possible, such as those indicated by responses to the Minnesota Living with Heart Failure Questionnaire described in E. Braunwald, ed., "Heart Disease-A Textbook of Cardiovascular Medicine," pp. 452-454, W.B. Saunders Co. (1997), the disclosure of which is incorporated herein by reference. Similarly, functional classifications based on the relationship between symptoms and the amount of effort required to provoke them can serve as quality of life and symptom measures, such as the New York Heart Association (NYHA) classifications I, II, III and IV, also described in *ibid*.

[0080] The patient may also add non-device quantitative measures, such as the six-minute walk distance, as complementary data to the device and derived measures sets 307 and the symptoms during the six-minute walk to quality of life and symptom measures sets 308.

[0081] FIGURE 24 is a record view showing, by way of example, a set of partial cardiac patient care records stored in the database 17 of the system 300 of FIGURE 21. Three patient care records are again shown for Patient 1, Patient 2, and Patient 3 with each of these records containing site specific measures sets 315, grouped as follows. First, the patient care record for Patient 1 includes three site specific measures sets A, B and C, corresponding to three sites on Patient 1's body. Similarly, the patient care record for Patient 2 includes two site specific measures sets A and B, corresponding to two sites, both of which are in the same relative positions on Patient 2's body as the sites for Patient 1. Finally, the patient care record for Patient 3 includes two site specific measures sets A and D, also corresponding to two medical device sensors, only one of which, Site A, is in the same relative position as Site A for Patient 1 and Patient 2.

[0082] The analysis module 56 (shown in FIGURE 22) performs two further forms of comparison in addition to comparing the individual measures for a given patient to other individual measures for that same patient or to other individual measures for a group of other patients sharing the same disease-specific characteristics or to the patient population in general. First, the individual measures corresponding to each body site for an individual patient can be compared to other individual measures for that same patient, a peer group or a general patient population. Again, these comparisons might be peer-to-peer measures projected over time, for instance, comparing measures for each site, A, B and C, for Patient 1,

$$\begin{aligned}
 & X_{n_1A}, X_{n_1B}, X_{n_1C}, X_{n-1A}, X_{n-1B}, X_{n-1C}, \\
 & X_{n-2A}, X_{n-2B}, X_{n-2C}, \dots, X_{0A}, X_{0B}, X_{0C}; X_{n_2A}, X_{n_2B}, X_{n_2C}, X_{n-1A}, X_{n-1B}, \\
 & X_{n-2A}, X_{n-2B}, X_{n-2C}, X_{n-3A}, X_{n-3B}, X_{n-3C}, \dots, X_{0A}, X_{0B}, X_{0C}; X_{n_3A}, X_{n_3B}, X_{n_3C}, X_{n-1A}, \\
 & X_{n-2A}, X_{n-2B}, X_{n-2C}, X_{n-3A}, X_{n-3B}, X_{n-3C}, \dots, X_{0A}, X_{0B}, X_{0C};
 \end{aligned}$$

comparing comparable measures for Site A for the three patients,

$$\begin{aligned}
 & X_{n_1A}, X_{n_2A}, X_{n_3A}, X_{n-1A}, \\
 & X_{n-2A}, X_{n-3A}, X_{n-4A}, X_{n-5A}, X_{n-6A}, \dots, X_{0A}, X_{0A}, X_{0A};
 \end{aligned}$$

or comparing the individual patient's measures to an average from the group. Similarly, these comparisons might be sibling-to-sibling measures for single snapshots, for instance, comparing comparable measures for Site A for the three patients,

$$X_{n_1A}, X_{n_2A}, X_{n_3A}, Y_{n_1A}, Y_{n_2A}, Y_{n_3A}, \text{ and } Z_{n_1A}, Z_{n_2A}, Z_{n_3A},$$

or comparing those same comparable measures for Site A projected over time, for instance,

$$\begin{aligned}
 & X_{n_k}, X_{n_k}^{\prime}, \\
 5 \quad & X_{n_k}, Y_{n_k}, Y_{n_k}^{\prime}, Z_{n_k}, Z_{n_k}^{\prime}, X_{n-1_k}, X_{n-2_k}, X_{n-3_k}, Y_{n-1_k}, Y_{n-2_k}, Y_{n-3_k}, \\
 & Z_{n-1_k}, Z_{n-2_k}, Z_{n-3_k}, X_{n-2_k}, X_{n-2_k}^{\prime}, X_{n-2_k}, Y_{n-2_k}, Y_{n-2_k}^{\prime}, Y_{n-2_k}, Z_{n-2_k}, Z_{n-2_k}^{\prime}, \\
 10 \quad & Z_{n-2_k}^{\prime}, \dots, X_{n_k}, X_{n_k}^{\prime}, X_{n_k}, Y_{n_k}, Y_{n_k}^{\prime}, Y_{n_k}^{\prime}, \text{ and } Z_{n_k}, Z_{n_k}^{\prime}, Z_{n_k}^{\prime}.
 \end{aligned}$$

Other forms of site-specific comparisons, including comparisons between individual measures from non-comparable sites between patients, are feasible.

[0083] Second, the individual measures can be compared on a disorder specific basis. The individual measures stored in each cardiac patient record can be logically grouped into measures relating to specific disorders and diseases, for instance, congestive heart failure, myocardial infarction, respiratory distress, and atrial fibrillation. The foregoing comparison operations performed by the analysis module 53 are further described below with reference to FIGURES 26A-26E.

[0084] FIGURE 25 is a Venn diagram showing, by way of example, peer group overlap between the partial patient care records 305 of FIGURE 24. Each patient care record 305 includes characteristics data 350, 351, 352, including personal traits, demographics, medical history, and related personal data, for patients 1, 2 and 3, respectively. For example, the characteristics data 350 for patient 1 might include personal traits which include gender and age, such as male and an age between 40-45; a demographic of resident of New York City; and a medical history consisting of anterior myocardial infarction, congestive heart failure and diabetes. Similarly, the characteristics data 351 for patient 2 might include identical personal traits, thereby resulting in partial overlap 353 of characteristics data 350 and 351. Similar characteristics overlap 354, 355, 356 can exist between each respective patient. The overall patient population 357 would include the universe of all characteristics data. As the monitoring population grows, the number of patients with personal traits matching those of the monitored patient will grow, increasing the value of peer group referencing. Large peer groups, well matched across all monitored measures, will result in a well known natural history of disease and will allow for more accurate prediction of the clinical course of the patient being monitored. If the population of patients is relatively small, only some traits 356 will be uniformly present in any particular peer group. Eventually, peer groups, for instance, composed of 100 or more patients each, would evolve under conditions in which there would be complete overlap of substantially all patient data, thereby forming a powerful cure reference group for any new patient being monitored.

[0085] FIGURES 26A-26E are flow diagrams showing a method for providing normalized voice feedback from an individual patient in an automated collection and analysis patient care system 360 in accordance with a further embodiment of the present invention. As with the method 230 of FIGURES 16A and 16B, this method is also implemented as a conventional computer program and performs the same set of steps as described with reference to FIGURES 16A and 16B with the following additional functionality. As before, the patient care records are organized in the database 17 with a unique patient care record assigned to each individual patient (block 361). Next, the individual measures for each site are iteratively obtained in a first processing loop (blocks 362-367) and each disorder is iteratively analyzed in a second processing loop (blocks 368-370). Other forms of flow control are feasible, including recursive processing.

[0086] During each iteration of the first processing loop (blocks 362-367), the collected measures sets for an individual patient are retrieved from the medical device or sensor located at the current site (block 363) using a programmer, interrogator, telemetered signals transceiver, and the like. The retrieved collected measures sets are sent, on a substantially regular basis, over the internetwork 15 or similar communications link (block 364) and periodically received by the server system 16 (block 365). The collected measures sets are stored into the patient care record 305 in the database 17 for that individual patient (block 366). Any voice feedback spoken by the patient 11 into the remote client 18 is processed into a quality of life measures set 228 (block 240), as described above with reference to FIGURE 17. The voice feedback is spoken substantially contemporaneous to the collection of an identified device measures set 50. The appropriate collected device measures set 50 can be matched to and identified with (not shown) the quality of life measures set 228 either by matching their respective dates and times of day or by similar means, either by the remote client 18 or the server system 16. The quality of life measures set 228 and the identified collected measures set 50 are sent over the internetwork 15 to the server system 16 (block 241). The quality of life measures set 228 and the identified collected measures set 50 are received by the server system 16 (block 242) and stored in the appropriate patient care record in the database 52 (block 243).

[0087] During each iteration of the second processing loop (blocks 368-370), the quality of life measures set 228, identified collected measures set 50, and one or more of the collected measures sets for that patient are analyzed for

the current disorder are analyzed (block 244). Finally, feedback based on the analysis is sent to that patient over the internetwork 15 as an email message, via telephone line as an automated voice mail or facsimile message, or by similar feedback communications link (block 245). In addition, the measures sets can be further evaluated and matched to diagnose specific medical disorders, such as congestive heart failure, myocardial infarction, respiratory distress, and atrial fibrillation, as described in related, commonly-owned U.S. Patent applications, Serial No. 09/441,823, pending, filed November 16, 1999; Serial No. 09/441,812, pending, filed November 16, 1999; Serial No. 09/442,125, pending, filed November 16, 1999; and Serial No. 09/441,813, pending, filed November 16, 1999, the disclosures of which are incorporated herein by reference. In addition, multiple near-simultaneous disorders can be ordered and prioritized as part of the patient status indicator as described in the related, commonly-owned U.S. Patent application, Serial No. 09/441,405, pending, filed November 16, 1999, the disclosure of which is incorporated herein by reference.

[0088] Therefore, through the use of the collected measures sets, the present invention makes possible immediate access to expert medical care at any time and in any place. For example, after establishing and registering for each patient an appropriate baseline set of measures, the database server could contain a virtually up-to-date patient history, which is available to medical providers for the remote diagnosis and prevention of serious illness regardless of the relative location of the patient or time of day.

[0089] Moreover, the gathering and storage of multiple sets of critical patient information obtained on a routine basis makes possible treatment methodologies based on an algorithmic analysis of the collected data sets. Each successive introduction of a new collected measures set into the database server would help to continually improve the accuracy and effectiveness of the algorithms used. In addition, the present invention potentially enables the detection, prevention, and cure of previously unknown forms of disorders based on a trends analysis and by a cross-referencing approach to create continuously improving peer-group reference databases.

[0090] Similarly, the present invention makes possible the provision of tiered patient feedback based on the automated analysis of the collected measures sets. This type of feedback system is suitable for use in, for example, a subscription based health care service. At a basic level, informational feedback can be provided by way of a simple interpretation of the collected data. The feedback could be built up to provide a graduated response to the patient, for example, to notify the patient that he or she is trending into a potential trouble zone. Human interaction could be introduced, both by remotely situated and local medical practitioners. Finally, the feedback could include direct interventive measures, such as remotely reprogramming a patient's IPG.

[0091] Finally, the present invention allows "live" patient voice feedback to be captured simultaneously with the collection of physiological measures by their implantable medical device. The voice feedback is normalized to a standardized set of quality of life measures which can be analyzed in a remote, automated fashion. The voice feedback could also be coupled with visual feedback, such as through digital photography or video, to provide a more complete picture of the patient's physical well-being.

[0092] While the invention has been particularly shown and described as referenced to the embodiments thereof, those skilled in the art will understand that the foregoing and other changes in form and detail may be made therein without departing from the spirit and scope of the invention.

## Claims

1. A system 200 for providing normalized voice feedback from an individual patient 11 in an automated collection and analysis patient care system 10, comprising:

a medical device 12 having a sensor for monitoring at least one physiological measure of an individual patient, the collected measures set comprising individual measures which each relate to patient information recorded by the medical device;

a remote client 18 processing voice feedback 201 into a set of quality of life measures which each relate to patient self-assessment indicators, the voice feedback 201 having been spoken by the individual patient 11 into a remote client 18 substantially contemporaneous to the collection of an identifiable device measures set;

a network server 16 over which is periodically received a set of collected measures retrieved on a substantially regular basis from the medical device 12, the identified collected device measures set is received from the medical device 12, and the quality of life measures set 228 is received from the remote client 18;

a database 17 coupled to the network server 16 and storing the collected measures set, the identified collected device measures set and the quality of life measures set into a patient care record for the individual patient within a database organized to store one or more patient care records which each comprise a plurality of the collected measures sets; and

an application server coupled to the database and analyzing the identified collected device measures set 50, the quality of life measures set 228, and one or more of the collected device measures sets in the patient care record for the individual patient relative to one or more other collected device measures sets stored in the data-

base to determine a patient status indicator.

2. A system according to Claim 1, further comprising:

the network server repeatedly receiving one or more collected measures sets which are each recorded by a sensor which monitors at least one physiological measure of the individual patient, each such sensor monitoring a site within the individual patient unique from the site monitored by any other such sensor; the database storing each collected measures set organized by specific site into the patient care record for the individual patient within the database; and the application server analyzing one or more of the site specific collected measures sets in the patient care record for each site within the individual patient relative to one or more other site specific collected measures sets stored in the database to determine a patient status indicator.

3. A system according to Claim 2, wherein the one or more site specific collected measures sets and the one or more other site specific collected measures sets both store measures collected from the same relative site.

4. A system according to Claim 2, wherein the one or more site specific collected measures sets and the one or more other site specific collected measures sets both store measures collected from a different site.

5. A system according to Claim 1, the remote client further comprising:

an audio prompter 210 requesting a quality of life measure via a voice prompt played on the remote client to the individual patient.

6. A system according to Claim 5, further comprising:

a written script 220 comprising a plurality of quality of life measure requests stored within the remote client; and the audio prompter 210 further comprising a speech synthesizer module 211 retrieving each quality of life request from the stored written script with each such retrieved quality of life measure request comprising one such voice prompt 226 and synthesizing speech for playback from the retrieved quality of life request.

7. A system according to Claim 5, further comprising:

pre-recorded speech 221 comprising a plurality of quality of life measure requests stored within the remote client; and the audio prompter 210 further comprising a playback module 212 retrieving each quality of life request from the stored pre-recorded speech with each such retrieved quality of life measure request comprising one such voice prompt and playing the pre-recorded speech from the retrieved quality of life request.

8. A system according to Claim 1, the remote client further comprising:

a speech engine 214 recognizing individual words in the spoken voice feedback and translating the individual spoken words into written individual words.

9. A system according to Claim 8, further comprising:

a voice grammar 222 stored within the remote client, the voice grammar comprising a plurality of speech phrases expressed in a natural language, each speech phrase corresponding to a normalized quality of life measure;

the speech engine 214 further comprising:

a parser 215 parsing the written individual words into tokens; and a lexical analyzer 217 performing a lexical analysis of the parsed tokens in accordance with the voice grammar to identify one such normalized quality of life measure.

10. A system according to Claim 8, further comprising:

a vocabulary 223 stored within the remote client, the vocabulary comprising the written individual words; and

the speech engine 214 further comprising a lookup module 218 performing a lookup of the written individual words from the vocabulary stored within the remote client.

11. A system according to Claim 1, the remote client further comprising:

wherein the remote client comprises at least one of a personal computer, an audio interface, and a telephony instrument.

12. A method for providing normalized voice feedback from an individual patient in an automated collection and analysis patient care system, comprising:

periodically receiving 94 a set of collected measures retrieved on a substantially regular basis from a medical device having a sensor for monitoring at least one physiological measure of an individual patient, the collected measures set 50 comprising individual measures which each relate to patient information recorded by the medical device;

storing 95 the collected measures set into a patient care record for the individual patient within a database organized to store one or more patient care records which each comprise a plurality of the collected measures sets;

processing 240 voice feedback into a set of quality of life measures 228 which each relate to patient self-assessment indicators, the voice feedback having been spoken by the individual patient into a remote client substantially contemporaneous to the collection of an identifiable device measures set;

receiving 242 the identified collected device measures set 50 and the quality of life measures set 228;

storing 243 the identified collected device measures set and the quality of life measures set into the patient care record for the individual patient within the database 52; and

analyzing 244 the identified collected device measures set 50, the quality of life measures set 228, and one or more of the collected device measures sets in the patient care record for the individual patient relative to one or more other collected device measures sets stored in the database to determine a patient status indicator 54.

13. A method according to Claim 12, further comprising:

repeatedly receiving one or more collected measures sets which are each recorded by a sensor which monitors at least one physiological measure of the individual patient, each such sensor monitoring a site within the individual patient unique from the site monitored by any other such sensor;

storing each collected measures set organized by specific site into the patient care record for the individual patient within the database; and

analyzing one or more of the site specific collected measures sets in the patient care record for each site within the individual patient relative to one or more other site specific collected measures sets stored in the database to determine a patient status indicator.

14. A method according to Claim 13, wherein the one or more site specific collected measures sets and the one or more other site specific collected measures sets both store measures collected from the same relative site.

15. A method according to Claim 13, wherein the one or more site specific collected measures sets and the one or more other site specific collected measures sets both store measures collected from a different site.

16. A method according to Claim 12, the operation of processing voice feedback 240 further comprising:

requesting 250 a quality of life measure via a voice prompt played on the remote client to the individual patient.

17. A method according to Claim 16, the operation of requesting a quality of life measure further comprising:

storing 261 a written script 220 comprising a plurality of quality of life measure requests within the remote client;

retrieving 262 each quality of life request from the stored written script 220 with each such retrieved quality of life measure request comprising one such voice prompt 226; and

synthesizing 263 speech for playback from the retrieved quality of life request.

18. A method according to Claim 16, the operation of requesting a quality of life measure further comprising:



storing 264 pre-recorded speech comprising a plurality of quality of life measure requests within the remote client;

retrieving 265 each quality of life request from the stored pre-recorded speech with each such retrieved quality of life measure request comprising one such voice prompt; and

5 playing 266 the pre-recorded speech from the retrieved quality of life request.

19. A method according to Claim 12, the operation of processing voice feedback further comprising:

recognizing 252 individual words in the spoken voice feedback; and

10 translating 252 the individual spoken words into written individual words.

20. A method according to Claim 19, further comprising:

storing 270 a voice grammar within the remote client, the voice grammar comprising a plurality of speech phrases expressed in a natural language, each speech phrase corresponding to a normalized quality of life measure;

15 parsing 273 the written individual words into tokens; and

performing a lexical analysis 274 of the parsed tokens in accordance with the voice grammar to identify one such normalized quality of life measure.

20

21. A method according to Claim 19, further comprising:

storing 271 the written individual words as a vocabulary within the remote client; and

performing a lookup 275 of the written individual words from the vocabulary stored within the remote client.

25

22. A method according to Claim 12, wherein the remote client comprises at least one of a personal computer, an audio interface, and a telephony instrument.

23. A computer program product stored on a computer usable medium comprising computer readable program means for causing a computer to carry out the method steps of any one of claims 12 to 22.

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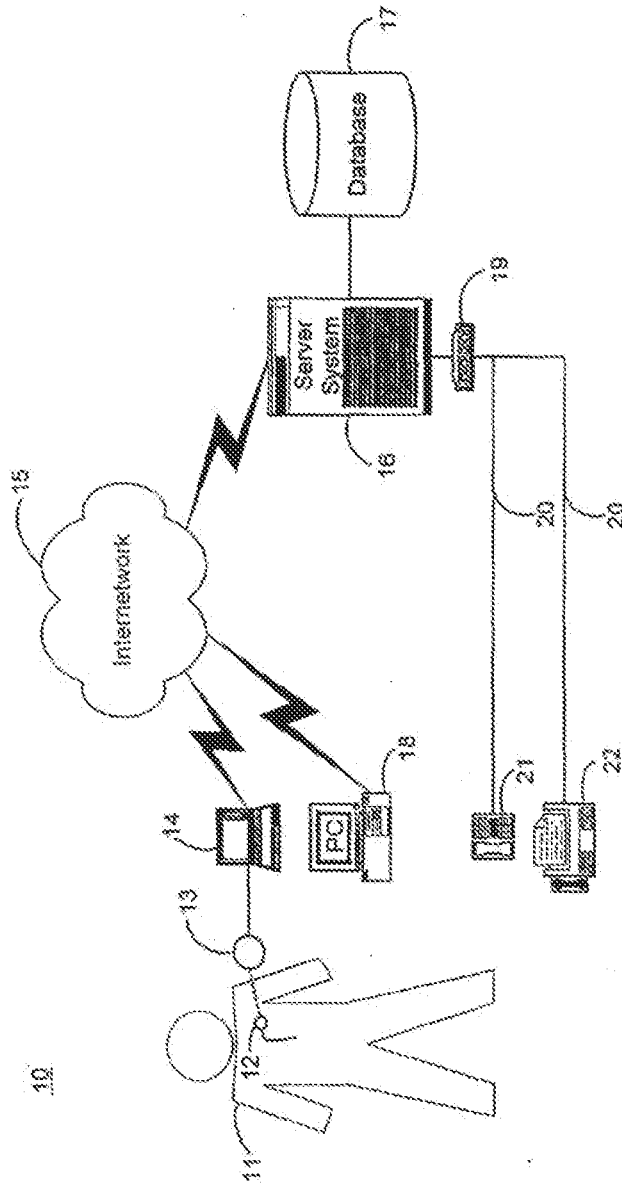


FIGURE 1

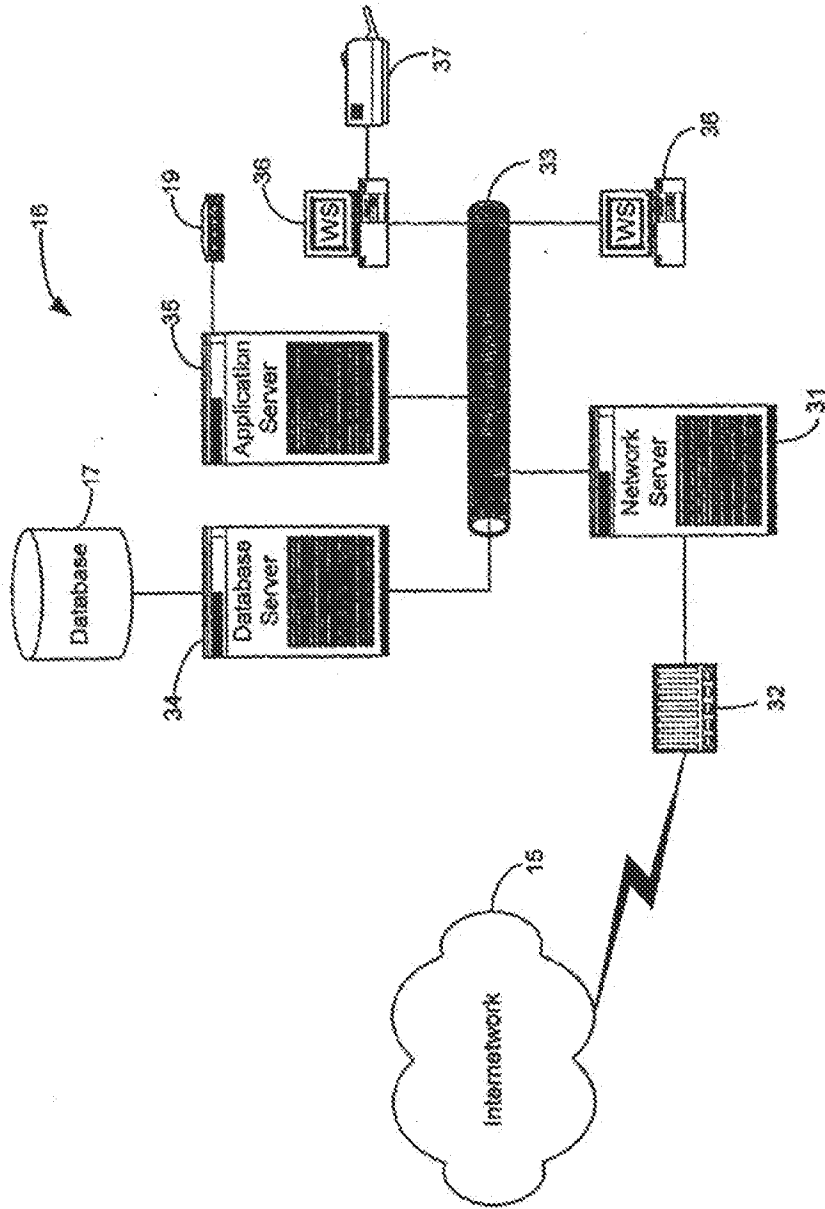


FIGURE 2

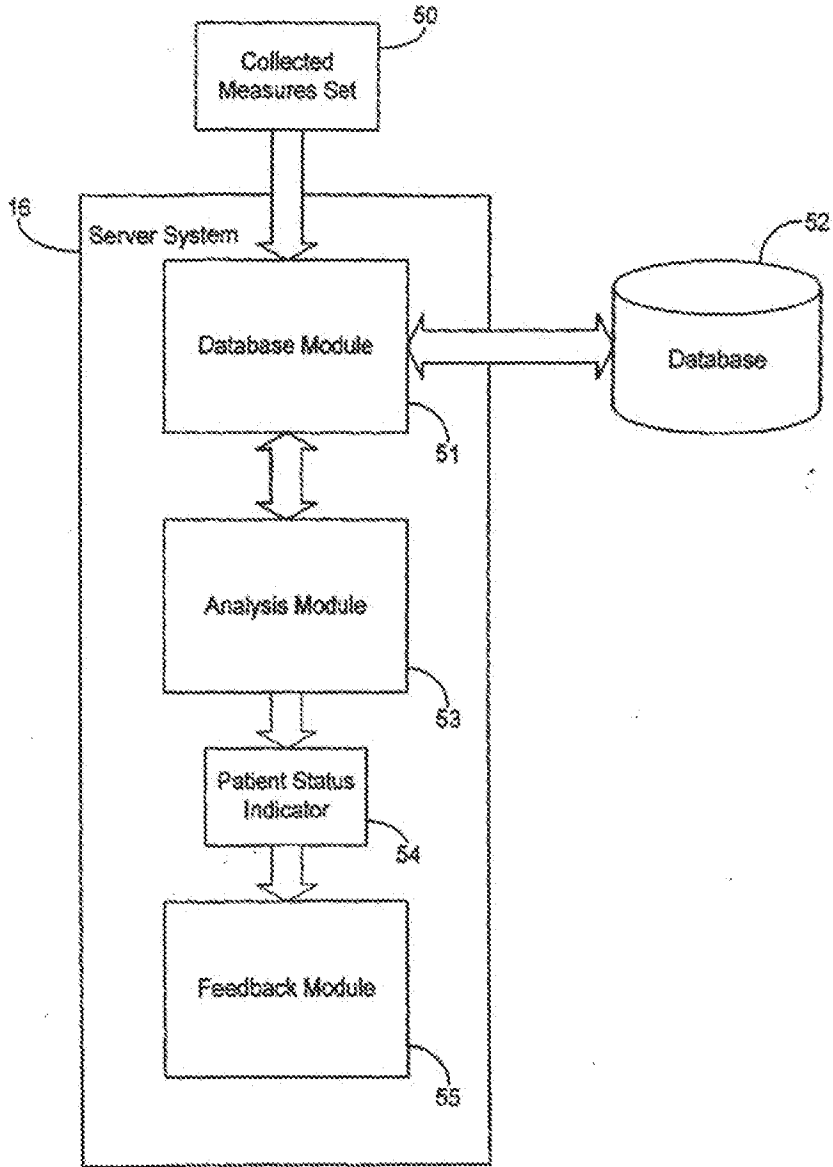


FIGURE 3

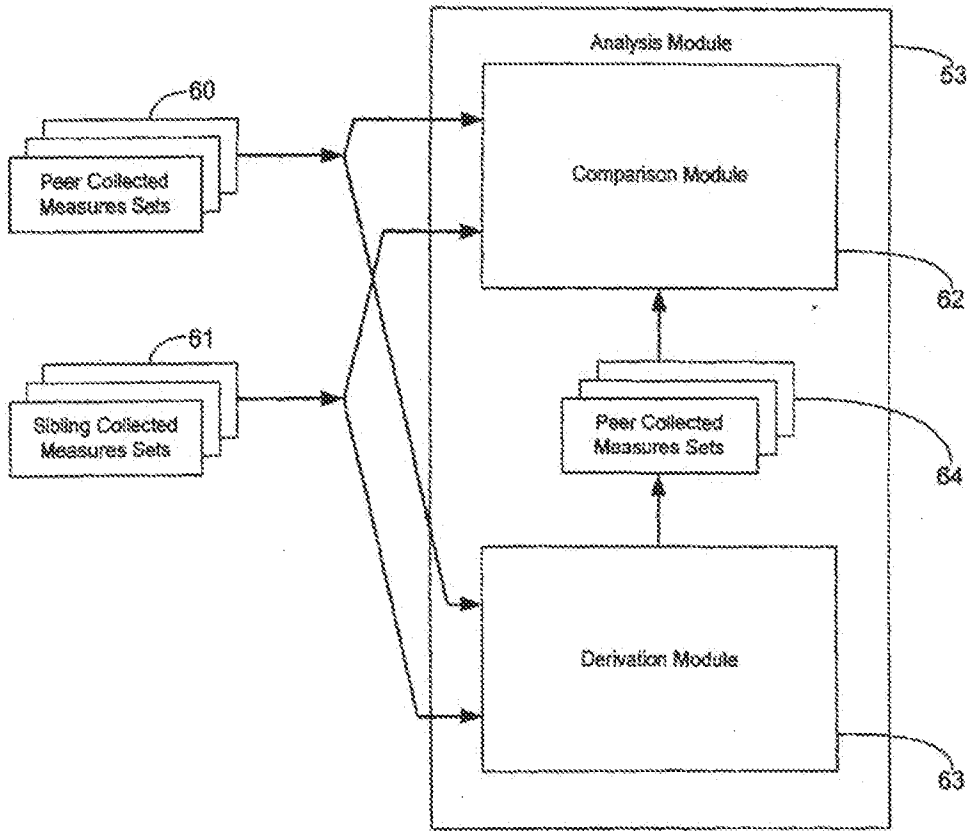


FIGURE 4

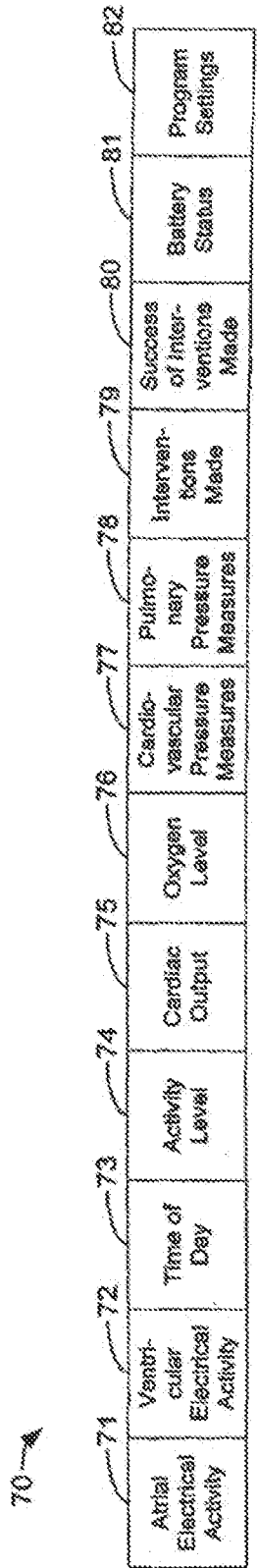


FIGURE 5

Patient 1

Set 0				Set n-2	Set n-1	Set n
$X_0$	*	*	*	$X_{n-2}$	$X_{n-1}$	$X_n$
$Y_0$	*	*	*	$Y_{n-2}$	$Y_{n-1}$	$Y_n$
$Z_0$	*	*	*	$Z_{n-2}$	$Z_{n-1}$	$Z_n$

time →

Patient 2

Set 0				Set n-2	Set n-1	Set n
$X_0'$	*	*	*	$X_{n-2}'$	$X_{n-1}'$	$X_n'$
$Y_0'$	*	*	*	$Y_{n-2}'$	$Y_{n-1}'$	$Y_n'$
$Z_0'$	*	*	*	$Z_{n-2}'$	$Z_{n-1}'$	$Z_n'$

time →

Patient 3

Set 0				Set n-2	Set n-1	Set n
$X_0''$	*	*	*	$X_{n-2}''$	$X_{n-1}''$	$X_n''$
$Y_0''$	*	*	*	$Y_{n-2}''$	$Y_{n-1}''$	$Y_n''$
$Z_0''$	*	*	*	$Z_{n-2}''$	$Z_{n-1}''$	$Z_n''$

time →

FIGURE 6

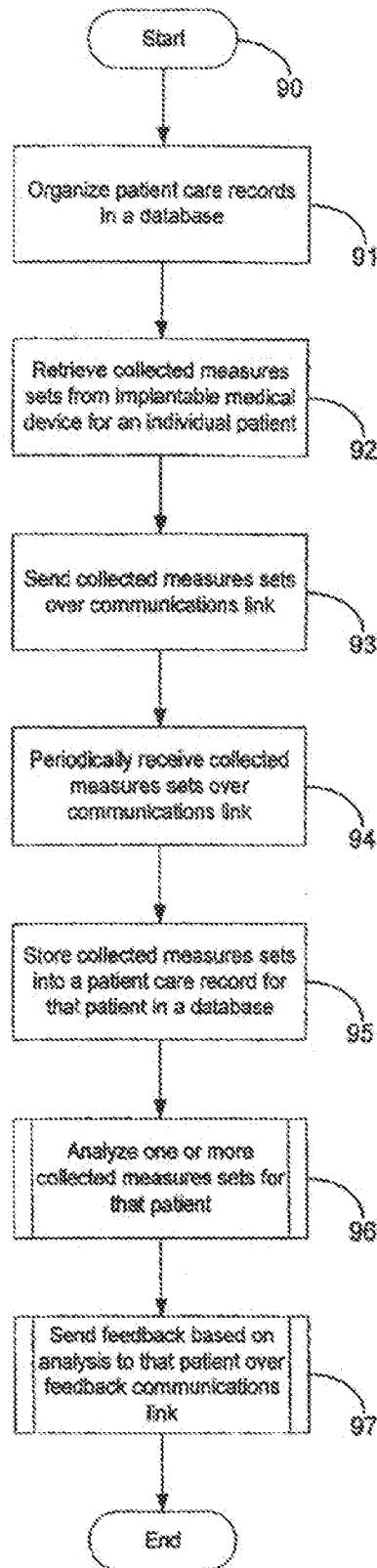


FIGURE 7



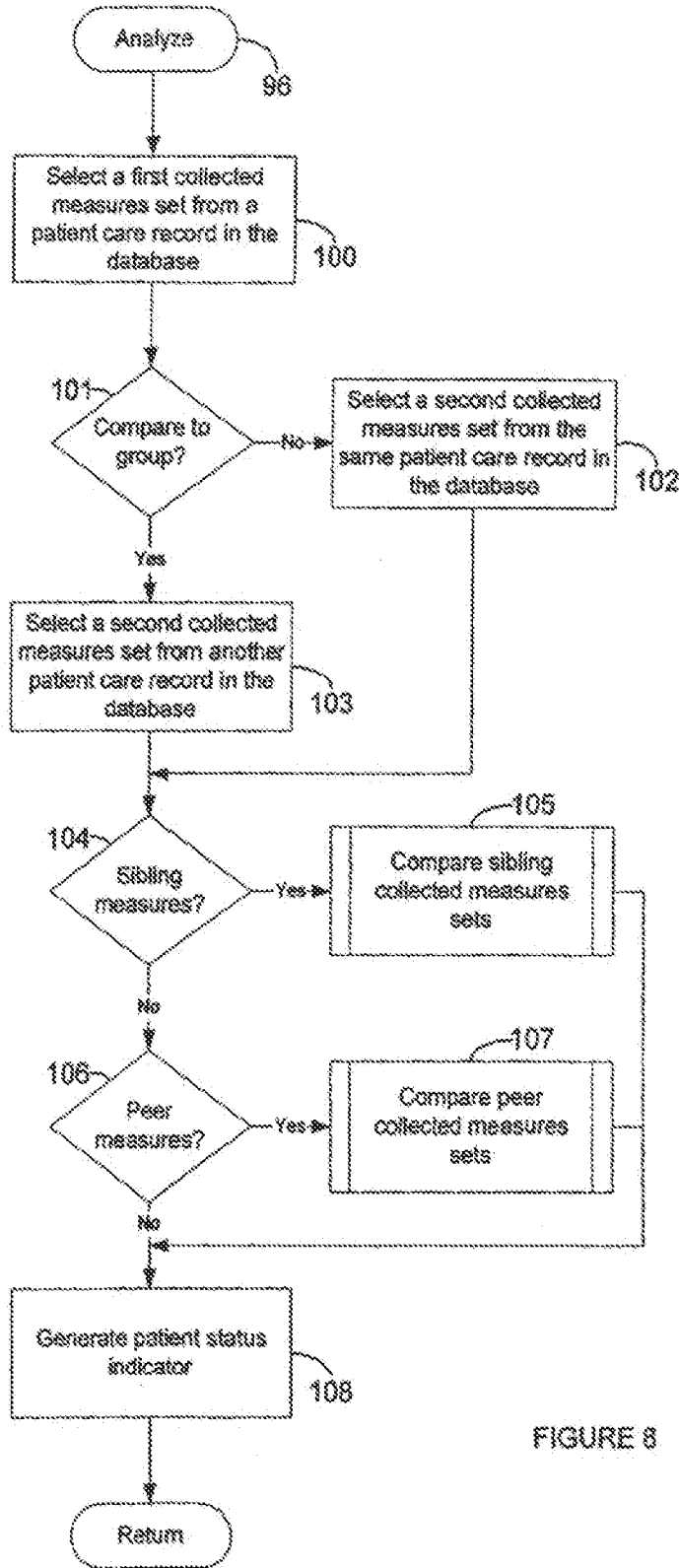


FIGURE 8

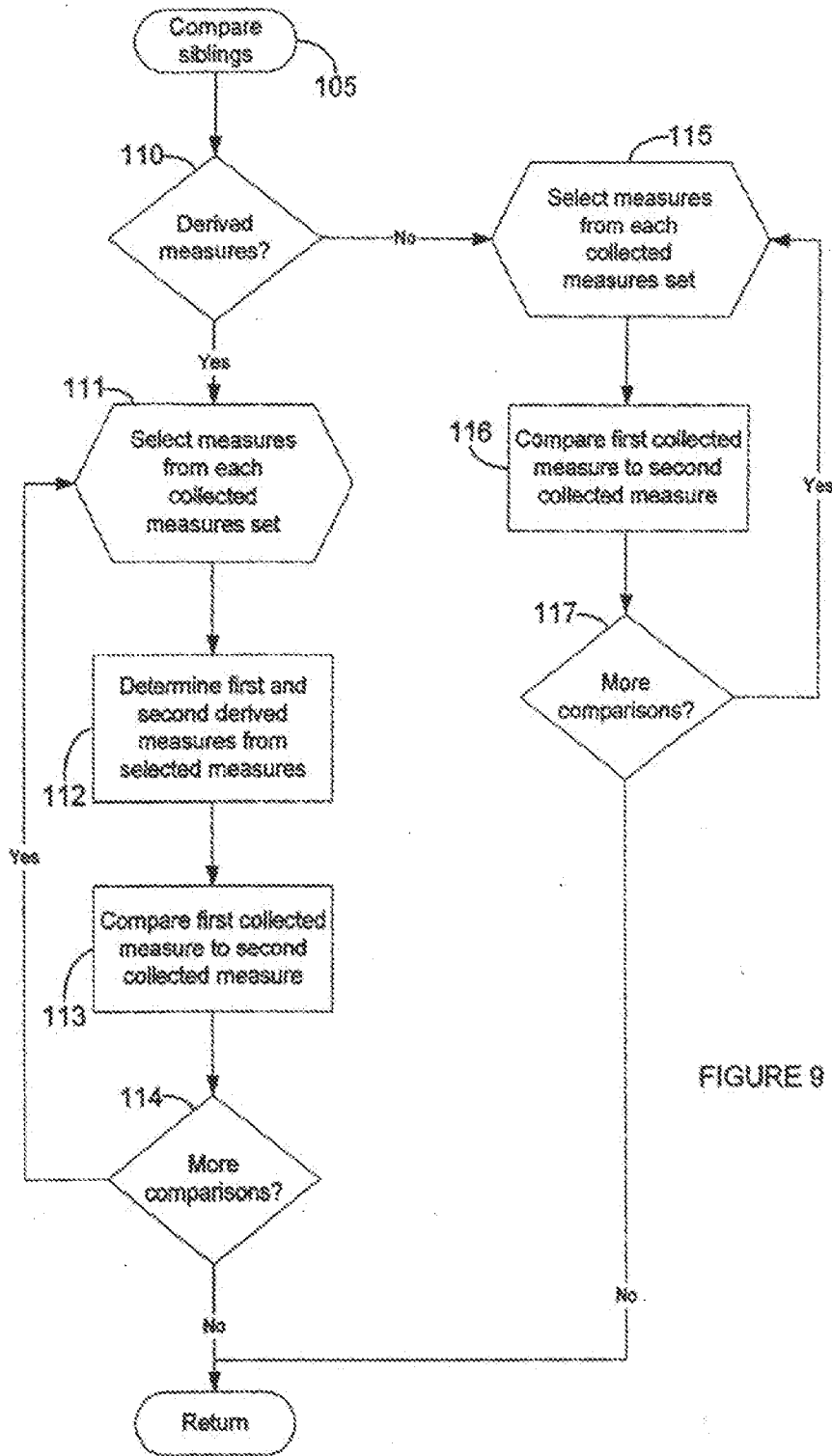


FIGURE 9

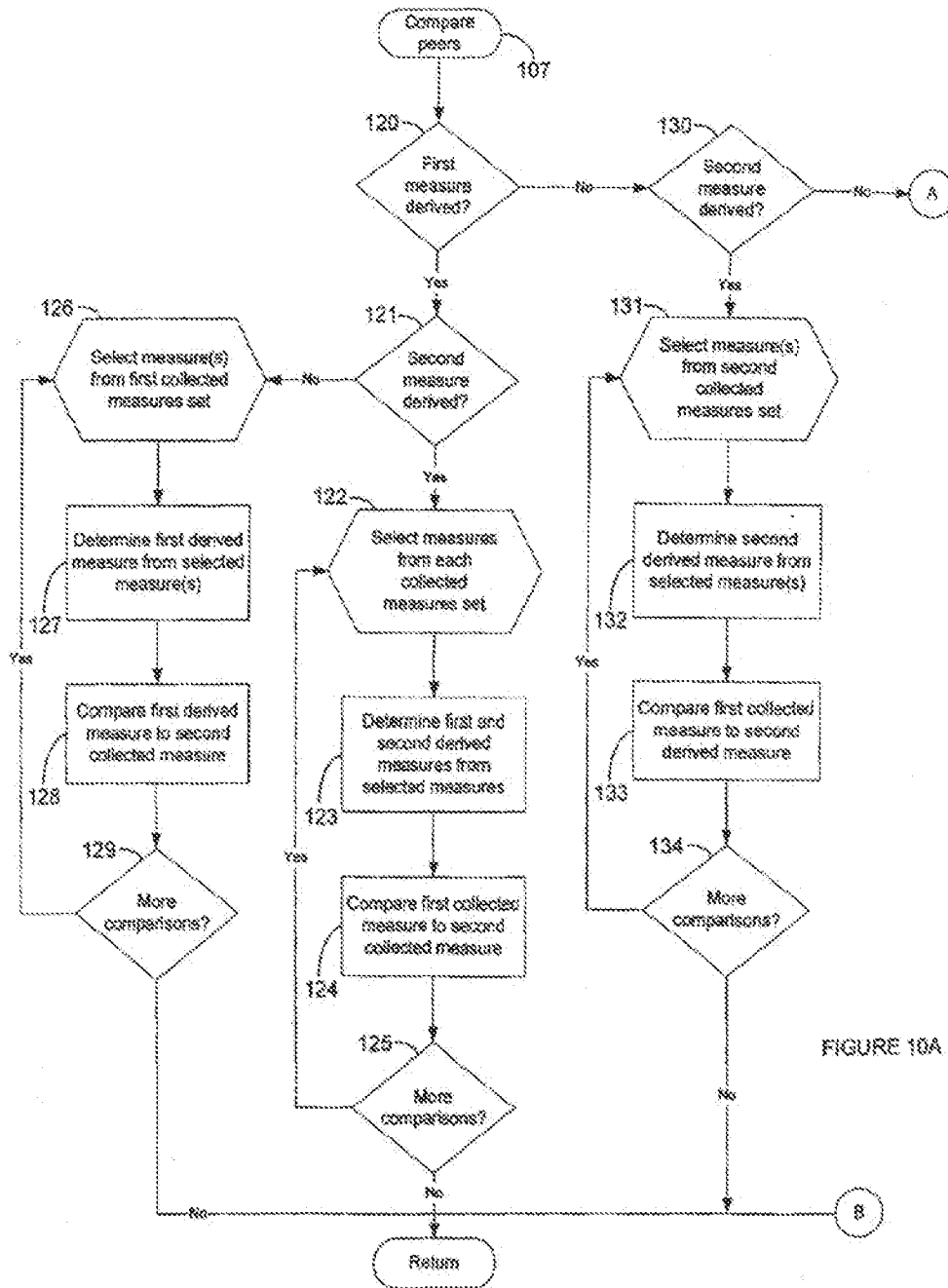


FIGURE 10A

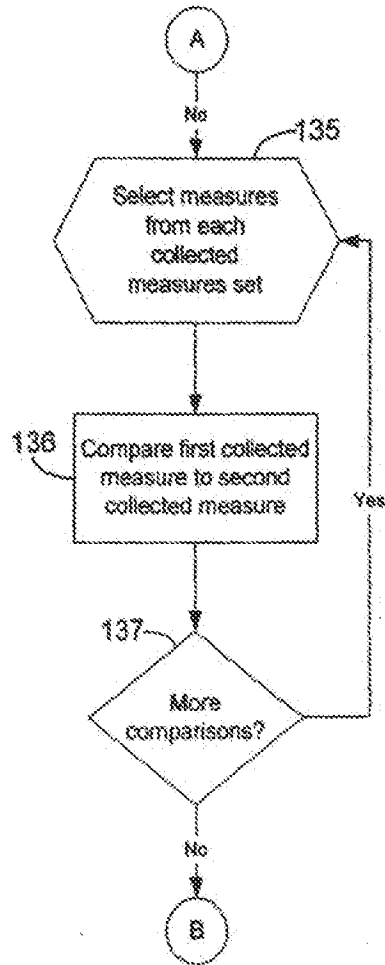


FIGURE 10B

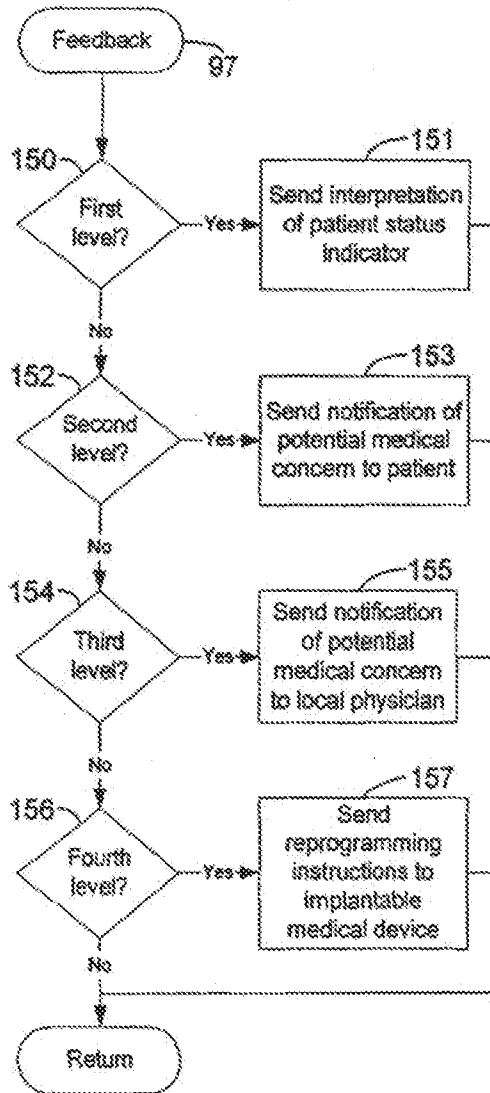


FIGURE 11

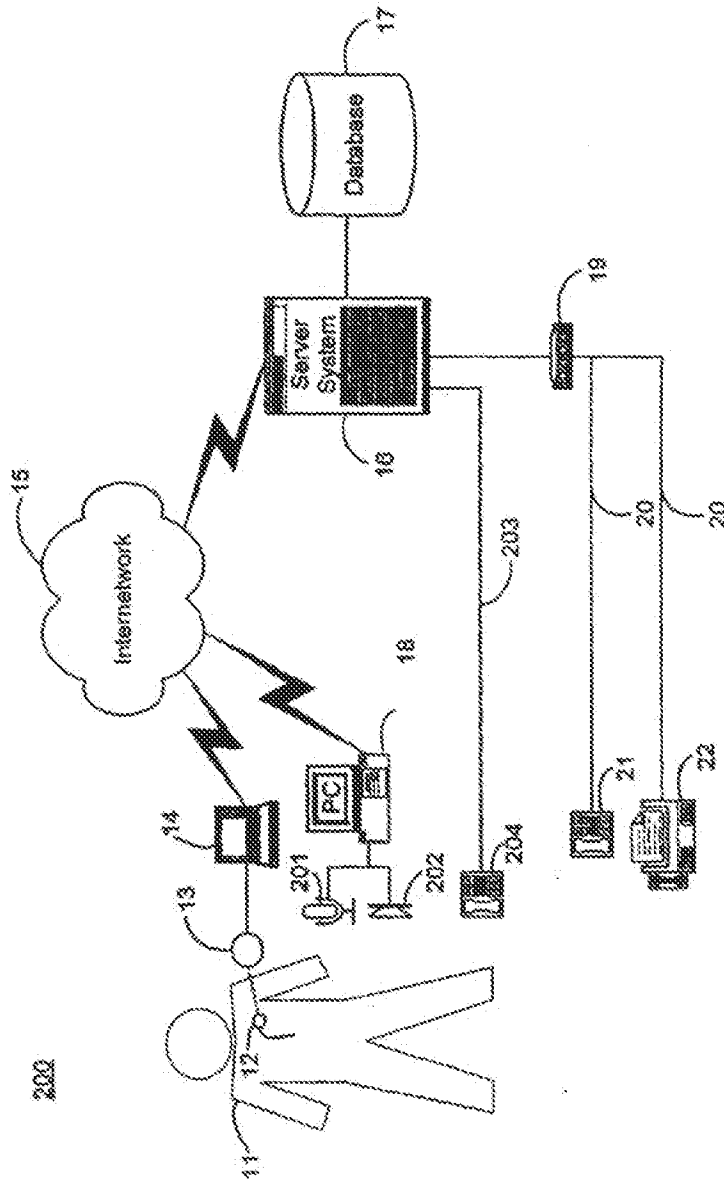


FIGURE 12

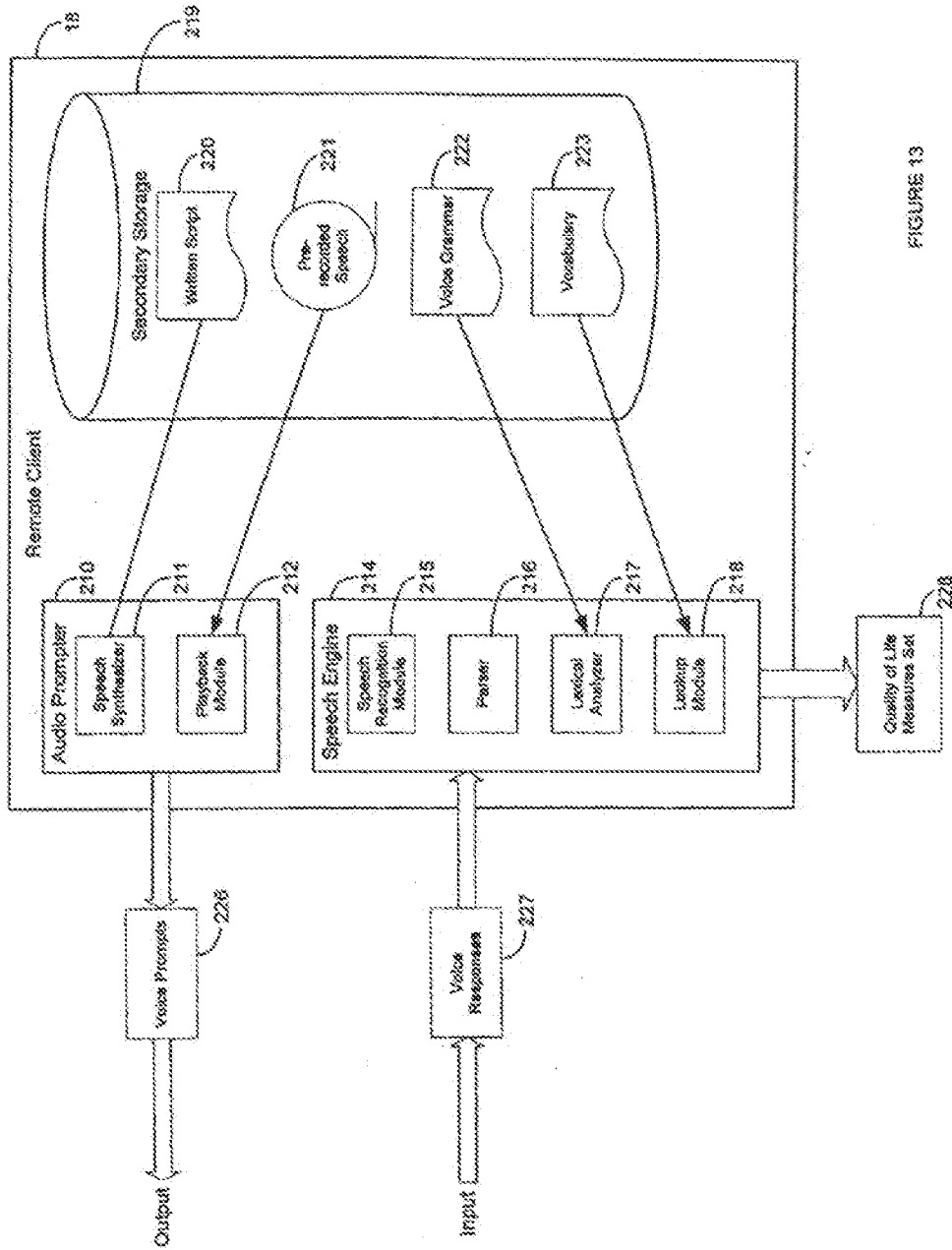


FIGURE 13

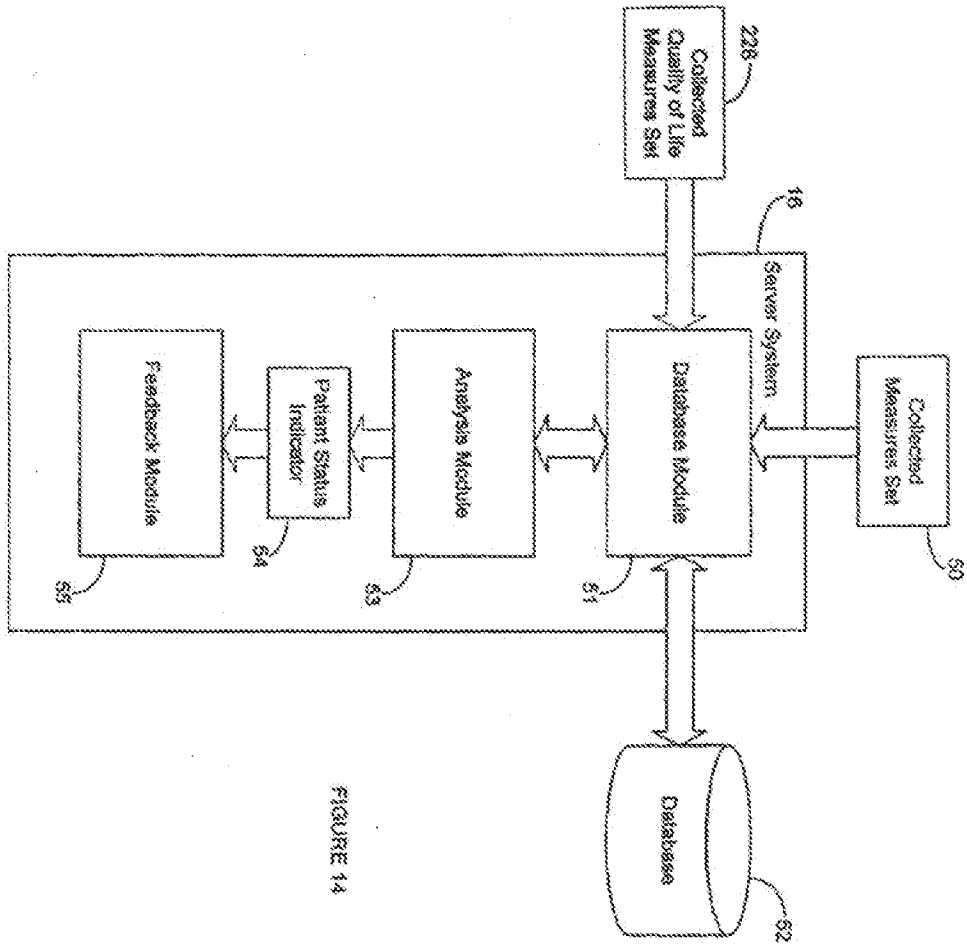


FIGURE 14



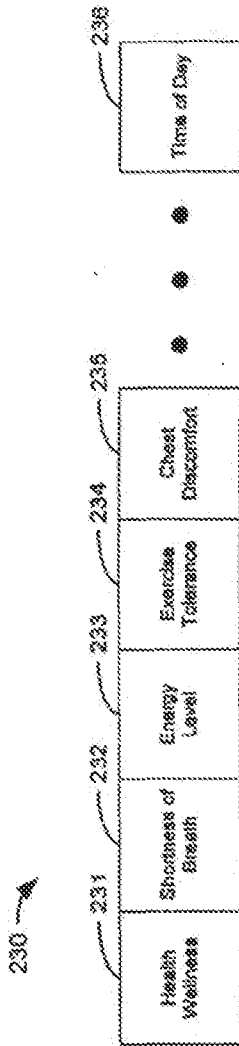


FIGURE 15

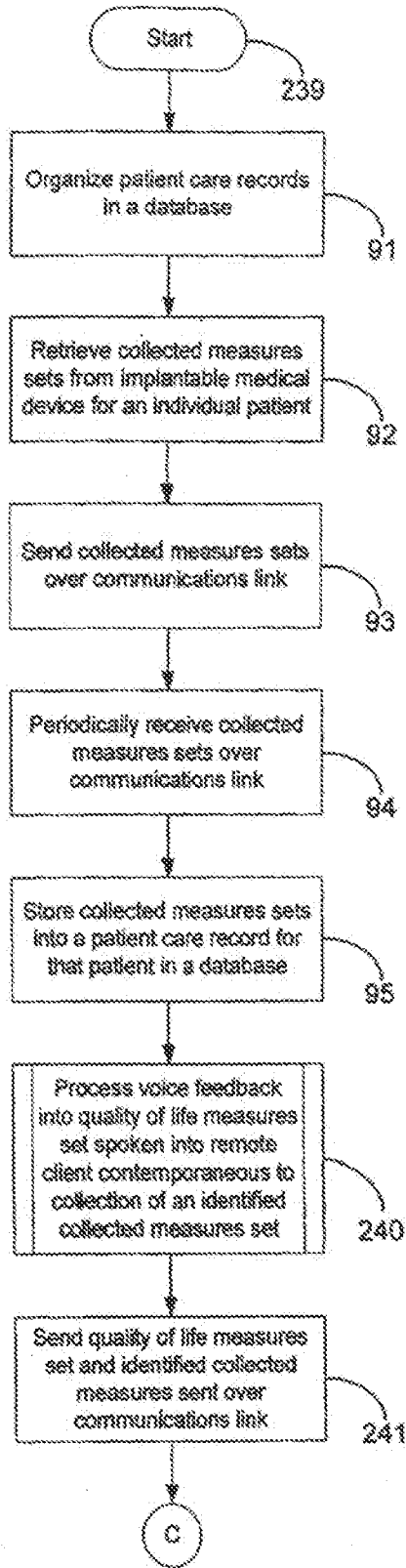


FIGURE 16A

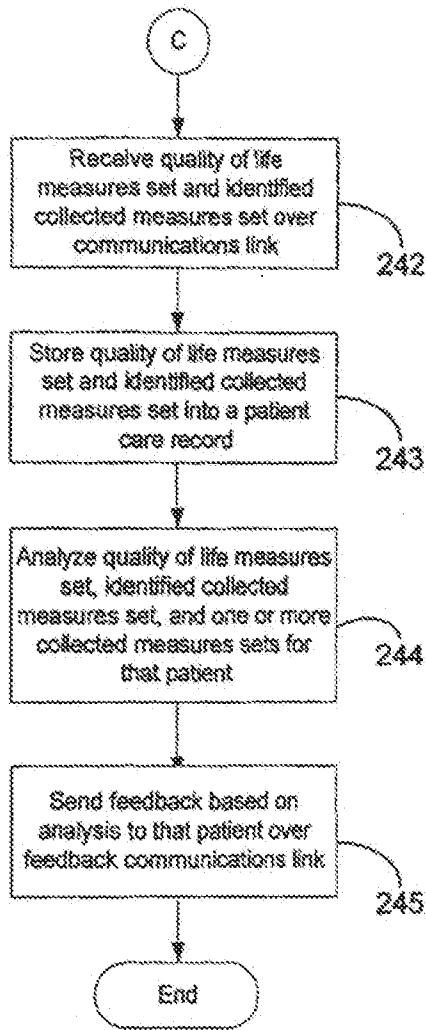


FIGURE 168

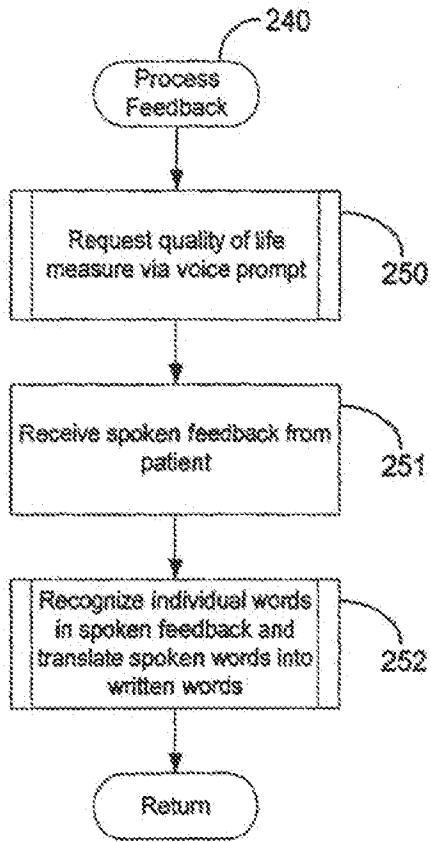


FIGURE 17

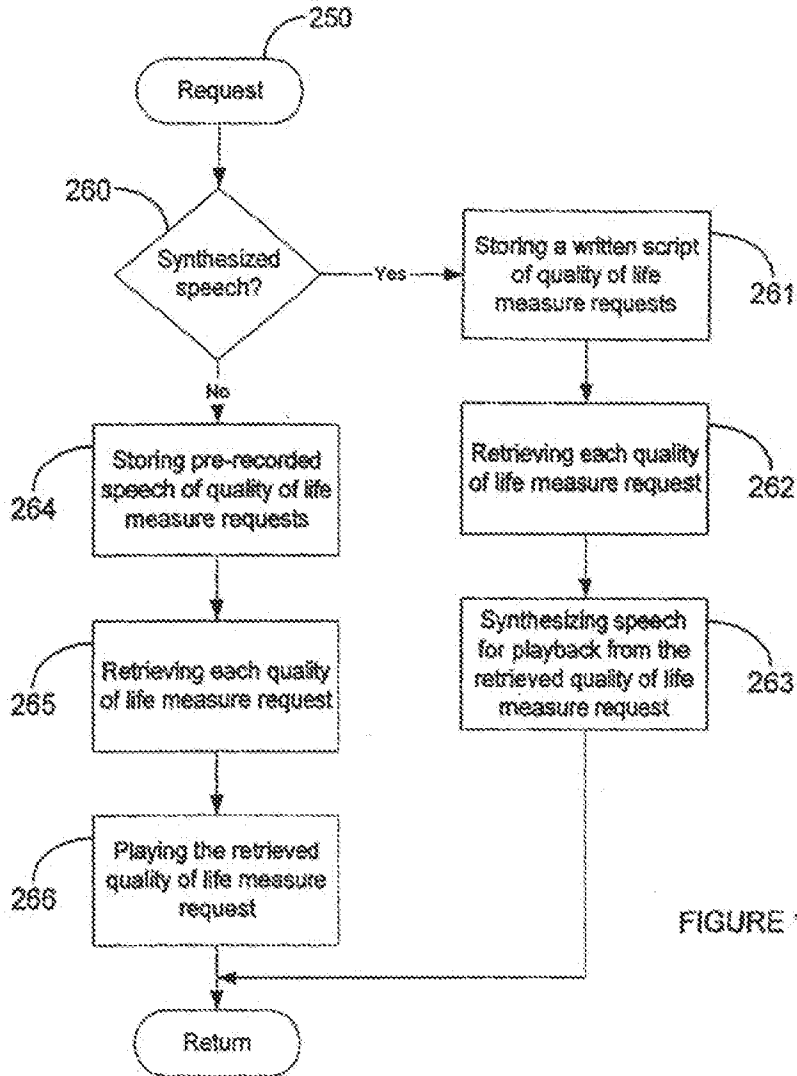


FIGURE 18

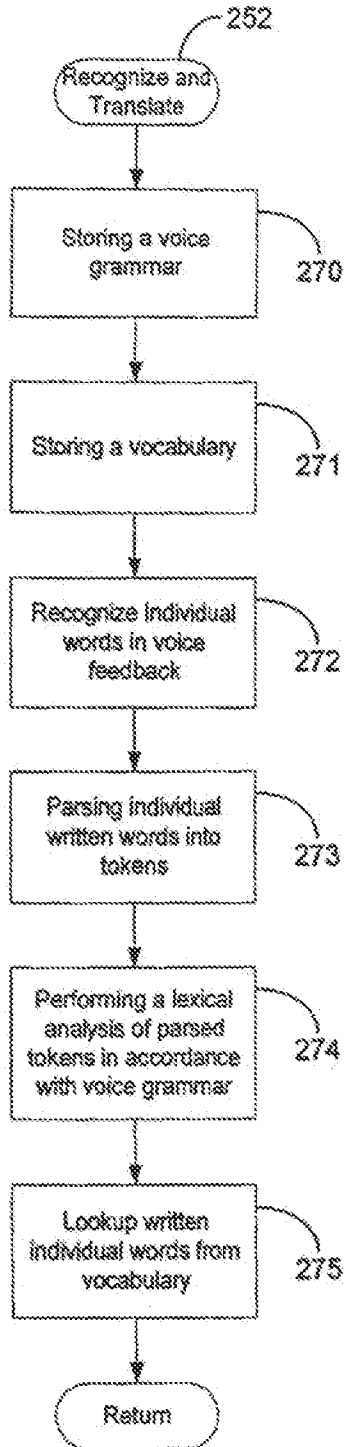


FIGURE 19

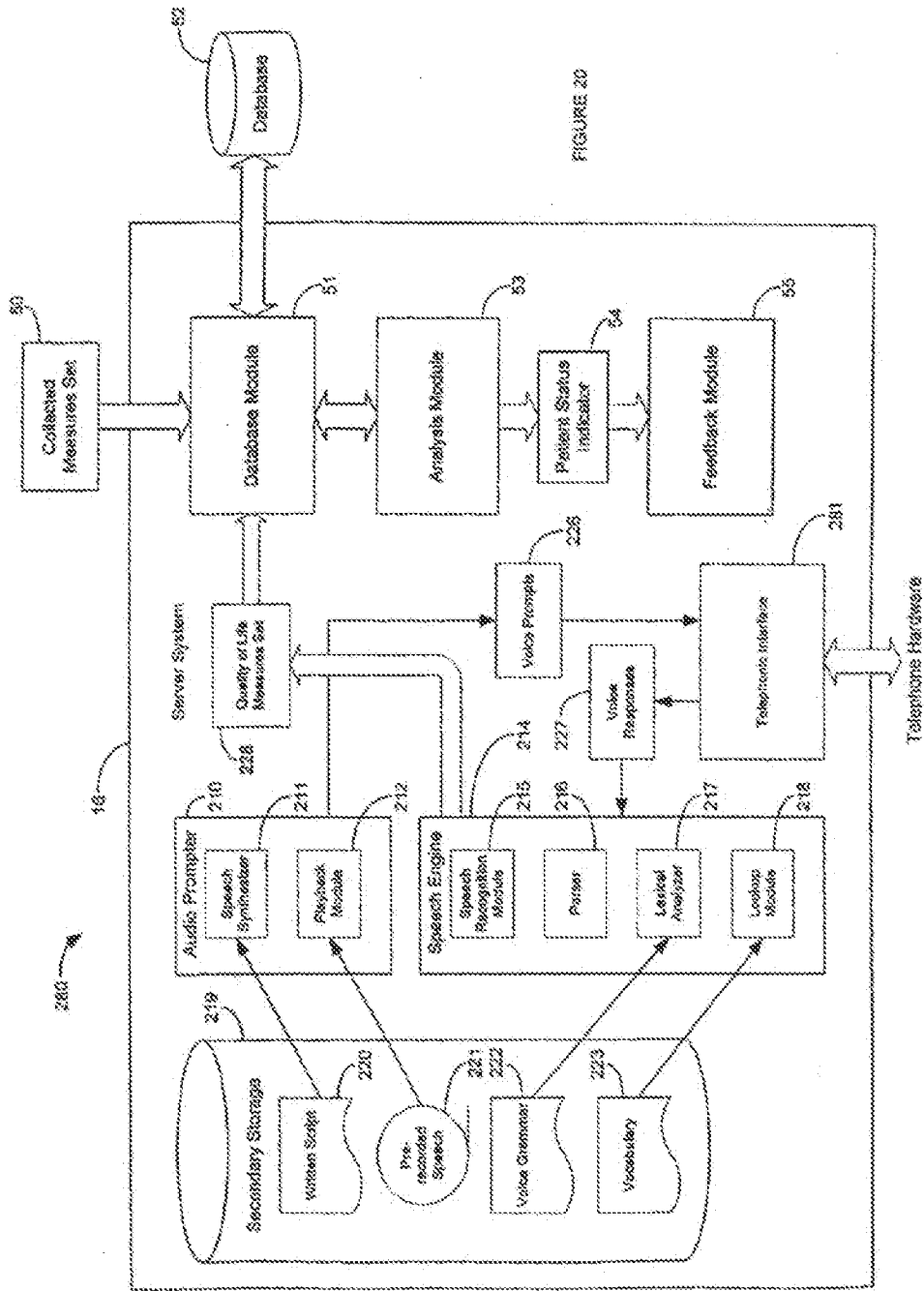


FIGURE 20

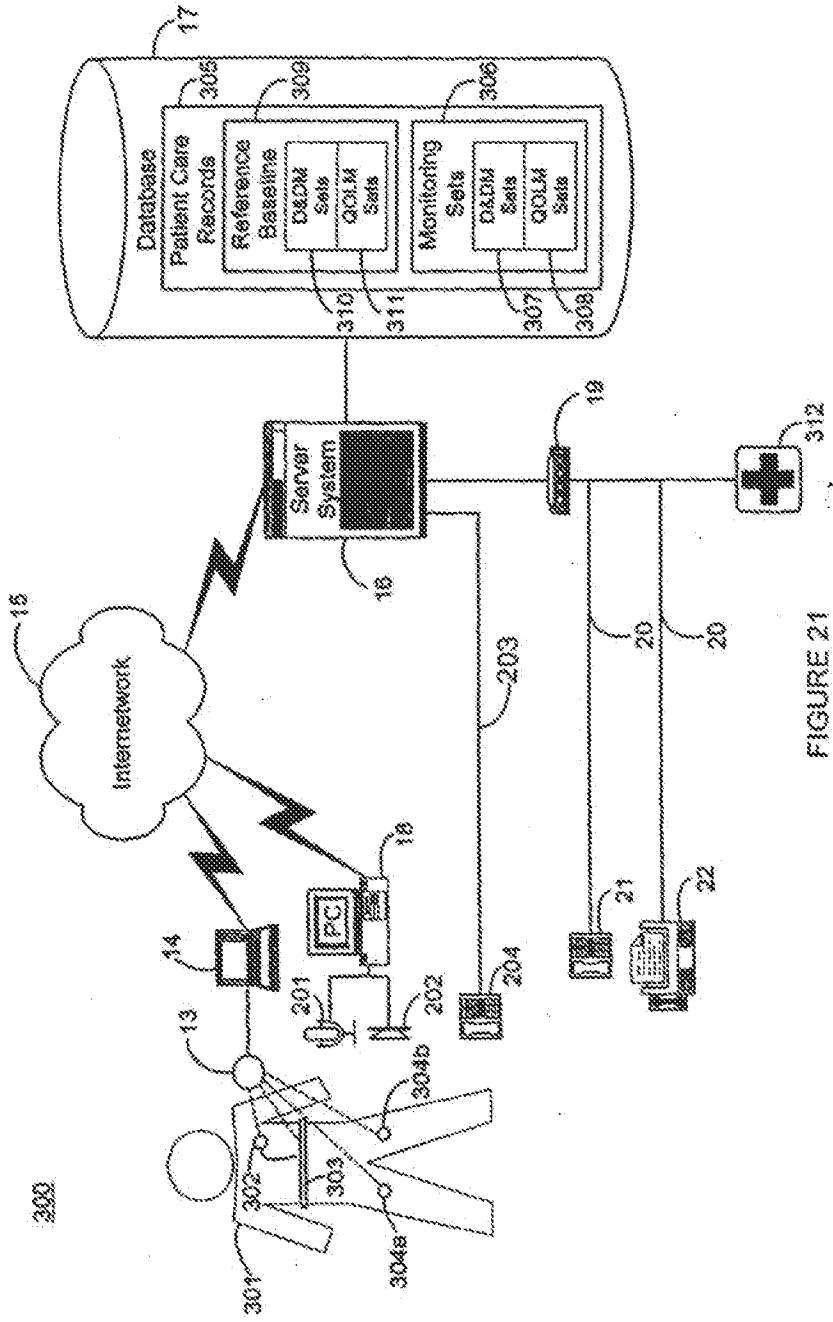


FIGURE 21



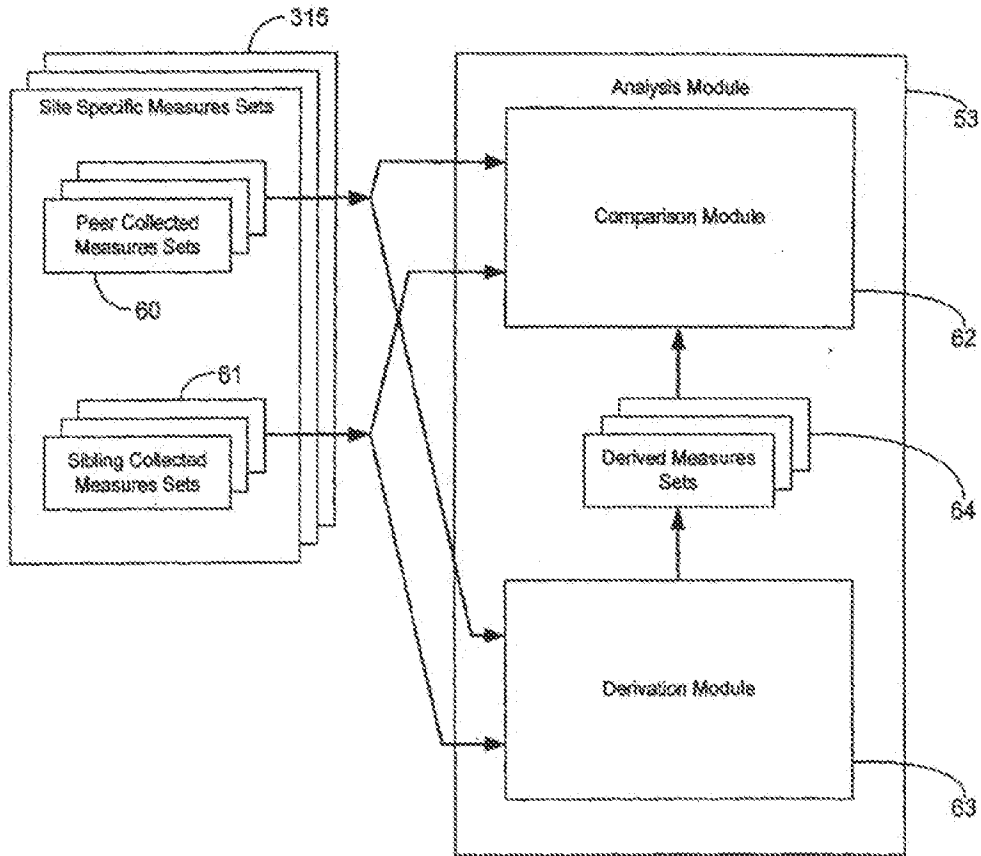


FIGURE 22

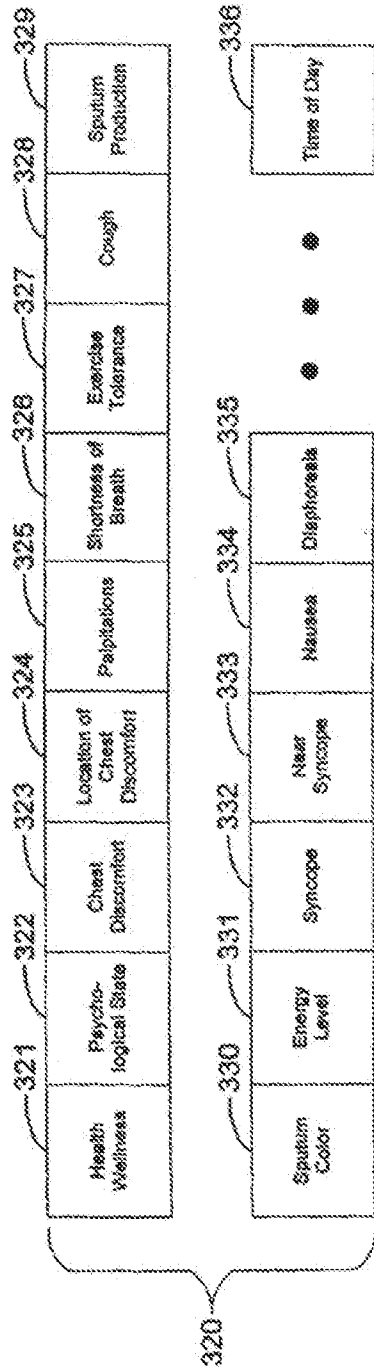


FIGURE 23

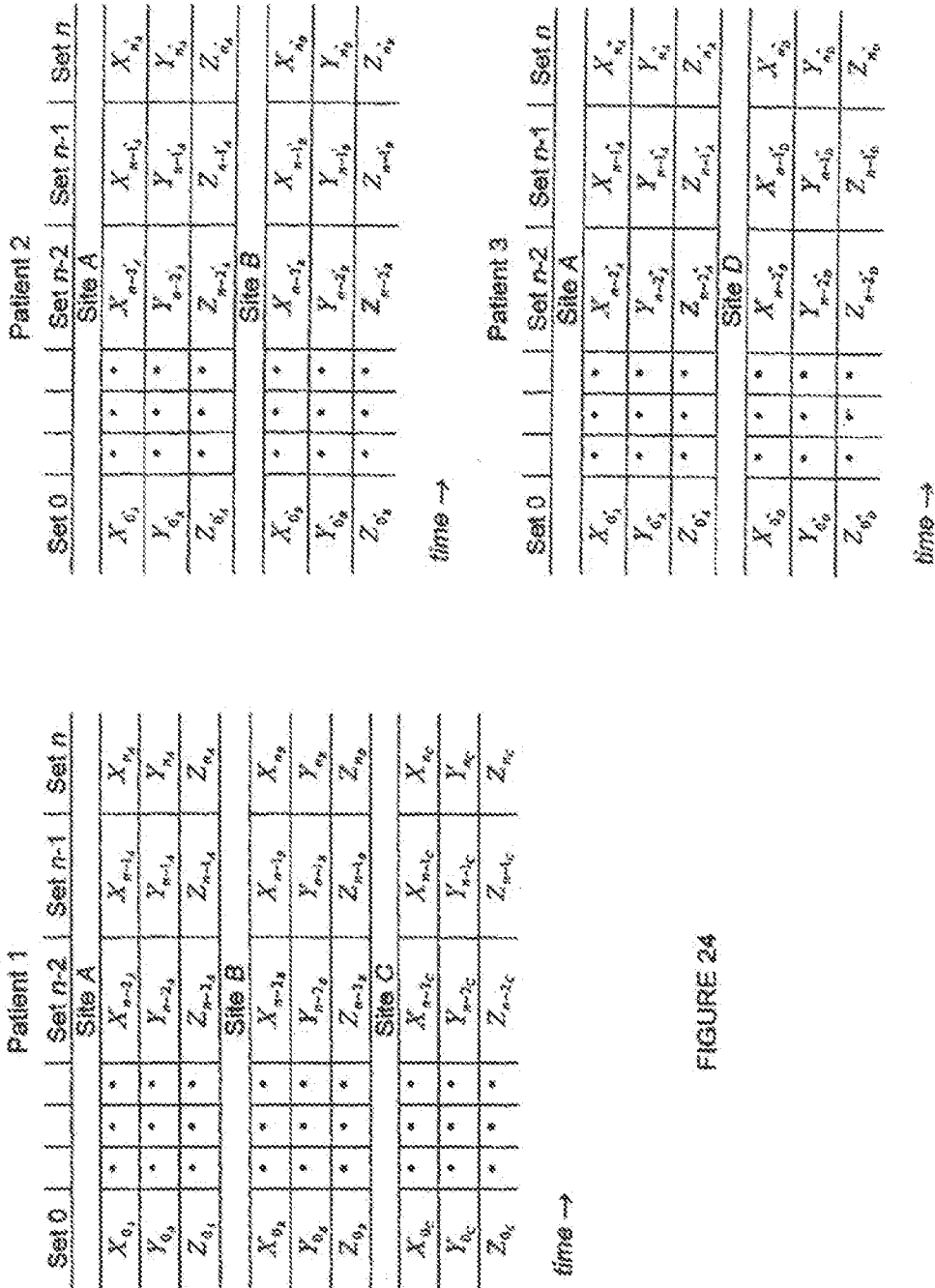


FIGURE 24

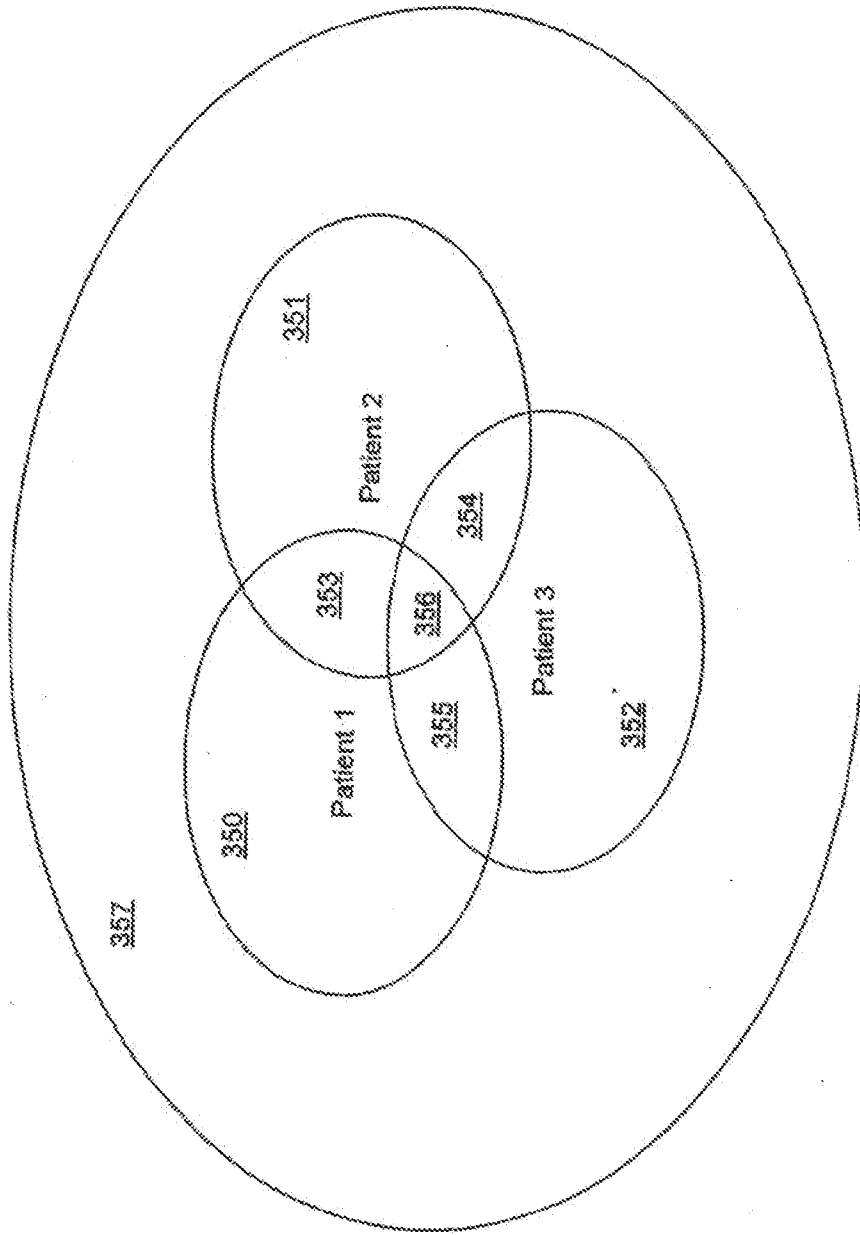


FIGURE 25

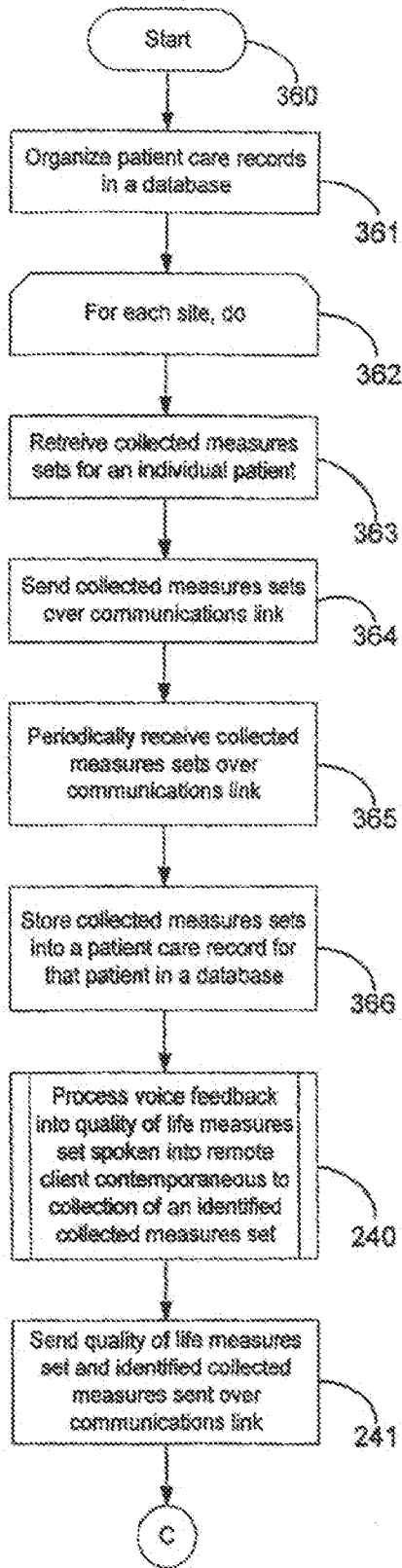


FIGURE 26A

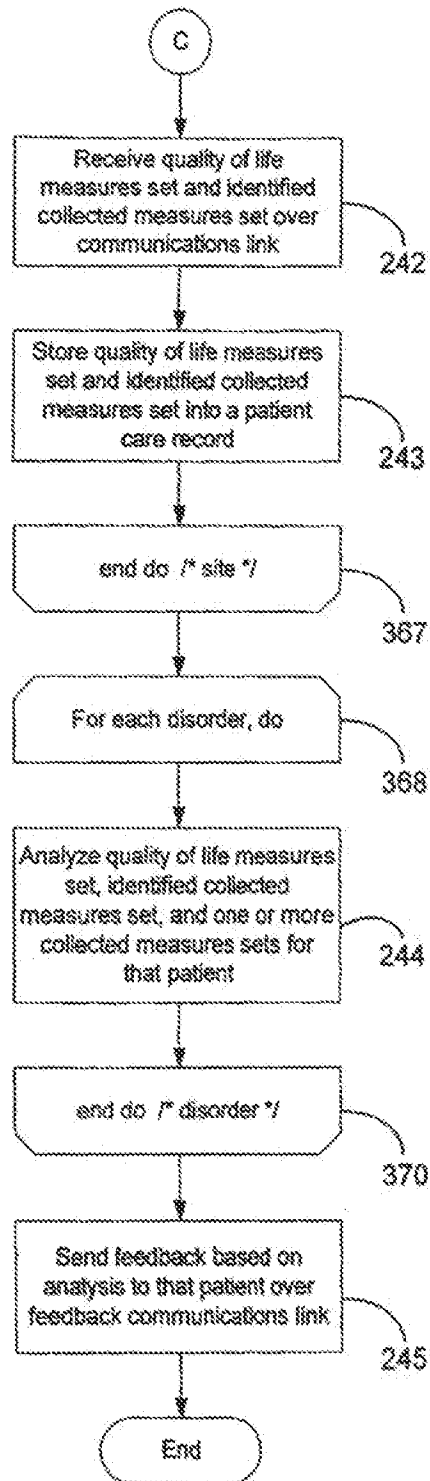


FIGURE 26B

# PATENT ABSTRACTS OF JAPAN

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(21)Application number : 2000-024516 (71)Applicant : YOSHIKAWA KAZUTAKA

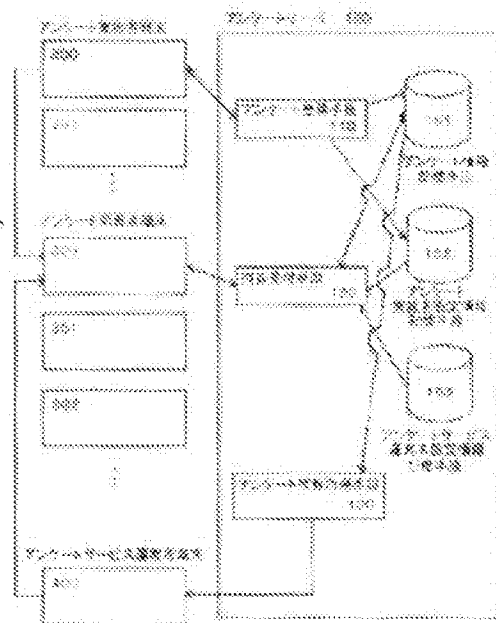
(22)Date of filing : 01.02.2000 (72)Inventor : YOSHIKAWA KAZUTAKA

(54) QUESTIONNAIRE SYSTEM, QUESTIONNAIRE SERVER, AND COMPUTER-READABLE RECORDING MEDIUM HAVING PROGRAM FOR EXECUTING PROCESSING OF QUESTIONNAIRE SERVER RECORDED THEREON

(57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a questionnaire system for displaying the reply reception screen of design matching with the image of a mail magazine.

**SOLUTION:** From a questionnaire executer terminal 200 to a questionnaire registration means 110, questions, choices and design information are transmitted. The questionnaire registration means 110 stores the design information in a questionnaire executer setting information storage means 152, issues URLs different for the respective choices and notifies the questionnaire executer terminal 200. A questionnaire executer transmits the URLs to questionnaire repplier terminals 300 through a mail magazine distribution server and questionnaire repliers click the URL corresponding to a suitable choice. A reply reception means 120 performs the count-up processing of the number of replies, reads the design information from the questionnaire executer setting information storage means 152, prepares the reply reception screen based on it and displays it at the questionnaire repplier terminals 300.



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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to a questionnaire system.

[0002]

[Description of the Prior Art]The mail magazine (e-zine) is used as the technique of distributing information etc. using the E-mail. As publicly known mail magazine distribution service, there are "\*\*\*\*\*", "Macky", "CLICK INCOME", "KAPURAITO", etc.

[0003]By the way, in order to take a questionnaire to a user on the Internet, the questionnaire executing person needs to include a questionnaire answer program in the server which oneself manages, and needs to notify a user of carrying out the questionnaire.

[0004]Now, it is also the same as when a mail magazine publisher carries out the questionnaire for readers, a questionnaire answer reception program is included in the server which oneself manages, and readers are notified in the mail magazine paper of carrying out the questionnaire. The knowledge of CGI is usually needed for inclusion of this questionnaire answer reception program. First of all, it does not have advanced knowledge and does not adapt itself to the characteristic of the mail magazine that \*\* can also be published. Even if it has the knowledge of CGI, in carrying out a questionnaire frequently, enforcement preparations of a questionnaire must be made and it takes time and effort each time.

[0005]Then, since questionnaire answer total vicarious execution service was provided for mail magazine publishers, the following systems were able to be considered. A questionnaire executing person transmits at least one choice to a questionnaire server, and a questionnaire server publishes different URL for said every choice, and notifies a questionnaire executing person of it. A questionnaire executing person notifies a respondent to a questionnaire of said URL with a choice, and a respondent to a questionnaire accesses an applicable choice and corresponding URL. A questionnaire server counts and displays the access number for every URL.

[0006]

[Problem to be solved by the invention]However, the above-mentioned system is what the service operator defined beforehand, and might differ in the designs (a color, a layout, a font, a font size, etc.) of the reply reception screen from the image of the e-zine which a questionnaire executing person publishes. For example, probably it was desirable to use the color of a red system, when it was a mail magazine on the theme of love, but it was not necessarily a system on which the reply reception screen suitable for the image of an e-zine is displayed. Even when two or more mail magazine publishers used, the design of the reply reception screen was common, and when replying to the questionnaire carried out using this system, it was a system on which which mail magazine carries out and it displays the reply reception screen of that and the same design. Therefore, there might be a case on which a different reply reception screen from the image of the mail magazine which carries out a questionnaire is displayed.

[0007]Then, the 1st purpose of this invention is for a questionnaire executing person slack mail magazine publisher to provide a questionnaire system which can specify a design of a reply reception screen.

[0008]Now, management of such questionnaire service may be realized by advertising revenue



from a sponsor. It is thought that it not only can publish an advertisement to a reply reception screen, but more advertising printing spaces are securable because the service operator himself publishes a mail magazine. That is, it is desirable on system management for a questionnaire service operator to publish a mail magazine which is carried out using a questionnaire system and which all introduces some questionnaires. In this case, the same questionnaire will be published by plurality of a mail magazine which a questionnaire executing person publishes, and a mail magazine which a questionnaire service operator publishes. In a mail magazine which a questionnaire service operator publishes. Since a questionnaire which two or more questionnaire executing persons carry out is published, when readers continue and reply to these questionnaires, in a system by which the 1st purpose was attained, a reply reception screen of a scattering design which is not unified will be displayed.

[0009]Then, the 2nd purpose of this invention receives a reply based on a mail magazine which a questionnaire executing person publishes. While displaying a reply reception screen by a design specified by a questionnaire executing person, it is displaying a reply reception screen by a design specified by a questionnaire service operator to a reply based on a mail magazine which a questionnaire service operator publishes.

[0010]By the way, generally, since an e-zine publisher wants strongly readership of an e-zine which oneself has published to increase, it is preferred to display subscription form of a mail magazine effectively in a reply reception screen. Then, the 3rd purpose of this invention receives a reply based on a mail magazine which a questionnaire executing person publishes. While displaying a reply reception screen containing subscription form of a mail magazine which a questionnaire service operator publishes, it is displaying a reply reception screen containing subscription form of a mail magazine which a questionnaire executing person publishes to a reply based on a mail magazine which a questionnaire service operator publishes.

[0011]by the way, the questionnaire service operator can gain more advertising revenue by displaying an advertisement effectively. Then, the 4th purpose of this invention relates an advertiser's advertisement information with a suitable candidate for advertising printing (every choice, every question, and every questionnaire enforcement e-zine), and memorizes it, and it is performing an advertising display based on it.

[0012]As for advertising delivery of the manuscript, it is desirable not to intervene but to also make \*\* as for a questionnaire service operator to real time according to questionnaire registration (or he has no time lag as possible). Then, the 5th purpose of this invention is for an advertiser to provide a system which can carry out advertising registration by its terminal handling.

[0013]The 6th purpose of this invention is that a user who has not received a reply request of this question acquires a question and a choice, and enables it to mainly answer by a WWW browser by e-mail about the same question as what carried out the reply request by e-mail.

[0014]

[Means for solving problem]In order to attain said 1st purpose, the invention according to claim 1 is a questionnaire system provided with the following requirements.

(b) Have a questionnaire server with which a questionnaire service operator has a royalty, a questionnaire executing person terminal which a questionnaire executing person operates, and a respondent-to-a-questionnaire terminal which a respondent to a questionnaire operates.

(\*\*) A questionnaire executing person terminal should transmit at least one choice corresponding to a question to a questionnaire server.

(\*\*) When you receive said choice, a questionnaire server should publish different URL.

(Uniformed Resource Locator) for every choice, and should transmit to a questionnaire executing person terminal.

(\*\*) A questionnaire executing person terminal should transmit a choice to a respondent-to-a-questionnaire terminal with URL corresponding to it directly or indirectly.

(\*\*) A respondent-to-a-questionnaire terminal should access said URL by a respondent's to a questionnaire operation.

(\*\*) Consider that access is the reply to a choice corresponding to said URL, and a questionnaire server should process it, when there is access to said URL from a respondent-to-a-questionnaire terminal.

(\*\*) A questionnaire server should use as a respondent-to-a-questionnaire terminal screen directions by a design which a questionnaire executing person defined beforehand, when there is access to said URL from a respondent-to-a-questionnaire terminal.

[0015]In order to attain said 2nd purpose, the invention according to claim 2 is a questionnaire system provided with the following requirements.

(b) Have a questionnaire server with which a questionnaire service operator has a royalty, a questionnaire executing person terminal which a questionnaire executing person operates, and a respondent-to-a-questionnaire terminal which a respondent to a questionnaire operates.

(\*\*) A questionnaire executing person terminal should transmit at least one choice corresponding to a question to a questionnaire server.

(\*\*) When you receive said choice, a questionnaire server should publish different URL (URL for a questionnaire executing person) for every choice, and should transmit to a questionnaire executing person terminal.

(\*\*) A questionnaire executing person terminal should transmit a choice to a respondent-to-a-questionnaire terminal with URL for said questionnaire executing person corresponding to it directly or indirectly.

(\*\*) A questionnaire server is different URL for every choice, and publish different URL (URL for a questionnaire service operator) from URL for said questionnaire executing person.

(\*\*) A questionnaire server should transmit a choice to a respondent-to-a-questionnaire terminal with URL for said questionnaire service operator corresponding to it directly or indirectly.

(\*\*) A respondent-to-a-questionnaire terminal should access said URL by a respondent's to a questionnaire operation.

(\*\*) Consider that access is the reply to a choice corresponding to said URL, and a questionnaire server should process it, when there is access to said URL from a respondent-to-a-questionnaire terminal.

(\*\*) When there is access to said URL from a respondent-to-a-questionnaire terminal, a questionnaire server, When URL with this access is URL for a questionnaire executing person, while using as a respondent-to-a-questionnaire terminal screen directions by a design which a questionnaire executing person defined beforehand, In being URL for a questionnaire service operator, use as a respondent-to-a-questionnaire terminal screen directions by a design which a questionnaire service operator defined beforehand.

[0016]In order to attain said 3rd purpose, the invention according to claim 3 is a questionnaire system provided with the following requirements.

(b) Have a questionnaire server with which a questionnaire service operator has a royalty, a questionnaire executing person terminal which a questionnaire executing person operates, and a respondent-to-a-questionnaire terminal which a respondent to a questionnaire operates.

(\*\*) A questionnaire executing person terminal should transmit at least one choice corresponding

to a question to a questionnaire server.

(\*\*) When you receive said choice, a questionnaire server should publish different URL (URL for a questionnaire executing person) for every choice, and should transmit to a questionnaire executing person terminal.

(\*\*) A questionnaire executing person terminal should transmit a choice to a respondent-to-a-questionnaire terminal with URL for said questionnaire executing person corresponding to it via an e-zine distributing server.

(\*\*) A questionnaire server is different URL for every choice, and publish different URL (URL for a questionnaire service operator) from URL for said questionnaire executing person.

(\*\*) A questionnaire server should transmit a choice to a respondent-to-a-questionnaire terminal with URL for said questionnaire service operator corresponding to it via an e-zine distributing server.

(\*\*) A respondent-to-a-questionnaire terminal should access said URL by a respondent's to a questionnaire operation.

(\*\*) Consider that access is the reply to a choice corresponding to said URL, and a questionnaire server should process it, when there is access to said URL from a respondent-to-a-questionnaire terminal.

(\*\*) When there is access to said URL from a respondent-to-a-questionnaire terminal, a questionnaire server. When URL with this access is URL for a questionnaire executing person, while using as a respondent-to-a-questionnaire terminal screen directions containing subscription registration form of a mail magazine which a questionnaire service operator publishes. In being URL for a questionnaire service operator, use as a respondent-to-a-questionnaire terminal screen directions containing subscription registration form of a mail magazine which a questionnaire executing person publishes.

[0017]In order to attain said 4th purpose, the invention according to claim 4 is a questionnaire system provided with the following requirements.

(b) Have a questionnaire server with which a questionnaire service operator has a royalty, a questionnaire executing person terminal which a questionnaire executing person operates, and a respondent-to-a-questionnaire terminal which a respondent to a questionnaire operates.

(\*\*) A questionnaire executing person terminal should transmit at least one choice corresponding to a question to a questionnaire server.

(\*\*) When you receive said choice, a questionnaire server should publish different URL for every choice, and should transmit to a questionnaire executing person terminal.

(\*\*) A questionnaire executing person terminal should transmit a choice to a respondent-to-a-questionnaire terminal with URL corresponding to it directly or indirectly.

(\*\*) A questionnaire server should relate an advertiser's advertisement information with the candidate for advertising printing, and should memorize it.

(\*\*) A respondent-to-a-questionnaire terminal should access said URL by a respondent's to a questionnaire operation.

(\*\*) Consider that access is the reply to the choice corresponding to said URL, and a questionnaire server should process it, when there is access to said URL from a respondent-to-a-questionnaire terminal.

(\*\*) A questionnaire server should use as a respondent-to-a-questionnaire terminal the screen directions including the advertisement memorized by relating with this choice, when there is access to said URL from a respondent-to-a-questionnaire terminal.

[0018]The invention according to claim 5 is the questionnaire system according to any one of

claims 1 to 4, and is a questionnaire system provided with at least two questionnaire executing person terminals.

[0019] In order to attain said 5th purpose, the invention according to claim 6 is a questionnaire system provided with the following requirements.

(b) Have a questionnaire server with which a questionnaire service operator has a royalty, a questionnaire executing person terminal which a questionnaire executing person operates, a respondent-to-a-questionnaire terminal which a respondent to a questionnaire operates, and a sponsor terminal which an advertiser operates.

(\*\*) A questionnaire executing person terminal should transmit at least one choice corresponding to a question and this question to a questionnaire server.

(\*\*) A questionnaire server should memorize said question and a choice.

(\*\*) A questionnaire server should transmit all or a part of said memorized question and choices to a sponsor terminal, and urge specification for advertising printing to it.

(\*\*) Relate a questionnaire server with a candidate for advertising printing which had an advertiser's advertisement information specified, and memorize it.

(\*\*) A questionnaire server should use as a respondent-to-a-questionnaire terminal screen directions including advertisement information related with this choice, when there is a reply to said choice from a respondent-to-a-questionnaire terminal.

[0020] The invention according to claim 7 is a questionnaire system provided with the following requirements.

(b) Have a questionnaire server with which a questionnaire service operator has a royalty, a questionnaire executing person terminal which a questionnaire executing person operates, a respondent-to-a-questionnaire terminal which a respondent to a questionnaire operates, and a sponsor terminal which an advertiser operates.

(\*\*) A questionnaire executing person terminal should transmit at least one choice corresponding to a question to a questionnaire server.

(\*\*) When you receive said choice, a questionnaire server should publish different URL for every choice, and should transmit to a questionnaire executing person terminal.

(\*\*) A questionnaire executing person terminal should transmit a choice to a respondent-to-a-questionnaire terminal with URL corresponding to it directly or indirectly.

(\*\*) A questionnaire server should transmit all or a part of the question and choices which received from the questionnaire executing person terminal to a sponsor terminal, and urge specification for advertising printing to it.

(\*\*) Relate a questionnaire server with the candidate for advertising printing which had an advertiser's advertisement information specified, and memorize it.

(\*\*) A respondent-to-a-questionnaire terminal should access said URL by a respondent's to a questionnaire operation.

(\*\*) Consider that access is the reply to the choice corresponding to said URL, and a questionnaire server should process it, when there is access to said URL from a respondent-to-a-questionnaire terminal.

(\*\*) A questionnaire server should use as a respondent-to-a-questionnaire terminal the screen directions including the advertisement information related with this choice, when there is access to said URL from a respondent-to-a-questionnaire terminal.

[0021] The invention according to claim 8 is a questionnaire system given in Claim 6 or either of 7, and is a questionnaire system having at least two questionnaire executing person terminals, and having at least two sponsor terminals.

[0022]In order to attain said 6th purpose, the invention according to claim 9 is a questionnaire system provided with the following requirements.

(b) Have a questionnaire server, the 1st respondent-to-a-questionnaire terminal that the 1st respondent to a questionnaire operates, and the 2nd respondent-to-a-questionnaire terminal that the 2nd respondent to a questionnaire operates.

(\*\*) A questionnaire server should memorize at least one choice corresponding to a question and this question.

(\*\*) A questionnaire server should publish different URL for every choice, and should transmit to the 1st respondent-to-a-questionnaire terminal by E-mail directly or indirectly.

(\*\*) Consider that access is the reply to a choice corresponding to said URL, and a questionnaire server should process it, when there is access to said URL from the 1st respondent-to-a-questionnaire terminal.

(\*\*) A questionnaire server should display a choice corresponding to a question and this question on a WWW browser of the 2nd respondent-to-a-questionnaire terminal, and should demand selection from the 2nd respondent to a questionnaire.

(\*\*) When selected choice information is received from the 2nd respondent-to-a-questionnaire terminal, consider that a questionnaire server is the reply to this choice, and process it.

[0023]The invention according to claim 10 is a questionnaire server in the questionnaire system according to any one of claims 1 to 9.

[0024]The invention according to claim 11 is a recording medium which recorded a program for performing processing of a questionnaire server in the questionnaire system according to any one of claims 1 to 9 and in which computer reading is possible.

[0025]By the way, a server in which a questionnaire service operator is receiving loan by a rental server etc. is contained not to mention a server which a questionnaire service operator owns being contained with "a questionnaire server with which a questionnaire service operator has a royalty."

[0026]It shall contain, also when it passes what kind of equipment in between with "it is indirect", and even if [ all ] it will become how many also when it passes what kind of person's operation and. Requirement (\*\*) in Claim 9 does not necessarily mean that a questionnaire server transmits an E-mail. It is sufficient if a certain equipment which intervenes in between transmits an E-mail to the 1st respondent-to-a-questionnaire terminal.

[0027]

[Mode for carrying out the invention]This embodiment of the invention is described. Although a domain name which finishes it as "xx.jp" does not exist really, it is used for explanation. First, a 1st embodiment of this invention is described. Drawing 1 is a block diagram showing a questionnaire system of a 1st embodiment. a questionnaire system -- the questionnaire server 100, the questionnaire service operator terminal 400, and the questionnaire executing person terminal 200,201 ... and the respondent-to-a-questionnaire terminal 300,301 -- it has ... and each is connected to the Internet always or if needed. The questionnaire server 100 has the questionnaire registration means 110, the reply receiving means 120, the questionnaire information acquisition means 130, the questionnaire information memory measure 151, the questionnaire executing person setup information memory measure 152, and the questionnaire service operator setup information memory measure 153.

[0028]A questionnaire information file is memorized by the questionnaire information memory measure 151. A questionnaire information file is created for every question, and makes a question code a file name. A data structure is shown in drawing 2. The number of replies for

every question, choice, and choice is memorized.

[0029]A questionnaire executing person setup information file is memorized by the questionnaire executing person setup information memory measure 152. A questionnaire executing person setup information file is created for every question, and makes a question code a file name. A data structure is shown in drawing 3. The background color and character color which the questionnaire executing person set up are memorized in RGB form.

[0030]A questionnaire service operator setup information file is memorized by the questionnaire service operator setup information memory measure 153. A file is usually one piece. A data structure is shown in drawing 4. The background color and character color which the questionnaire service operator set up are memorized in RGB form.

[0031]A procedure of questionnaire registration is explained. First, a questionnaire executing person explains as what operates the questionnaire executing person terminal 200. The questionnaire registration means 110 transmits questionnaire registration form to the questionnaire executing person terminal 200. A questionnaire registration form screen and an input example are shown in drawing 5. A questionnaire executing person operates a terminal, inputs a question, a choice corresponding to this, and design information, and transmits to the questionnaire registration means 110. The questionnaire registration means 110 which received these publishes a question code, and creates a questionnaire information file which makes the question code a file name to the questionnaire information memory measure 151. The number of replies to a question, a choice, and each choice (wholly [ in a questionnaire registration stage ] zero) is recorded on this questionnaire information file.

[0032]A questionnaire executing person setup information file which makes the question code a file name is created to the questionnaire executing person setup information memory measure 152. Design information is recorded on this questionnaire information file. Different URL for every choice is published and it is made to display on a questionnaire executing person terminal. A display example is shown in drawing 6. Explanation of URL is shown in drawing 7.

[0033]URL which a questionnaire executing person received -- a choice -- the respondent-to-a-questionnaire terminal 300,301 -- it transmits to ... Even if transmission at this time is based on e-mail software included in the questionnaire executing person terminal 200, A thing using the above-mentioned mail magazine distribution service or an HTML document is uploaded to a Web server, a respondent to a questionnaire may be made to access, or the either may use two or more methods together.

[0034]Here, a respondent to a questionnaire advances explanation as what operates the respondent-to-a-questionnaire terminal 300. The respondent-to-a-questionnaire terminal 300 receives URL corresponding to a choice and each of a question.

[0035]It is also possible to also use a WWW browser for this reception and to use e-mail software. A questionnaire addressee reads a question and a choice, operates the questionnaire addressee terminal 300 and accesses URL corresponding to an applied choice. This access operation can be made easy by the click of a mouse, when a hyperlink is set as URL, but even when that is not right, it can be made by copy and paste to a URL input window of a WWW browser.

[0036]In this way, if a respondent to a questionnaire accesses URL, the reply receiving means 120 will receive a question code, a choice code, and a media code. A file which makes a file name a received question code is read in the questionnaire information memory measure 151, and the number of replies corresponding to a choice code is added one, and is overwritten. The reply judges with a thing based on a medium which a questionnaire executing person publishes

from a media code. The contents of a design which this questionnaire executing person set up are read in the questionnaire executing person setup information memory measure 152, and a reply reception screen which applied it is transmitted to the respondent-to-a-questionnaire terminal 300. A display example of a respondent-to-a-questionnaire terminal is shown in drawing 8.

[0037] Apart from it, a questionnaire service operator operates the questionnaire service operator terminal 400, and gives a demand to the questionnaire information acquisition means 130. The questionnaire information acquisition means 130 is asked, acquires a choice from the questionnaire information memory measure 151, publishes different URL for every choice, and is made to display it on the questionnaire service operator terminal 400 in response to a demand. A display example is shown in drawing 9. A media code of this URL is 2 and can be distinguished from URL published for a questionnaire executing person. A questionnaire service operator transmits to the respondent-to-a-questionnaire terminal 300 like the above-mentioned questionnaire executing person's case. At this time, there may be a respondent-to-a-questionnaire terminal which receives transmission from [ both ] a questionnaire executing person from a questionnaire service operator about the same contents of a question, and there may be a respondent-to-a-questionnaire terminal which receives transmission only from either.

[0038] As similarly as the point, if a respondent to a questionnaire accesses URL, the reply receiving means 120 will receive a question code, a choice code, and a media code. A file which makes a file name a received question code is read in the questionnaire information memory measure 151, and the number of replies corresponding to a choice code is added one, and is overwritten. The reply judges with a thing based on a medium which a questionnaire service operator publishes from a media code. The contents of a design which a questionnaire service operator set up are read in the questionnaire service operator setup information memory measure 153, and a reply reception screen which applied it is transmitted to the respondent-to-a-questionnaire terminal 300. A display example is shown in drawing 10.

[0039] Next, a 2nd embodiment of this invention is described. Drawing 11 is a block diagram showing a questionnaire system of a 2nd embodiment. a questionnaire system -- the questionnaire server 100, the questionnaire service operator terminal 400, and the questionnaire executing person terminal 200, 201 ... and the respondent-to-a-questionnaire terminal 300, 301 ... and the sponsor terminal 500, 501 ... and the e-zine distributing server 600. [ have and ] Each is connected to the Internet always or if needed. The questionnaire server 100 has the questionnaire registration means 110, the questionnaire information acquisition means 130, the reply receiving means 120, the advertising registration means 140, the reply form preparing means 145, the questionnaire information memory measure 151, and the advertisement information storage means 154.

[0040] A questionnaire information file is memorized by the questionnaire information memory measure 151. A questionnaire information file is created for every question, and makes a question code a file name. A data structure is shown in drawing 12. The number of replies for every question, choice, and choice and an advertising code for every choice are memorized. Magazine ID of an e-zine which a questionnaire executing person publishes is also memorized. In a figure, a character string of "nothing" shows that an advertisement is not registered into the choice.

[0041] An advertisement information file is memorized by the advertisement information storage means 154. An advertisement information file is created for every advertisement, and makes an advertising code a file name. A data structure is shown in drawing 13. URL of a character string used as an advertising manuscript and the point which sets a hyperlink as it is memorized.



[0042]The e-zine distributing server 600 has the mail transmission means 610, the reader management tool 620, and the mail address storage means 630.

[0043]Generally the mail transmission means 610 transmits an e-zine manuscript transmitted by e-zine publisher to addressing to a reader address of this e-zine memorized by the mail address storage means 630. Generally, according to a demand from a user, the reader management tool 620 registers a user's mail address into the mail address storage means 630, or is deleted. A mail address storage file is stored in the mail address storage means 630. A mail address storage file is created for every e-zine, and makes magazine ID a file name. A reader mail address is memorized for every e-zine. A data structure is shown in drawing 14.

[0044]By the way, even if an operator of the e-zine distributing server 600 is in agreement with a questionnaire service operator, he does not have to do. A questionnaire executing person and a questionnaire service operator do use registration (e-zine first publication procedure) of the e-zine distributing server 600 beforehand, and acquire magazine ID. Magazine ID of an e-zine which a questionnaire executing person publishes presupposes that it is m0001, and magazine ID of an e-zine which a questionnaire service operator publishes presupposes that it is m0002.

[0045]A procedure of questionnaire registration is explained. First, a questionnaire executing person explains as what operates the questionnaire executing person terminal 200. The questionnaire registration means 110 transmits questionnaire registration form to the questionnaire executing person terminal 200. A questionnaire registration form screen and an input example are shown in drawing 15. A questionnaire executing person operates a terminal, inputs a question, a choice corresponding to this, and e-zine information, and transmits to the questionnaire registration means 110. E-zine information consists of magazine ID in an e-zine distributing server. This information is needed in order to display subscription registration form of this e-zine later.

[0046]The questionnaire registration means 110 which received these publishes a question code, and creates a questionnaire information file which makes the question code a file name to the questionnaire information memory measure 151. The number of replies to a question, a choice, and each choice (wholly [ in a questionnaire registration stage ] zero) and an advertising code (wholly [ in a questionnaire registration stage ] nothing) for every choice are recorded on this questionnaire information file.

[0047]Different URL for every choice is published and it is made to display on a questionnaire executing person terminal. A display example is shown in drawing 16.

[0048]Next, a procedure of advertising registration is explained. An advertiser advances [ operating the sponsor terminal 500 and displaying a list of a question and choices on the advertising registration means 140, and ] a demand. While reading whether an advertisement in which the advertising registration means 140 corresponds with a question, a choice, and a choice from the questionnaire information memory measure 151 in response to a demand is already registered and making it display on the sponsor terminal 500, specification of a choice which wishes advertising printing is urged. A display example is shown in drawing 17. An input example is shown in drawing 18. An advertiser is an Internet bookstore and this example is a case where he would like to carry out advertising delivery of the manuscript of the user who often reads a book at a target. An advertiser specifies a choice which publishes an advertisement, and inputs an advertising manuscript (text sentence character) and advertiser home page URL, and transmits to the advertising registration means 140. The advertising registration means 140 publishes an advertising code, creates an advertisement information file which makes an advertising code a file name to the advertisement information storage means 154, and writes in



an advertising manuscript and advertiser home page URL. The questionnaire information memory measure 151 is accessed, it replaces with a character of nothing about a choice specified as a candidate for advertising printing, and an advertising code is written in. It is notified to the sponsor terminal 500 that advertising registration was completed.

[0049]Next, a reply request by an e-zine which a questionnaire executing person publishes is explained. A questionnaire executing person sticks URL, etc. which were published like the point, and draws up an e-zine manuscript. A questionnaire executing person operates the questionnaire executing person terminal 200, and transmits magazine ID and an e-zine manuscript to the mail transmission means 610. From the mail address storage means 630, the mail transmission means 610 acquires a mail address corresponding to magazine ID, and transmits an e-zine manuscript to the addressing to a mail address by e-mail. In a transmission destination, it is assumed that the respondent-to-a-questionnaire terminal 300 is included.

[0050]A respondent to a questionnaire operates the respondent-to-a-questionnaire terminal 300, and receives said mail by e-mail software. A question and a choice are read, what is applied out of a choice is chosen, and URL corresponding to it is clicked with a mouse.

[0051]In this way, if a respondent to a questionnaire accesses URL, the reply receiving means 120 will receive a question code, a choice code, and a media code. A file which makes a file name a received question code is read in the questionnaire information memory measure 151, and the number of replies corresponding to a choice code is added one, and is overwritten. An advertising code corresponding to the choice is acquired, advertisement information corresponding to the advertising code is acquired from the advertisement information storage means 154, and it is considered as an advertisement displayed on a reply reception screen. The advertisement sets a hyperlink as advertiser home page URL. The reply judges with a thing based on a medium which a questionnaire executing person publishes from a media code, and a reply reception screen containing subscription registration form of an e-zine which a questionnaire service operator publishes is transmitted to the respondent-to-a-questionnaire terminal 300. A display example of a respondent-to-a-questionnaire terminal is shown in drawing 19. If a respondent to a questionnaire inputs a mail address into a mail address input column of this screen and pushes a "transmitting" button, a purport that it is "(not being "deletion") registration", magazine ID, and a mail address will be transmitted to the reader management tool 620. In response, the reader management tool 620 performs registration processing.

[0052]Apart from it, a questionnaire service operator operates the questionnaire service operator terminal 400, and gives a demand to the questionnaire information acquisition means 130. The questionnaire information acquisition means 130 is asked, acquires a choice from the questionnaire information memory measure 151, publishes different URL for every choice, and is made to display it on the questionnaire service operator terminal 400 in response to a demand. A display example is shown in drawing 20. A media code of this URL is 2 and can be distinguished from URL published for a questionnaire executing person. A questionnaire service operator transmits to the respondent-to-a-questionnaire terminal 300 via an e-zine distributing server like the above-mentioned questionnaire executing person's case. At this time, there may be a respondent-to-a-questionnaire terminal which receives transmission from [ both ] a questionnaire executing person from a questionnaire service operator about the same contents of a question, and there may be a respondent-to-a-questionnaire terminal which receives transmission only from either.

[0053]A respondent to a questionnaire operates the respondent-to-a-questionnaire terminal 300,

and receives said mail by e-mail software. A question and a choice are read, what is applied out of a choice is chosen, and URL corresponding to it is clicked with a mouse. In this way, if a respondent to a questionnaire accesses URL, the reply receiving means 120 will receive a question code, a choice code, and a media code. A file which makes a file name a received question code is read in the questionnaire information memory measure 151, and the number of replies corresponding to a choice code is added one, and is overwritten. An advertising code corresponding to the choice is acquired, advertisement information corresponding to the advertising code is acquired from the advertisement information storage means 154, and it is considered as an advertisement displayed on a reply reception screen. The advertisement sets a hyperlink as advertiser home page URL. The reply judges with a thing based on a medium which a questionnaire service operator publishes from a media code, and a reply reception screen containing subscription registration form of an e-zine which a questionnaire executing person publishes is transmitted to the respondent-to-a-questionnaire terminal 300. A display example of the respondent-to-a-questionnaire terminal 300 is shown in drawing 21. If a respondent to a questionnaire inputs a mail address into a mail address input column of this screen and pushes a "transmitting" button, a purport that it is "(not being "deletion") registration", magazine ID, and a mail address will be transmitted to the reader management tool 620. In response, the reader management tool 620 performs registration processing.

[0054]Next, the case where a question, a choice display, and a reply are carried out using a WWW browser is explained. By this explanation, a respondent to a questionnaire shall operate the respondent-to-a-questionnaire terminal 301. By a respondent's to a questionnaire operation, the respondent-to-a-questionnaire terminal 301 gives the demand of a reply form display to the reply form preparing means 145. The reply form preparing means 145 which received the demand reads one questionnaire information file from the questionnaire information memory measure 151 suitably, creates a form screen, and is made to display it on the respondent-to-a-questionnaire terminal 301. A display example is shown in drawing 22. This form has a question code and a media code in the hidden field. A choice code is decided by the selected choice. A respondent to a questionnaire operates the respondent-to-a-questionnaire terminal 301, chooses an applied choice, and clicks a "transmitting" button with a mouse.

[0055]In this way, the reply receiving means 120 receives a question code, a choice code, and a media code. The file which makes a file name the received question code is read in the questionnaire information memory measure 151, and the number of replies corresponding to a choice code is added one, and is overwritten. The advertising code corresponding to the choice is acquired, the advertisement information corresponding to the advertising code is acquired from the advertisement information storage means 154, and it is considered as the advertisement displayed on a reply reception screen. The advertisement sets the hyperlink as advertiser home page URL. A reply reception screen is created and it is made to display on the respondent-to-a-questionnaire terminal 301. A display example is shown in drawing 23. At this time, subscription registration [ both or either one of ] the subscription registration form of an e-zine which a questionnaire executing person publishes or the form which a questionnaire service operator publishes of an e-zine may be displayed. Since the respondent to a questionnaire who replied to this question with interest is considered that a possibility of carrying out subscription registration of the e-zine which a questionnaire executing person publishes is high, it is preferred to display the subscription registration form of an e-zine which a questionnaire executing person publishes. The respondent to a questionnaire unsatisfactory to a questionnaire answer should just do a form display requirement to the reply form preparing means 145 again.

[0056]About said 1st-2nd embodiment, the following application is possible.

[0057]In said 1st embodiment, although design information is made to transmit simultaneously with a question and a choice at the time of questionnaire registration, it may not necessarily be simultaneous. A questionnaire executing person may be made to do use registration beforehand, design information may be made to register in this case, an e-zine code (password) may be published, and it may manage now. Design information may be made to transmit after questionnaire registration.

[0058]In said 2nd embodiment, although e-zine information is made to transmit simultaneously with a question and a choice at the time of questionnaire registration, it may not necessarily be simultaneous. A questionnaire executing person may be made to do use registration beforehand, e-zine information may be made to register in this case, an e-zine code (password) may be published, and it may manage now. E-zine information may be made to transmit after questionnaire registration. In said 2nd embodiment, at the time of advertising registration, although advertisement information is made to transmit simultaneously with choice specification, it may not necessarily be simultaneous. An advertiser may be made to do use registration beforehand, advertisement information may be made to register in this case, an advertising code (password) may be published, and it may manage now. Advertisement information may be made to transmit after choice specification.

[0059]Although setting out of only a background color and a character color of a reply reception screen is enabled about a design in said 1st embodiment, it may enable it to set up a color of other portions. It may enable it to set up fonts (Mincho, a block letter, etc.) It may enable it to set up a font size. It may enable it to set up a layout of the whole reply reception screen.

[0060]Although time is not taken into consideration, a questionnaire executing person may be made to specify reply deadline time in said each embodiment. In this case, when deadline time information is memorized and there was reply operation by the questionnaire memory measure 151, the reply receiving means 120 may read that information, and it may be judged whether a deadline has passed.

[0061]In said each embodiment, a reply log storing means may be prepared further and the reply receiving means 120 may record an IP address of reply date time, a question code, a choice code, a media code, and a respondent-to-a-questionnaire terminal, etc. A reply log file may be created for every question code. A questionnaire executing person may be provided with the contents of the reply log.

[0062]In said each embodiment, although URL which the questionnaire server 100 publishes can understand a meaning at a glance, it may publish URL enciphered about a data part transmitted to the reply receiving means 120.

[0063]In said each embodiment, an entry form of a comment may be displayed further in a reply reception screen, and an input of a comment relevant to a theme of a questionnaire may be demanded from a respondent to a questionnaire.

[0064]In said 2nd embodiment, it is good also as paying a part or all of advertising revenue that a questionnaire service operator got to a questionnaire executing person. The amount of money to pay may be determined based on the number of times as which an advertisement was displayed on a reply reception screen of a questionnaire which this questionnaire executing person carried out, the number of times which an advertisement was clicked and was jumped to an advertiser's homepage, sale proceeds based on an advertisement, etc. An advertising display in case a media code is 1 may be evaluated more heavily than other things, and an amount paid may be determined.

[0065]In said 2nd embodiment, although a questionnaire executing person and a questionnaire service operator use the same e-zine distributing server, they may differ. Different e-zine distributing servers may be used about two or more questionnaire executing persons. Information for specifying an e-zine distributing server may be made to choose or input in questionnaire registration form that it should correspond to this in addition to magazine ID. Two or more e-zine distributing servers may be used about the same e-zine.

[0066]In said 2nd embodiment, although an advertising manuscript presupposed that it is a text sentence character, it is good also as an image picture.

[0067]In said 2nd embodiment, although specification for advertising printing is made into "every choice", it is good also as "every question" and "every questionnaire enforcement e-zine." "Every choice" is further subdivided by a media code, and it is made to perform specification for advertising printing.

[0068]In said each embodiment, the respondent-to-a-questionnaire terminal may not necessarily be a personal computer (personal computer). A respondent-to-a-questionnaire terminal may be a cellular phone which can access the Internet. By the reply receiving means 120, it judges whether a respondent-to-a-questionnaire terminal is a cellular phone, and when it is a cellular phone, it may be made to display a reply reception screen for cellular phones.

[0069]In said each embodiment, although a thing in particular for which respondent to a questionnaire same about the same question performs multiple-times reply operation is not forbidden, when an identical person does multiple-times reply operation at the same question, it is good also as not counting about a thing of the 2nd henceforth as accepting it once and being able to answer. What is called Cookie may be used for this processing.

[0070]In said each embodiment, an another question and a choice may be displayed in a reply reception screen, and a reply may be urged.

[0071]

[Effect of the Invention]According to the questionnaire system of this invention, there is the following effect.

- The reply reception screen of the design suitable for the image of the mail magazine is displayed.
- The reply reception screen which is concerned and unified into design setting out of the e-zine which is carrying out the questionnaire to the reply based on the media which a questionnaire service operator publishes, and a questionnaire service operator sets up is displayed.
- The increase in a reader is expected about both the e-zine which a questionnaire service operator publishes, and the e-zine which a questionnaire executing person publishes.
- An effective advertising display can be performed by specifying the candidate for advertising printing.
- According to questionnaire registration, advertising registration is mostly made as for an advertiser to real time

## CLAIMS

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[Claim(s)]

[Claim 1] A questionnaire system provided with the following requirements.

(b) Have a questionnaire server with which a questionnaire service operator has a royalty, a questionnaire executing person terminal which a questionnaire executing person operates, and a respondent-to-a-questionnaire terminal which a respondent to a questionnaire operates.

(\*\*) A questionnaire executing person terminal should transmit at least one choice corresponding to a question to a questionnaire server.

(\*\*) When you receive said choice, a questionnaire server should publish different URL (Uniformed Resource Locator) for every choice, and should transmit to a questionnaire executing person terminal.

(\*\*) A questionnaire executing person terminal should transmit a choice to a respondent-to-a-questionnaire terminal with URL corresponding to it directly or indirectly.

(\*\*) A respondent-to-a-questionnaire terminal should access said URL by a respondent's to a questionnaire operation.

(\*\*) Consider that access is the reply to a choice corresponding to said URL, and a questionnaire server should process it, when there is access to said URL from a respondent-to-a-questionnaire terminal.

(\*\*) A questionnaire server should use as a respondent-to-a-questionnaire terminal screen directions by a design which a questionnaire executing person defined beforehand, when there is access to said URL from a respondent-to-a-questionnaire terminal.

[Claim 2] A questionnaire system provided with the following requirements.

(b) Have a questionnaire server with which a questionnaire service operator has a royalty, a questionnaire executing person terminal which a questionnaire executing person operates, and a respondent-to-a-questionnaire terminal which a respondent to a questionnaire operates.

(\*\*) A questionnaire executing person terminal should transmit at least one choice corresponding to a question to a questionnaire server.

(\*\*) When you receive said choice, a questionnaire server should publish different URL (URL for a questionnaire executing person) for every choice, and should transmit to a questionnaire executing person terminal.

(\*\*) A questionnaire executing person terminal should transmit a choice to a respondent-to-a-questionnaire terminal with URL for said questionnaire executing person corresponding to it directly or indirectly.

(\*\*) A questionnaire server is different URL for every choice, and publish different URL (URL for a questionnaire service operator) from URL for said questionnaire executing person.

(\*\*) A questionnaire server should transmit a choice to a respondent-to-a-questionnaire terminal with URL for said questionnaire service operator corresponding to it directly or indirectly.

(\*\*) A respondent-to-a-questionnaire terminal should access said URL by a respondent's to a questionnaire operation.

(\*\*) Consider that access is the reply to a choice corresponding to said URL, and a questionnaire

server should process it, when there is access to said URL from a respondent-to-a-questionnaire terminal.

(\*\*) When there is access to said URL from a respondent-to-a-questionnaire terminal, a questionnaire server, When URL with this access is URL for a questionnaire executing person, while using as a respondent-to-a-questionnaire terminal screen directions by a design which a questionnaire executing person defined beforehand, In being URL for a questionnaire service operator, use as a respondent-to-a-questionnaire terminal screen directions by a design which a questionnaire service operator defined beforehand.

[Claim 3]A questionnaire system provided with the following requirements.

(b) Have a questionnaire server with which a questionnaire service operator has a royalty, a questionnaire executing person terminal which a questionnaire executing person operates, and a respondent-to-a-questionnaire terminal which a respondent to a questionnaire operates.

(\*\*) A questionnaire executing person terminal should transmit at least one choice corresponding to a question to a questionnaire server.

(\*\*) When you receive said choice, a questionnaire server should publish different URL (URL for a questionnaire executing person) for every choice, and should transmit to a questionnaire executing person terminal.

(\*\*) A questionnaire executing person terminal should transmit a choice to a respondent-to-a-questionnaire terminal with URL for said questionnaire executing person corresponding to it via an e-zine distributing server.

(\*\*) A questionnaire server is different URL for every choice, and publish different URL (URL for a questionnaire service operator) from URL for said questionnaire executing person.

(\*\*) A questionnaire server should transmit a choice to a respondent-to-a-questionnaire terminal with URL for said questionnaire service operator corresponding to it via an e-zine distributing server.

(\*\*) A respondent-to-a-questionnaire terminal should access said URL by a respondent's to a questionnaire operation.

(\*\*) Consider that access is the reply to a choice corresponding to said URL, and a questionnaire server should process it, when there is access to said URL from a respondent-to-a-questionnaire terminal.

(\*\*) When there is access to said URL from a respondent-to-a-questionnaire terminal, a questionnaire server, When URL with this access is URL for a questionnaire executing person, while using as a respondent-to-a-questionnaire terminal screen directions containing subscription registration form of a mail magazine which a questionnaire service operator publishes, In being URL for a questionnaire service operator, use as a respondent-to-a-questionnaire terminal screen directions containing subscription registration form of a mail magazine which a questionnaire executing person publishes.

[Claim 4]A questionnaire system provided with the following requirements.

(b) Have a questionnaire server with which a questionnaire service operator has a royalty, a questionnaire executing person terminal which a questionnaire executing person operates, and a

respondent-to-a-questionnaire terminal which a respondent to a questionnaire operates.  
(\*\*) A questionnaire executing person terminal should transmit at least one choice corresponding to a question to a questionnaire server.

(\*\*) When you receive said choice, a questionnaire server should publish different URL for every choice, and should transmit to a questionnaire executing person terminal.

(\*\*) A questionnaire executing person terminal should transmit a choice to a respondent-to-a-questionnaire terminal with URL corresponding to it directly or indirectly.

(\*\*) A questionnaire server should relate an advertiser's advertisement information with a candidate for advertising printing, and should memorize it.

(\*\*) A respondent-to-a-questionnaire terminal should access said URL by a respondent's to a questionnaire operation.

(\*\*) Consider that access is the reply to a choice corresponding to said URL, and a questionnaire server should process it, when there is access to said URL from a respondent-to-a-questionnaire terminal.

(\*\*) A questionnaire server should use as a respondent-to-a-questionnaire terminal screen directions including an advertisement memorized by relating with this choice, when there is access to said URL from a respondent-to-a-questionnaire terminal.

[Claim 5] A questionnaire system which is the questionnaire system according to any one of claims 1 to 4, and is characterized by having at least two questionnaire executing person terminals.

[Claim 6] A questionnaire system provided with the following requirements.

(b) Have a questionnaire server with which a questionnaire service operator has a royalty, a questionnaire executing person terminal which a questionnaire executing person operates, a respondent-to-a-questionnaire terminal which a respondent to a questionnaire operates, and a sponsor terminal which an advertiser operates.

(\*\*) A questionnaire executing person terminal should transmit at least one choice corresponding to a question and this question to a questionnaire server.

(\*\*) A questionnaire server should memorize said question and a choice.

(\*\*) A questionnaire server should transmit all or a part of said memorized question and choices to a sponsor terminal, and urge specification for advertising printing to it.

(\*\*) Relate a questionnaire server with a candidate for advertising printing which had an advertiser's advertisement information specified, and memorize it.

(\*\*) A questionnaire server should use as a respondent-to-a-questionnaire terminal screen directions including advertisement information related with this choice, when there is a reply to said choice from a respondent-to-a-questionnaire terminal.

[Claim 7] A questionnaire system provided with the following requirements.

(b) Have a questionnaire server with which a questionnaire service operator has a royalty, a questionnaire executing person terminal which a questionnaire executing person operates, a respondent-to-a-questionnaire terminal which a respondent to a questionnaire operates, and a sponsor terminal which an advertiser operates.

(\*\*) A questionnaire executing person terminal should transmit at least one choice corresponding to a question to a questionnaire server.

(\*\*) When you receive said choice, a questionnaire server should publish different URL for every choice, and should transmit to a questionnaire executing person terminal.

(\*\*) A questionnaire executing person terminal should transmit a choice to a respondent-to-a-questionnaire terminal with URL corresponding to it directly or indirectly.

(\*\*) A questionnaire server should transmit all or a part of a question and choices which received from a questionnaire executing person terminal to a sponsor terminal, and urge specification for advertising printing to it.

(\*\*) Relate a questionnaire server with a candidate for advertising printing which had an advertiser's advertisement information specified, and memorize it.

(\*\*) A respondent-to-a-questionnaire terminal should access said URL by a respondent's to a questionnaire operation.

(\*\*) Consider that access is the reply to a choice corresponding to said URL, and a questionnaire server should process it, when there is access to said URL from a respondent-to-a-questionnaire terminal.

(\*\*) A questionnaire server should use as a respondent-to-a-questionnaire terminal screen directions including advertisement information related with this choice, when there is access to said URL from a respondent-to-a-questionnaire terminal.

[Claim 8]A questionnaire system being a questionnaire system given in Claim 6 or either of 7, and having at least two questionnaire executing person terminals, and having at least two sponsor terminals.

[Claim 9]A questionnaire system provided with the following requirements.

(b) Have a questionnaire server, the 1st respondent-to-a-questionnaire terminal that the 1st respondent to a questionnaire operates, and the 2nd respondent-to-a-questionnaire terminal that the 2nd respondent to a questionnaire operates.

(\*\*) A questionnaire server should memorize at least one choice corresponding to a question and this question.

(\*\*) A questionnaire server should publish different URL for every choice, and should transmit to the 1st respondent-to-a-questionnaire terminal by E-mail directly or indirectly.

(\*\*) Consider that access is the reply to a choice corresponding to said URL, and a questionnaire server should process it, when there is access to said URL from the 1st respondent-to-a-questionnaire terminal.

(\*\*) A questionnaire server should display a choice corresponding to a question and this question on a WWW browser of the 2nd respondent-to-a-questionnaire terminal, and should demand selection from the 2nd respondent to a questionnaire.

(\*\*) When selected choice information is received from the 2nd respondent-to-a-questionnaire terminal, consider that a questionnaire server is the reply to this choice, and process it.

[Claim 10]A questionnaire server in the questionnaire system according to any one of claims 1 to 9.



[Claim 11] A recording medium which recorded a program for performing processing of a questionnaire server in the questionnaire system according to any one of claims 1 to 9 and in which computer reading is possible.

# PATENT ABSTRACTS OF JAPAN

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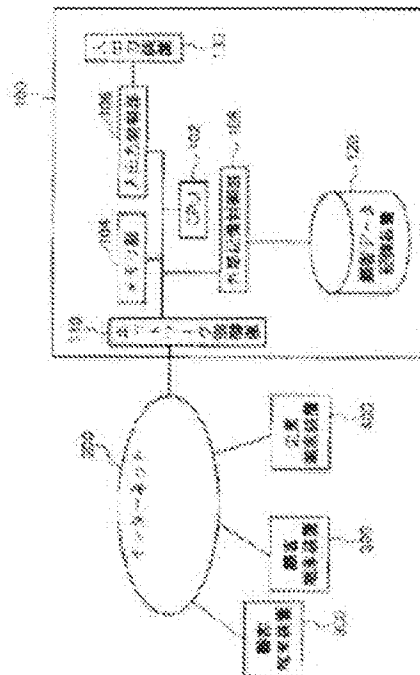
(72)Inventor : OZAWA YASUO

## (54) INFORMATION PROVISION DEVICE

(57)Abstract:

**PROBLEM TO BE SOLVED:** To improve a recovery rate in a questionnaire survey or the like performed on-line through a network.

**SOLUTION:** This information provision device 100 is provided with a network control part 110 for transmitting questionnaire mail to customer terminal equipment 300 on the basis of individual data and receiving questionnaire response mail from the customer terminal equipment 300 and transmitting statistic data on the basis of the questionnaire response mail to a company terminal equipment 400 which is the client of the questionnaire survey, the customer terminal equipment 300 which is a responder of the questionnaire, a CPU 102 for ciphering the individual data received from the customer terminal equipment 300 and generating the statistic data on the basis of the data of the received questionnaire response mail, and a customer data storage device 120 for storing the data of the questionnaire response mail received from the customer terminal equipment 300 or the like.



## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]this invention stores the data especially provided from the computer via the network in the server about the technology of providing a computer with data via a network, and relates to the technology in which a server transmits data according to the demand of other computers.

[0002]

[Description of the Prior Art]Conventionally, there is information disclosure equipment indicated by JP,H8-255150,A as equipment which provides information via a network. The data storage circuit where this information disclosure equipment memorizes the data of a predetermined information form, The information retrieval circuit which searches the data stored in the data storage circuit, and the demand reception circuit for receiving the demand of information disclosure from an information-requirements person, The response rule store circuit which stores the personal-relations information about the characteristic personal relations between the user of the information provider side who owns the common knowledge and data for generating the response according to an information-requirements person, and the user of the information-requirements person side, Based on the knowledge and personal-relations information which answered the demand received by the demand reception circuit and were stored in the response rule store circuit, The response plan creation circuit which plans the response for showing an information-requirements person the data produced by the information retrieval circuit by searching the data stored in the data storage circuit, and the response generating circuit which generates the response to an information-requirements person according to a plan to have been created by the response plan creation circuit are included.

[0003]According to the information disclosure equipment indicated by the above-mentioned gazette, a response rule store circuit stores the personal-relations information about the characteristic personal relations between the user of the information provider side who owns the common knowledge and data for generating the response according to an information-requirements person, and the user of the information-requirements person side. A response plan creation circuit answers the demand received by the demand reception circuit, The response for showing an information-requirements person the data produced by searching the data stored in the data storage circuit by the information retrieval circuit based on the knowledge and personal-relations information which were stored in the response rule store circuit is planned. Thereby, the information to release can be changed based on the personal-relations information between an information provider and an information-requirements person. As a result, according to this information disclosure equipment, personal information can be opened only to a suitable partner, or only required information can be released.

[0004]A questionnaire can be performed via a network using this information disclosure equipment, and the contents of the questionnaire answer data which stores questionnaire answer data in a data storage circuit, and exhibits it can be made to change based on personal relations etc.

[0005]

[Problem to be solved by the invention]However, in the information disclosure equipment indicated by the above-mentioned gazette. Even if it is a case where individual data is contained in questionnaire answer data, the questionnaire answer data itself which it is only having

changed questionnaire answer data based on personal relations etc., and was stored in the data storage circuit is not changed. The equipment indicated by the above-mentioned gazette does not make a questionnaire answer give positively the questionnaire candidate who is an information provider.

[0006]Are made in order that this invention may solve above-mentioned problem, and the purpose, It is providing the information providing device whose amount of offers of information can do the motivation of a questionnaire answer, whose recovery rate of a questionnaire improves, and increases by fully protecting privacies, such as a respondent etc. of the questionnaire performed on-line, via a network. Other purposes are to provide the information providing device whose amount of offers of information can do the motivation of a questionnaire answer, whose recovery rate of a questionnaire improves, and increases by treating information providers, such as a respondent to a questionnaire of a questionnaire, favorably.

[0007]

[Means for solving problem]The information providing device concerning the 1st invention receives the information containing the personal data which can specify an individual from an information provider via a network, Are an information providing device which provides information according to an information-requirements person's demand, it is connected to a network, and information is received from an information provider, The information storage means for enciphering the personal data contained in the received information, and memorizing information, The request reception means for receiving the data which requires the arbitrary information which was connected to the network and memorized by the information storage means from an information-requirements person, It is connected to a network, an information storage means, and a request reception means, an information storage means memorizes, and the information transmission means for transmitting the information demanded by the information-requirements person to an information-requirements person is included.

[0008]According to the 1st invention, an information storage means enciphers the personal data which receive information from an information provider and are contained in the received information via a network, and memorizes information. A request reception means receives the data which requires the arbitrary information memorized by the information storage means from an information-requirements person via a network. An information transmission means is memorized by the information storage means, and transmits the information demanded by the information-requirements person to an information-requirements person. Thereby, since the personal data in the information provided by the information provider are enciphered and memorized, they can raise protection of privacy. As a result, since an information provider can provide information in comfort, the information providing device whose amount of offers of information increases can be provided.

[0009]The information providing device concerning the 2nd invention, including further the identification data creating means for generating the identification data defined for every information provider in addition to the 1st composition of invention an information storage means, The means for memorizing the information which enciphers the personal data which receive information from an information provider and are contained in the received information based on identification data, and contains the enciphered personal data is included.

[0010]According to the 2nd invention, an identification data creating means generates the identification data defined for every information provider. An information storage means memorizes the information which enciphers the personal data contained in the information which received information from the information provider based on identification data, and contains the

enciphered personal data. Thereby, since the personal data in the information provided by the information provider are enciphered and memorized based on identification data, they can raise protection of privacy.

[0011][0011]. It has below \*\* concerning the 3rd invention.

A providing device in the 1st composition of invention in addition, a request reception means, \*\*\*\*\* for an information transmission means to choose an information provider based on a narrowing-down factor and personal data including the means for receiving the data for requiring the information chosen based on the predetermined narrowing-down factor about personal data from an information-requirements person.

1st selection DE for reading an information provider's information that the selecting means and the information provider selecting means were selected from an information storage means, and transmitting to an information-requirements person.

[0012] According to the 3rd invention, a request reception means receives the data for requiring the information chosen based on the predetermined narrowing-down factor about personal data from an information-requirements person. An information provider selecting means chooses an information provider based on a narrowing-down factor and personal data. The 1st select data transmitting means reads an information provider's information that the information provider selecting means was selected from an information storage means, and transmits to an information-requirements person. Thereby, the information-requirements person can obtain the information to need based on the narrowing-down information which self required.

[0013] In addition to the 3rd composition of invention, the information providing device concerning the 4th invention is connected to a network, an information provider selecting means, and an information storage means, and an information provider's information that the information provider selecting means was selected is read from an information storage means, The 2nd select data transmitting means for transmitting to an information provider with the selected information provider selecting means is included further.

[0014] According to the 4th invention, the 2nd select data transmitting means reads an information provider's information that the information provider selecting means was selected from an information storage means, and transmits to an information provider. Thereby, the information provider can obtain information based on the narrowing-down information from an information-requirements person. As a result, it becomes the motivation of an offer of information that information can be obtained for an information provider, and the information providing device whose amount of offers of information increases can be provided.

[0015][0015]. It has below \*\* concerning the 5th invention.

Statistics DE for a providing device to carry out the statistical work of an information provider's information that the information transmission means was chosen by the information provider selecting means in addition to the composition of the 3rd invention or the 4th invention.

1st statistics DE for transmitting the statistical data generated by the creating means and the statistical-data creating means to an information-requirements person.

[0016] According to the 5th invention, a statistical-data creating means carries out the statistical work of an information provider's information that the information provider selecting means was selected. The 1st statistical-data transmitting means transmits the statistical data generated by the statistical-data creating means to an information-requirements person. Thereby, the information provider can obtain the statistical data to need based on the narrowing-down information which

self required.

[0017]In addition to the 5th composition of invention, the information providing device concerning the 6th invention is connected to a network, an information provider selecting means, and a statistical-data creating means, The 2nd statistical-data transmitting means for transmitting the statistical data generated by the statistical-data creating means to an information provider with the selected information provider selecting means is included further.

[0018]According to the 6th invention, the 2nd statistical-data transmitting means transmits the statistical data generated by the statistical-data creating means to an information provider with the selected information provider selecting means. Thereby, the information provider can obtain a statistical data based on the narrowing-down information from an information-requirements person. As a result, it becomes the motivation of an offer of information that a statistical data can be obtained for an information provider, and the information providing device whose amount of offers of information increases can be provided.

[0019]In addition to the 4th composition of invention, the information providing device concerning the 7th invention includes further an input means for an information provider to input the predetermined narrowing-down factor about personal data, The 2nd select data transmitting means reads an information provider's information that the information provider selecting means was selected from an information storage means, and contains the means for transmitting to the information provider who inputted the narrowing-down factor into the input means.

[0020]According to the 7th invention, an information provider inputs the predetermined narrowing-down factor about personal data into an input means. The 2nd select data transmitting means reads an information provider's information that the information provider selecting means was selected from an information storage means, and transmits to the information provider who inputted the narrowing-down factor into the input means. Thereby, the information provider can obtain the information to need based on the narrowing-down information which self required. As a result, it becomes the motivation of an offer of information that the self information to need can be obtained for an information provider, and the information providing device whose amount of offers of information increases can be provided.

[0021]In addition to the 6th composition of invention, the information providing device concerning the 8th invention includes further an input means for an information provider to input the predetermined narrowing-down factor about personal data, The 2nd statistical-data transmitting means contains the means for transmitting the statistical data generated by the statistical-data means to the information provider who inputted the narrowing-down factor into the input means.

[0022]According to the 8th invention, an information provider inputs the predetermined narrowing-down factor about personal data into an input means. The 2nd statistical-data transmitting means transmits the statistical data generated by the statistical-data means to the information provider who inputted the narrowing-down factor into the input means. Thereby, the information provider can obtain the statistical data to need based on the narrowing-down information which self required. As a result, it becomes the motivation of an offer of information that the self statistical data to need can be obtained for an information provider, and the information providing device whose amount of offers of information increases can be provided.

[0023]In addition to the composition of invention of either the 3rd - the 6th invention, it is connected to a network and an information provider selecting means, and the information providing device concerning the 9th invention includes further the narrowing-down factor transmitting means for transmitting the data in which a narrowing-down factor is shown to an

information provider with the selected information provider selecting means.

[0024]According to the 9th invention, a narrowing-down factor transmitting means transmits the data in which a narrowing-down factor is shown to an information provider with the selected information provider selecting means. Thereby, if chosen as an information provider, the narrowing-down factor which is the selected Reason will be transmitted. As a result, it becomes the motivation of an offer of information that why the information provider was chosen can be obtained, and the information providing device whose amount of offers of information increases can be provided.

[0025]In addition to composition of invention of either the 1st - the 9th invention information of an information providing device concerning the 10th invention is questionnaire information, an information provider is a respondent to a questionnaire, and statistical information is the statistical information generated based on questionnaire information collected via a network.

[0026]According to the 10th invention, it is enciphered and a respondent's to a questionnaire personal data are memorized by information storage means. A questionnaire candidate is narrowed down based on a narrowing-down factor, and a narrowing-down factor is transmitted to a questionnaire candidate. If it replies to a questionnaire, a narrowing-down factor can be inputted into an input means and information or a statistical data based on a result of a questionnaire will be transmitted to a respondent to a questionnaire as a result of the inputted questionnaire which is depended for narrowing down. Volition which that a candidate of a questionnaire fully receives protection of privacy tends to become the motivation which replies to a questionnaire by this, and it is going to answer to a questionnaire increases, and an information providing device whose recovery rate of a questionnaire improves can be provided. It becomes the motivation of a questionnaire answer that a respondent to a questionnaire can obtain a result of a questionnaire etc., volition which it is going to answer to a questionnaire increases, and an information providing device whose recovery rate of a questionnaire improves can be provided.

[0027]

[Mode for carrying out the invention]Hereafter, an embodiment of the invention is described, referring to Drawings. In the following explanation, the same mark is given to the same parts. Those names and functions are also the same. Therefore, a repetition of the detailed explanation about them is omitted suitably.

[0028]The information providing device 100 applied to an embodiment of the invention with reference to drawing 1 is an information providing device which receives a questionnaire answer and provides a questionnaire result via the Internet 200 according to a demand of the company which is an information-requirements person from the customer who is a respondent to a questionnaire. The consumer premises equipment equipment 300 by the side of the customer who performs a questionnaire answer, and the corporation terminal equipment 400 of the company which performs a request of a questionnaire are connected to the Internet 200. It is used displaying the questionnaire result transmitted to the corporation terminal equipment 400 from the information providing device 100 by the demand from the business information equipment 400 in the business information terminal 400, or merging it with the data which the business information terminal 400 has memorized.

[0029][0029]. \*\*\*\*\* is provided with the following.

The network which \*\* 100 is connected to the Internet 200 and controls the data communications between the information providing device 100, the consumer premises equipment equipment 300, and the corporation terminal equipment 400 via the Internet 200.

Encipher the portion of the personal data contained in the information which it was connected to the part 110 and the network control section 110, and was received, or, CPU which narrows down a questionnaire candidate from customer information based on the received narrowing-down data, generates a statistical data based on the data of the received questionnaire answer mail, or controls operation of each part of this information providing device 100 (Central Processing Unit).

The account of customer information which memorizes the customer information which is connected to 102 and CPU102 and contains personal data, or memorizes the data etc. of the questionnaire answer mail received from the consumer premises equipment equipment 300.

[0030]The network control section 110 mutually connected to CPU102 by bus, The memory part 104 which memorizes the intermediate data in the program which performs the program and CPU102 which CPU102 performs, etc., I/O control unit 106 which controls the input/output devices 130, such as a keyboard, and the external memory control section 108 which controls the external storage 120 are connected.

[0031]The network control section 110 is controlled by CPU102, and receive questionnaire answer mail from the consumer premises equipment equipment 300, or, Receive the narrowing-down data for narrowing down a questionnaire candidate from customer information from the corporation terminal equipment 400 etc., or, The data of the questionnaire answer mail received from the consumer premises equipment equipment 300 is transmitted to the corporation terminal equipment 400 etc., or narrowing-down data is transmitted to a customer's consumer premises equipment equipment 300 which was able to be narrowed down.

[0032]It is transmitted to the information providing device 100 from the corporation terminal equipment 400 and the consumer premises equipment equipment 300, or the narrowing-down data for narrowing down a questionnaire candidate is inputted from the input/output device 130 of the information providing device 100. Questionnaire result mail is transmitted to the corporation terminal equipment 400 and the consumer premises equipment equipment 300. Questionnaire result mail contains the data of questionnaire answer mail, and the statistical data generated based on the data of questionnaire answer mail.

[0033]With reference to drawing 2 (A), the data memorized by the customer information management table in the customer information memory storage 120 contains customer ID (identification), personal data, and questionnaire answer data. Personal data include the transmission destination address of a customer's name, age (data 1), sex (data 2), and an E-mail, etc. Questionnaire answer data contains the data indicated to the questionnaire answer mail which the customer answered to the questionnaire carried out to the customer.

[0034]It is enciphered based on the password which the customer inputted a name, the data 1, the data 2, etc. which are personal data as customer ID in the consumer premises equipment equipment 300, and was entered with reference to drawing 2 (B) from the password or the input/output device 130 transmitted to the information providing device 100. Some personal data could be decrypted like drawing 2 (C) and drawing 2 (D) in these enciphered personal data. In this case, company ID is received from the corporation terminal equipment 400, and some or all of personal data that was enciphered is decrypted based on the data disclosed information which was made to correspond to company ID beforehand with company ID, and was set up. The personal data and questionnaire answer data which were decrypted are transmitted to the corporation terminal equipment 400. The encryption itself is performed by the publicly known public key system etc.



[0035]The program executed with the information providing device 100 with reference to drawing 3 has the following control structure about customer information registration processing.

[0036]It is judged whether at Step (a step is hereafter abbreviated to S) 100, CPU102 received the customer's personal data from the consumer premises equipment equipment 300 via the network control section 110 and the Internet 200. If a customer's personal data are received from the consumer premises equipment equipment 300 (it is YES at S302), processing will be moved to S102. On the other hand, if a customer's personal data are not received from the consumer premises equipment equipment 300 (it is NO at S102), processing will be returned to S100 and will wait for reception of a customer's personal data from the consumer premises equipment equipment 300. A questionnaire is carried out by narrowing down a questionnaire candidate based on the personal data which register a majority of these personal data, and were registered, and transmitting questionnaire mail to the transmission destination address of the E-mail contained in personal data so that it may mention later.

[0037]In S102, CPU102 judges whether the personal data of the customer who received S100 are registered into the customer information memory storage 120. Processing will be ended if the personal data of the customer who received are registered into the customer information memory storage 120 (it is YES at S102). On the other hand, if the personal data of the customer who received are not registered into the customer information memory storage 120 (it is NO at S102), processing will be moved to S104.

[0038]In S104, CPU102 creates a column of customer information corresponding to personal data received on a customer-relations-management table shown in drawing 2 (A). In S106, CPU102 creates a customer's customer ID. For example, this customer ID can be made into a numerical value as shown in drawing 2 (A). In a customer-relations-management table of the customer information memory storage 120 of the information providing device 100, one customer can be specified by this customer ID.

[0039]In S108, CPU102 checks an input of a password. This password is a password which was received with a customer's personal data from the consumer premises equipment equipment 300 and which was set up for every customer, or is a password set up for every operator of the information providing device 100 inputted from the input/output device 300.

[0040]CPU102 enciphers a customer's personal data S110 based on the password which checked the input by the customers ID and S108 who generated in S106. The data of the customer-relations-management table shown in drawing 2 (A) changes with these encryption, as shown in drawing 2 (B).

[0041]In S112, CPU102 writes a customer's personal data enciphered S110 in the customer information memory storage 120.

[0042]The personal data of the customer who becomes the customer information memory storage 120 with the candidate of a questionnaire as mentioned above are accumulated. When the request data of a questionnaire is transmitted to the information providing device 100 from the corporation terminal equipment 400 after accumulation of personal data, the information providing device 100, A questionnaire candidate is narrowed down from the customer information memorized by the customer information memory storage 120, and questionnaire mail is transmitted to the narrowed-down questionnaire candidate. A questionnaire is performed when the information providing device 100 receives the questionnaire answer mail to questionnaire mail from the consumer premises equipment equipment 300. The details of this questionnaire processing are explained below. About registration of personal data, a direct entry may be carried out not from Internet 200 course but from the input/output device 130.

[0043]The program executed with the information providing device 100 with reference to drawing 4 has the following control structure about questionnaire processing.

[0044]In S200, CPU102 judges whether the request data of the questionnaire was received from the corporation terminal equipment 400. The request data of this questionnaire is provided with the following.

Questionnaire data.

Narrowing-down data for narrowing down a questionnaire candidate.

Transmission destination data of questionnaire result mail.

Data in which the kind of data included in questionnaire result mail is shown.

The request data of a questionnaire contains the option data of the data etc. in which the necessity of the statistical work based on the data in which the necessity of processing which performs the notice used as a questionnaire object to a questionnaire candidate is shown, and the data of questionnaire answer mail is shown. Reception of the request data of a questionnaire will move processing to S300 (it is YES at S200). On the other hand, if the request data of a questionnaire is not received (it is NO at S200), processing will be returned to S200 and will wait for reception of the request data of a questionnaire.

[0045]In S300, this information providing device 100 performs questionnaire candidate narrowing-down processing. This processing narrows down a questionnaire candidate based on the personal data memorized by the customer information memory storage 120 and the narrowing-down data received in S200.

[0046]In S400, CPU102 judges whether the notice processing to a questionnaire candidate is required based on the option data received in S200. If it is judged that notice processing is required (it is YES at S400), processing will be moved to S500. On the other hand, if notice processing is not required, it is judged (it is NO at S400), processing will be moved to S600.

[0047]In S500, the information providing device 100 performs notice processing of a questionnaire candidate to the questionnaire candidate who narrowed down S300. This processing notifies the purpose etc. of the Reason which became a questionnaire object to the questionnaire candidate, and this questionnaire.

[0048]In S600, via the Internet 200, the information providing device 100 transmits questionnaire mail to the consumer premises equipment equipment 300 by E-mail, and performs collection processing of the questionnaire answer mail corresponding to questionnaire data from the consumer premises equipment equipment 300.

[0049]In S650, CPU102 judges whether a fixed quantity of whether fixed time's having passed since transmission of questionnaire mail and questionnaire mail were received. If fixed time passes since transmission of questionnaire mail or a fixed quantity of questionnaire mail is received (it is YES at S650), processing will be moved to S700. On the other hand, if fixed time does not pass since transmission of questionnaire mail and a fixed quantity of questionnaire mail is not received (it is NO at S650), processing is returned to S650, and it will stand by until fixed time passes since transmission of questionnaire mail or it receives a fixed quantity of questionnaire mail.

[0050]In S700, CPU102 judges whether a statistical work is required based on the option data received in S200. If it is judged that a statistical work is required (it is YES at S700), processing will be moved to S800. On the other hand, if it is judged that a statistical work is not required (it is NO at S700), processing will be moved to S900.

[0051]In S800, the information providing device 100 generates a statistical data based on the data of the questionnaire answer mail received in S600.

[0052]In S900, the information providing device 100 transmits the statistical data generated as a questionnaire result in the data of the questionnaire answer mail received by S600, or S800 to the corporation terminal equipment 400.

[0053]Reception of the request data of the questionnaire in S200 is also receivable not only from the corporation terminal equipment 400 but the consumer premises equipment equipment 300. In transmitting processing of the questionnaire result in S900, a transmission destination can also be taken not only as the corporation terminal equipment 400 but as the consumer premises equipment equipment 300. Thus, it becomes the motivation of a questionnaire answer that can be made to perform the request of a questionnaire, or he treats favorably the customer who is a respondent to a questionnaire as the customer of the respondent-to-a-questionnaire side can receive a questionnaire result, and a questionnaire recovery rate is raised.

[0054]Questionnaire candidate narrowing-down processing (S300), the notice processing of a questionnaire candidate (S500), the questionnaire dispatch collection processing (S600), statistical information generation processing (S800), and questionnaire result transmitting processing (S900) in which it explained with reference to drawing 4 are explained in detail below.

[0055]The program executed with the information providing device 100 with reference to drawing 5 has the following control structure about questionnaire candidate narrowing-down processing.

[0056]In S302, CPU102 checks a questionnaire candidate's narrowing-down entry of data. The check of this narrowing-down entry of data is performed by having received narrowing-down data via the Internet 200 and the network control section 110 from the corporation terminal equipment 400 or the consumer premises equipment equipment 300. When narrowing-down data is inputted from the input/output device 130, the check of a narrowing-down entry of data is performed by having inputted narrowing-down data from the input/output device 130. Here, it narrows down and data is data of [ sex ] 26-30 years old in a man and age, for example.

[0057]In S304, CPU102 reads a customer's personal data from the customer information memory storage 120 via the external memory control section 108. In S306, CPU102 decrypts a customer's read personal data based on a customer's ID and a password.

[0058]In S308, CPU102 judges whether the 1st personal data are in agreement with the narrowing-down data which checked the input in S302. If personal data are in agreement with narrowing-down data (it is YES at S308), processing will be moved to S310. On the other hand, if personal data are not in agreement with narrowing-down data (it is NO at S308), processing will be moved to S310.

[0059]In S310, CPU102 saves congruous personal data temporarily at the memory part 104. In S312, CPU102 judges whether customer information was completed. If it is judged that customer information was completed (it is YES at S312), processing will be moved to S314. On the other hand, if it is judged that customer information is not completed (it is NO at S312), it will be judged whether processing is moved to S308 and its following personal data correspond with narrowing-down data.

[0060]In S314, CPU102 is written in the customer information memory storage 120 with narrowing-down data by using as questionnaire candidate data the personal data temporarily saved in S310 at the memory part 104.

[0061]The program executed with the information providing device 100 with reference to drawing 6 has the following control structure about the notice processing of a questionnaire candidate. In the option data in the request data of a questionnaire, notice processing of a

questionnaire candidate shown below is performed, only when it is chosen that the notice processing of a questionnaire candidate is required.

[0062]In S502, CPU102 reads a questionnaire candidate's personal data written in the customer information memory storage 120 in S314. In S504, CPU102 reads the narrowing-down data written in the customer information memory storage 120 in S314.

[0063]In S506, CPU102 checks that the questionnaire purpose etc. have been inputted. This questionnaire purpose means the purpose for performing a questionnaire, the purpose of using a questionnaire result, etc. It can become the motivation of a questionnaire answer to notify a questionnaire candidate of this questionnaire purpose, and a questionnaire recovery rate can be raised. The data aimed at obtaining [ this ] a questionnaire etc. is inputted via the Internet 200 and the network control section 110 from the corporation terminal equipment 400 and the consumer premises equipment equipment 300, or is inputted from the input/output device 130.

[0064]In S508, CPU102 decrypts a customer's personal data based on customer ID and a password. In S510, CPU102 transmits narrowing-down data, the data aimed at obtaining a questionnaire, etc. to the transmission destination address of the E-mail memorized by the decrypted personal data.

[0065]The program executed with the information providing device 100 with reference to drawing 7 has the following control structure about questionnaire dispatch collection processing.

[0066]In S602, CPU102 reads a questionnaire candidate's personal data from the customer information memory storage 120. In S604, CPU102 decrypts a customer's personal data based on customer ID and a password. In S606, CPU102 transmits questionnaire data to the transmission destination address of the E-mail memorized by the decrypted personal data. URL (uniform resourcelocators) of the homepage as which questionnaire data is displayed is transmitted instead of transmitting questionnaire data by E-mail. A questionnaire candidate may be made to obtain the questionnaire data stored in the server by the homepage.

[0067]The questionnaire candidate of the consumer premises equipment equipment 300 transmits the questionnaire answer mail to questionnaire data to the information providing device 100 via the Internet 200 to the questionnaire data transmitted to the questionnaire candidate as mentioned above.

[0068]In S608, CPU102 judges whether questionnaire answer mail was received from the consumer premises equipment equipment 300 via the Internet 200 and the network control section 110. This questionnaire answer mail contains questionnaire answer data and customer ID. Reception of questionnaire answer mail will move processing to S610 (it is YES at S608). On the other hand, if questionnaire answer mail is not received (it is NO at S608), processing will be returned to S608 and will wait for reception of questionnaire answer mail.

[0069]In S610, CPU102 reads the customer information applicable to customer ID which received S608 from the customer information memory storage 120. In S612, CPU102 decrypts the personal data of the customer information read in S610 based on customer ID and a password. In S614, CPU102 adds the data of the questionnaire answer mail collected to customer information. At this time, the data of the collected questionnaire answer mail can be certainly added to customer information by coinciding the originator address of the questionnaire answer mail received in S608, and the transmission destination address of the E-mail of the personal data decrypted by S612.

[0070]In S612, CPU102 enciphers a customer's personal data based on customer ID and a password. In S618, CPU102 writes the personal data enciphered S616 and the data of questionnaire answer mail in the customer information memory storage 120. As mentioned

above, in S650 of drawing 4, processing of these S608-S620 is repeatedly performed until fixed time passes since transmission of questionnaire mail, or until it receives a constant rate of questionnaire answer mails.

[0071]The program executed with the information providing device 100 with reference to drawing 8 has the following control structure about statistical information generation processing. In the option data of the request data of the questionnaire received in S200 shown in drawing 4, statistical information generation processing shown below is performed, only when it is chosen that statistical information generation processing is required.

[0072]In S802, CPU102 reads the customer information answered to the questionnaire from the customer information memory storage 102. In S804, CPU102 decrypts the personal data of the customer information read in S802 based on customer ID and a password. In S806, CPU102 generates a statistical data based on the personal data of customer information, and the data of questionnaire answer mail. Here, the statistical data refers to what analyzed the data of questionnaire answer mail by age or sex. In S808, CPU102 writes the statistical data generated S806 in the customer information memory storage 120.

[0073]The program executed with an information providing device with reference to drawing 9 has the following control structure about questionnaire result transmitting processing. In the questionnaire result transmitting processing shown below, A transmission destination and the data to transmit are determined based on the data in which the kind of data contained in the transmission destination data of questionnaire result mail and questionnaire result mail which are included in the request data of the questionnaire received in S200 of drawing 4 is shown.

[0074]In S902, it is judged whether CPU102 is the company which requested whether the transmission destination of a questionnaire result is the customer who replied to the questionnaire, and a questionnaire. This judgment is performed based on the contents of the option data kicked to the request data of the questionnaire received in S200 of drawing 4.

[0075]If a transmission destination is judged to be a customer (he is a customer at S902), processing will be moved to S904. On the other hand, if a transmission destination is judged to be a company (it is a company at S902), processing will be moved to S910.

[0076]In S904, CPU102 reads a respondent's to a questionnaire customer information from the customer information memory storage 120. In S906, CPU102 decrypts the personal data of the customer information read in S904 based on customer ID and a password. In S908, CPU102 sets the transmission destination address of questionnaire result mail as the transmission destination address of the E-mail memorized by personal data based on the personal data decrypted S906. In S910, CPU102 sets the transmission destination address of questionnaire result mail as the transmission destination address of the E-mail contained in the request data of a questionnaire.

[0077]In S920, CPU102 judges whether the data contained in the questionnaire result mail to transmit is data of questionnaire answer mail, or it is a statistical data. This judgment is performed based on the contents of the option data in the request data of the questionnaire received in S200 of drawing 4. If send data is judged to be data of questionnaire answer mail (it is a questionnaire at S920), processing will be moved to S920. On the other hand, if the data to transmit is judged to be a statistical data (it is a statistical data at S920), processing will be moved to S924.

[0078]In S922, CPU102 reads the customer information answered to the questionnaire from the customer information memory storage 120, and sets the data of questionnaire answer mail of the read customer information as send data. In S924, CPU102 reads a statistical data from the customer information memory storage 120, and sets the read statistical data as send data.

[0079]In S926, CPU102 transmits the predetermined data set up in S922 or S924 via the network control section 110 and the Internet 200 to the predetermined transmission destination set up in S908 or S910.

[0080]In S928, CPU102 judges whether transmitting processing was completed. This judgment is performed based on the history of the judgment in S902 and S920, and the contents of the option data in the request data of the questionnaire received in S200 of drawing 4. That is, a judgment in S902 and S920 is repeatedly made until it fulfills the contents of option data.

[0081]The operation of the information providing device 100 based on above structures and flow charts is explained.

[0082][Customer information register operation] The processing which registers customer information to the information providing device 100 is explained from the consumer premises equipment equipment 300. If the transmission destination address etc. of the name which is a customer's personal data, age, sex, and an E-mail are transmitted to the information providing device 100 via the Internet 200 from the consumer premises equipment equipment 300, the information providing device 100 will receive a customer's personal data (it is YES at S100).

[0083]If the received personal data are not registered into the customer information memory storage 120 (it is NO at S102), a new column will be created by the customer information management table (S104), and customer ID will be created (S106). The password entered beforehand is checked (S108) and a customer's personal data are enciphered based on customer ID and a password (S110). A customer's enciphered personal data are written in the customer information memory storage 120. At this time, customer information contains customer ID and the personal-data part which are shown in drawing 2 (A). Questionnaire answer data has not been memorized yet by customer information.

[0084][-- the person for a questionnaire narrows down --] of operation -- before performing a questionnaire, the operation which narrows down the questionnaire candidate who performs the questionnaire is explained.

[0085]If a questionnaire candidate's narrowing-down entry of data is carried out from the corporation terminal equipment 400 etc. (S302), a customer's personal data will be read from the customer information memory storage 120 (S304). It is judged whether a customer's personal data are decrypted based on customer ID and a password (S306), and the decrypted personal data are in agreement with narrowing-down data. When personal data are in agreement with narrowing-down data (it is YES at S308), congruous personal data are saved temporarily to the memory part 104 (S310). Then, these operations are repeatedly performed until all the customer information is completed. An end of customer information will write the data saved temporarily at the memory part 104 in the customer information memory storage 120 with narrowing-down data as questionnaire candidate data (S314) (it is YES at S312)

[0086][Questionnaire candidate notification action] If a questionnaire candidate is narrowed down, based on option data, it will be reported that it was chosen as the questionnaire candidate to the questionnaire candidate etc.

[0087]A questionnaire candidate's personal data are read from the customer information memory storage 120 (S502), and narrowing-down data is read from the customer information memory storage 120 (S504). The questionnaire purpose etc. are inputted when notifying a questionnaire candidate of the questionnaire purpose other than narrowing-down data, etc. (S506). Narrowing-down data etc. are transmitted to the transmission destination address of the E-mail which the questionnaire candidate's personal data read from the customer information memory storage 120 were decrypted based on customer ID and a password (S508), and was memorized by the

decrypted personal data. The transmitted E-mail is displayed in the consumer premises equipment equipment 300, and it is notified to a customer that the purposes of a questionnaire, etc. are having been chosen as the questionnaire candidate and narrowing-down data.

[0088][Questionnaire dispatch collecting operation] A questionnaire candidate's personal data are read from the customer information memory storage 120 after the notice processing of a questionnaire candidate (S602), and a customer's read personal data are decrypted based on customer ID and a password (S604). Questionnaire data is transmitted to the transmission destination address of the E-mail memorized by the decrypted personal data (S606). Thus, the questionnaire answer mail to questionnaire data is transmitted from the consumer premises equipment equipment 300 to the transmitted questionnaire data. Reception of questionnaire answer mail will read the customer information of customer ID applicable based on customer ID which received from the customer information memory storage 120 (S610). (it is YES at S608) A customer's read personal data are decrypted based on customer ID and a password (S612), and the data of the questionnaire answer mail collected to customer information is added (S614). Based on customer ID and a password, a customer's personal data are enciphered (S616) and the personal data and questionnaire answer data which were enciphered are written in the customer information memory storage 120 (S618).

[0089][Statistical information generation operation] After carrying out fixed time lapse from transmission of the sent questionnaire data, or after receiving a fixed quantity of questionnaire result mails, statistical information generation operation is performed based on option data.

[0090]The customer information answered to the questionnaire is read from the customer information memory storage 120 (S802), and a customer's personal data are decrypted based on customer ID and a password (S804). Based on a customer's personal data and questionnaire answer data which were decrypted, a statistical data is generated (S806) and the generated statistical data is written in the customer information memory storage 120 (S808).

[0091][Questionnaire result send action] After receiving a fixed quantity of questionnaire answer mails after fixed time lapse from transmission of questionnaire data, a questionnaire result send action is performed. Based on the option data of the request data of a questionnaire, the transmission destination of questionnaire result mail, When it is the corporation terminal equipment 400, the transmission destination address of company) and a questionnaire result is set as the transmission destination address included in the request data of a questionnaire in (S902 (S910). On the other hand, when the transmission destination of questionnaire result mail is the consumer premises equipment equipment 300, in (S902 Customer), The personal data of the customer who replied to the questionnaire are read from the customer information memory storage 120 (S904), The read personal data are decrypted with customer ID and a password (S906), and the transmission destination address of questionnaire result mail is set as the transmission destination address of the E-mail memorized by personal data (S908).

[0092]Based on the contents of the option data in the request data of a questionnaire, When send data is questionnaire result data, the customer information answered to the questionnaire is read from questionnaire) and the customer information memory storage 120 in (S920, and the data of questionnaire answer mail is set as send data (S922). On the other hand, when send data is a statistical data, a statistical data is read from statistical-data) and the customer information memory storage 120 in (S920, and it is set as send data.

[0093]After a transmission destination and send data are set up, predetermined data is transmitted to a predetermined transmission destination (S926). When there is a Request to Send of another transmission destination or another data (it is NO at S928), a transmission destination

and send data are set up again, and predetermined data is transmitted to a predetermined transmission destination.

[0094]The information providing device applied to this embodiment as mentioned above, In order to encipher and memorize the questionnaire answer data etc. in which individual data is contained via a network in the questionnaire etc. which are performed on-line, Information providers, such as a respondent etc. of the questionnaire performed on-line, can fully receive protection of privacy. The Reason which became a questionnaire candidate, questionnaire result data or a statistical data, etc. can be transmitted to information providers, such as a respondent to a questionnaire of a questionnaire. As a result, the recovery rate of a questionnaire improves because a questionnaire candidate gets the motivation of a questionnaire answer, the data volume of questionnaire result data increases, and the information providing device whose reliability of a statistical data also improves can be provided.

[0095]With all the points, an embodiment indicated this time is illustration and should be considered not to be restrictive. The range of this invention is shown by above-mentioned not explanation but Claims, and it is meant that Claims, an equal meaning, and all the change in within the limits are included.



## CLAIMS

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[Claim(s)]

[Claim 1] An information providing device which receives information containing personal data which can specify an individual from an information provider via a network, and provides said information according to an information-requirements person's demand, comprising:

An information storage means for being connected to said network, enciphering said personal data which receive said information from said information provider, and are contained in said received information, and memorizing information.

A request reception means for receiving data which requires arbitrary information which was connected to said network and memorized by said information storage means from said information-requirements person.

An information transmission means for transmitting information which was connected to said network, said information storage means, and said request reception means, was memorized by said information storage means, and was demanded by said information-requirements person to said information-requirements person.

[Claim 2] Said information providing device, including further an identification data creating means for generating identification data defined for said every information provider said information storage means. The information providing device according to claim 1 which enciphers said personal data which receive said information from an information provider and are contained in said received information based on said identification data, and contains a means for memorizing information containing said enciphered personal data.

[Claim 3] The information providing device comprising according to claim 1:

Said request reception means data for requiring information chosen based on a predetermined narrowing-down factor about said personal data. An information provider selecting means for said information transmission means to choose an information provider based on the aforementioned narrowing-down factor and said personal data including a means for receiving from said information-requirements person.

The 1st select data transmitting means for reading an information provider's information that said information provider selecting means was selected from said information storage means, and transmitting to said information-requirements person.

[Claim 4] Said information providing device is connected to said network, said information provider selecting means, and said information storage means, and an information provider's information that said information provider selecting means was selected is read from said information storage means. The information providing device according to claim 3 which includes further the 2nd select data transmitting means for transmitting to an information provider with said selected information provider selecting means.

[Claim 5] A statistical-data creating means for said information transmission means to carry out the statistical work of an information provider's information that said information provider

selecting means was selected. The information providing device according to claim 3 or 4 including the 1st statistical-data transmitting means for transmitting a statistical data generated by said statistical-data creating means to said information-requirements person.

[Claim 6] Said information providing device is connected to said network, said information provider selecting means, and said statistical-data creating means. The information providing device according to claim 5 which includes further the 2nd statistical-data transmitting means for transmitting a statistical data generated by said statistical-data creating means to an information provider with said selected information provider selecting means.

[Claim 7] Said information providing device a predetermined narrowing-down factor about said personal data, including an input means for said information provider to input further said 2nd select data transmitting means. The information providing device according to claim 4 which reads an information provider's information that said information provider selecting means was selected from said information storage means, and contains a means for transmitting to an information provider who inputted a narrowing-down factor into said input means.

[Claim 8] Said information providing device a predetermined narrowing-down factor about said personal data, including an input means for said information provider to input further said 2nd statistical-data transmitting means. The information providing device according to claim 6 containing a means for transmitting a statistical data generated by said statistical-data means to an information provider who inputted a narrowing-down factor into said input means.

[Claim 9] The information providing device according to any one of claims 3 to 6 which said information providing device is connected to said network and said information provider selecting means, and includes further a narrowing-down factor transmitting means for transmitting data in which the aforementioned narrowing-down factor is shown to an information provider with said selected information provider selecting means.

[Claim 10] Said information is questionnaire information.

The information providing device according to any one of claims 1 to 9 said whose information provider is a respondent to a questionnaire and in which said statistical information is the statistical information generated based on questionnaire information collected via said network.

# PATENT ABSTRACTS OF JAPAN

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(21)Application number : 02-335777

(71)Applicant : SEGA ENTERP LTD

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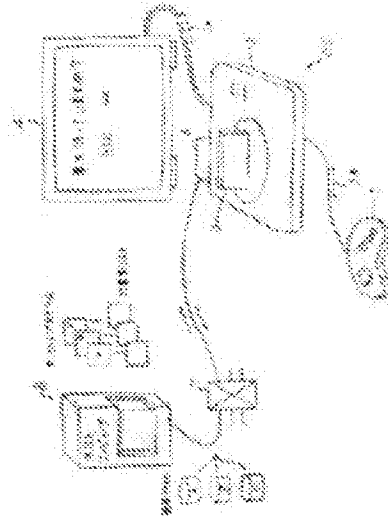
(72)Inventor : TAKAMI TOMIO

## (54) REAL TIME ON-LINE SURVEY SYSTEM

(57)Abstract:

PURPOSE: To answer to a questionnaire in real time by reading questionnaire software designated from plural questionnaire software stored in a host computer in a holding terminal system by using a telephone line, and answering to the questionnaire.

CONSTITUTION: The questionnaire software stored once in memory in a terminal main body 1 is further read in the terminal main body 1 via boot ROE 5, and is analyzed with an operation signal SB inputted to the terminal main body 1 via a control pad 3 by a user, and a monitor control signal is generated, and is sent out to a television monitor 4, thereby, the control of picture of the television monitor 4 is performed. The user reads audio visual information obtained from the television monitor 4 as the content of the questionnaire, and inputs a questionnaire input signal to the terminal main body 1 by operating the control pad 3, and an answer to the questionnaire is issued. In such a case, access to a host computer 8 is performed via a modem 6 and a telephone line network 7. In such a way, the questionnaire can be easily executed.





Espacenet

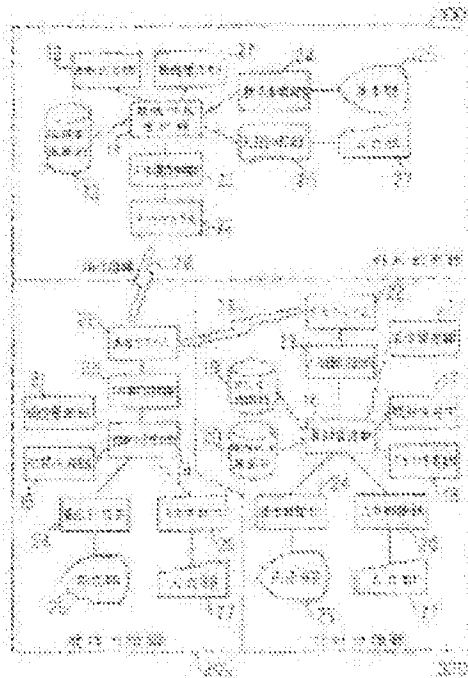
## Bibliographic data: JP 4288664 (A)

### METHOD AND DEVICE FOR PROCESSING ELECTRONIC QUESTIONNAIRE

**Publication date:** 1992-10-13  
**Inventor(s):** YAGI SACHIKO; MIYAZAKI KAZUYA +  
**Applicant(s):** MITSUBISHI ELECTRIC CORP +  
**Classification:** - **International:** G06Q50/00; (IPC1-7): G06F15/20  
- **European:**  
**Application number:** JP19910028589 19910222  
**Priority number(s):** JP19910028589 19910222

### Abstract of JP 4288664 (A)

**PURPOSE:** To economize paper and to reduce the labor of executors and totalizers of a questionnaire and persons who deliver the questionnaire and recover replies by obtaining a device capable of questionnaire processing on online in accordance with consistent attributes or ID. **CONSTITUTION:** A questionnaire generating part 12, a questionnaire reply generating part 15, a statistical processing part 17, a graph generating part 18, an attribute management part 21 which adds attributes or ID to the questionnaire and replies and analyzes them, and a means 23 which transmits and receives the questionnaire and replies are provided on a computer connected to a communication line.



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特開平4-288664

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(71) 出願人 000000013

三菱電機株式会社  
東京都千代田区丸の内二丁目2番3号

(72) 発明者 八木 色知子

鎌倉市大船五丁目1番1号 三菱電機株式  
会社情報電子研究所内

(72) 発明者 宮崎 一哉

鎌倉市大船五丁目1番1号 三菱電機株式  
会社情報電子研究所内

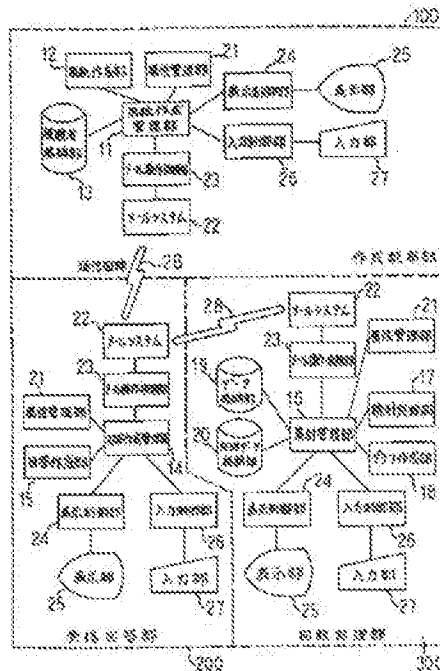
(74) 代理人 弁理士 高田 守 (外1名)

(54) 【発明の名称】 電子式アンケート処理装置及びその処理方法

(57) 【要約】

【目的】 一貫した属性やIDに従って、オンライン上でアンケート処理を行なえる装置を得、紙の節約とアンケートの実施者、集計者、アンケート用紙や回答の配布・回収に携わる人の労力を削減する。

【構成】 通信回線につながれたコンピュータ上に、アンケート用紙作成部12と、アンケートの回答作成部15と、統計処理部17と、グラフ作成部18と、アンケート用紙や回答に属性やIDを付加したり解析したりする属性管理部21と、アンケート用紙や回答の発信や受信をずらすための手段23を設ける。



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【特許請求の範囲】  
 【請求項1】 以下の(a)、(b)の要素のうち少なくとも、ひとつの要素を有する電子式アンケート処理装置

(a) 以下の要素を有する作成配布部、(a1) アンケート書式を作成する書式作成手段、(a2) 作成されたアンケート書式に所定の集計情報を付加し、回線を通じて配布する配布手段、(b) 以下の要素を有する回収処理部、(b1) 配布されたアンケート書式を回線を通じて回収する回収手段、(b2) 回収されたアンケート書式

【請求項2】 以下の工程を有する電子式アンケート処理方法

(a) アンケート書式を作成する書式作成工程、(b) 作成されたアンケート書式に所定の集計情報を付加し、回線を通じて配布する配布工程、(c) 配布されたアンケート書式を受信して回答を作成し、回線を通じて回答する回答工程、(d) 回答されたアンケート書式を受信する回収工程、(e) 回収されたアンケート書式

【発明の詳細な説明】

【0001】

【産業上の利用分野】 この発明は、オンライン上でアンケートを実施するための電子式アンケート処理装置及びその処理方法に関するものであり、特に、アンケート用紙や回答を送信する際に送信側が特別な集計情報として属性やIDを自動的に付加し、受信側でこれら集計情報としての属性やIDを解析することによって、一貫したアンケート処理を行なうことができる電子式アンケート

【0002】

【従来の技術】 図3は従来の方式でアンケートを実施した時のブロック図を示している。図において、1はワードプロセッサ、2はワードプロセッサに接続されたプリンタ、3は紙に印刷されたアンケート用紙である。4は郵政省が提供する郵送サービス、5は被験者が手作業で行なうアンケートへの回答作業を示している。6は紙に書かれた回答、7は、例えば局番03-70722号公報に示された従来のデータ読み取り装置、8は電子化されたデータの統計処理を行なうことのできる統計処理装置である。

【0003】 次に動作について説明する。ワードプロセッサ1を用いて作成されたアンケート用紙は、ワードプロセッサ1に接続されたプリンタ2によって紙に印刷される。印刷されたアンケート用紙は、郵送サービス4によって被験者に配布される。被験者は、そのアンケート用紙に鉛筆などの筆記用具を用いて回答し、回答結果は、郵送サービスによって回収される。回収された回答結果は、データ読み取り装置7を用いて電子化され、そ

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のデータは統計処理装置8によって集計され、必要に応じて、表にされたり、グラフ・図化される。

【0004】

【発明が解決しようとする課題】 従来のアンケートは以上のように実施されているので、アンケート用紙を紙に出力しなければならず、多量の紙が必要である。また、アンケートの配布や配送を郵便等で行なっているので人の手を介さなければならない。さらに、紙にかかれた回答をデータ読み取り装置で読まなければならない、集計者の労力を必要とするなどの問題点があった。

【0005】 この発明は上記のような問題点を解消するためになされたもので、一貫した統計情報に従って、オンライン上でアンケート処理を行なうことのできる電子式アンケート処理装置及びその処理方法を得ることを目的としている。

【0006】

【課題を解決するための手段】 第1の発明に係る電子式アンケート処理装置は、以下の(a)、(b)の要素のうち少なくともひとつの要素を有するものである。

(a) 以下の要素を有する作成配布部、(a1) アンケート書式を作成する書式作成手段、(a2) 作成されたアンケート書式に所定の集計情報を付加し、回線を通じて配布する配布手段、(b) 以下の要素を有する回収処理部、(b1) 配布されたアンケート書式を回線を通じて回収する回収手段、(b2) 回収されたアンケート書式

【0007】 また、第2の発明に係る電子式アンケート処理方法は以下の工程を有するものである。

(a) アンケート書式を作成する書式作成工程、(b) 作成されたアンケート書式に所定の集計情報を付加し、回線を通じて配布する配布工程、(c) 配布されたアンケート書式を受信して回答を作成し、回線を通じて回答する回答工程、(d) 回答されたアンケート書式を受信する回収工程、(e) 回収されたアンケート書式

【0008】

【作用】 この発明における電子式アンケート処理装置及びその処理方法は、アンケートの実施者はアンケート書式(アンケート用紙)を作成する書式作成手段(書式作成工程)を用いて電子情報としてアンケート用紙を作成する。そして、それを配布する配布手段(配布工程)を用いて、集計情報を付加し、電子情報のままアンケート用紙を配布することができる。また、被験者は、受信回答工程により、アンケート用紙を受信する際、電子情報としてアンケート用紙を受信し、回答を作成し、電子情報のまま回答を送信することができる。また、集計者は回答を回収する回収手段(回収工程)を用いて電子情報として回答を回収し、処理手段(処理工程)により、集計情報及びそのデータを直接参照して集計作業を行なう

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ことができる。特に、この発明にかかる電子式アンケート処理装置及びその処理方法は、アンケート用紙や回答を送信する際に送信側が特別な集計情報として属性やIDを自動的に付加し、受信側でこれら集計情報としての属性やIDを解析することによって、一貫したアンケート処理を行なうことができる。

【0009】

【実施例】実施例1。以下、この発明の一実施例を図について説明する。本実施例では、アンケート用紙や回答のコンピュータ間のデータ転送に電子メールシステムを利用するものとする。

【0010】図1において、100は作成配布部、200は受信回答部、300は回収処理部である。また、11は用紙作成管理部、12はアンケート用紙を作成するための用紙作成部、13は被験者のIDやメールアドレスを格納する被験者格納部である。14は回答作成管理部、15はアンケートに対する回答を作成するための回答作成部である。16は集計管理部、17は平均や偏差値などの統計処理を行なう統計処理部、18は表や図、グラフを作成するグラフ作成部、19は回収した回答結果を格納するデータ格納部、20は統計処理を施したデータを格納する処理データ格納部である。21はアンケート用紙や回答の配布や回収の際に、アンケート用紙や回答に属性やIDを付加したり、付けられた属性や回答を解析するための属性管理部である。22はメールの送信・受信等を行なうことのできる電子メールシステムであり、23は用紙作成管理部、メール操作管理部、集計管理部から電子メールシステム22の機能の一部を利用するためのメール操作依頼部である。24は表示制御部、25はCRTなどで実現される表示部であり、26は入力制御部、27はキーボードやマウスなどで実現される入力部である。28は電話回線などの、データ転送をすることのできる通信回線を示している。

【0011】次にこの実施例の動作について説明する。アンケートの作成者は、用紙作成管理部11を起動させ、用紙作成部12の機能を利用することにより、アンケート用紙を作成する。この作業は、入力部27から、入力制御部26を通してデータを入力し、その結果を表示制御部24から表示部25で表示しながら行なう（書式作成工程）。

【0012】作成されたアンケート用紙は、メール操作依頼部23からメールシステム22の機能の一部であるメールの発信機能を用いて、被験者格納部13に登録されているアドレスに、属性管理部21によって自動的に属性やIDが付加されて、電子メールとして配布される（配布工程）。ここで、属性の例として、電子メールのヘッダ部のサブジェクトとして「アンケート」という属性を用いることにする。また、IDの例として、各配布先ごとに異なる「番号」をIDとして用いることにする。たとえば100人へのアンケートなら1番～100

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番の番号が付けられる。

【0013】被験者は、メールとしてアンケート用紙が送られてくると、回答作成管理部14を起動させ、メール操作依頼部23からメールシステム22の機能の一部であるメールの受信機能を用いて、属性管理部21によりメールに付けられた属性とIDを解析して、アンケート用紙を読み込む。そして、表示制御部24を通して表示部25にアンケート用紙を表示させながら、入力部27から入力制御部26を通してデータを入力し、回答作成部15の機能を用いて、回答を作成する。作成された回答は、メール操作依頼部23からメールシステム22の機能の一部であるメールの発信機能によって、指定されたアドレスに、属性管理部21により自動的に受信したアンケート用紙と同じ属性やIDが付加されて、電子メールとして送信される（回答工程）。

【0014】集計者は、回答がメールとして送られてくると、集計管理部16を起動させ、メール操作依頼部23からメールシステム22の機能の一部であるメールの受信機能を用いて、属性管理部21によりメールに付けられた属性とIDを解析して、回答を読み込み、データ格納部19に格納する（回収工程）。この例では、属性が「アンケート」でIDが「番号」であるものをピックアップしてこれをアンケートの回答として、他の電子メールのデータと区別して格納することができる。

【0015】集計者はデータ格納部19に格納されたデータをもとに統計処理部17の機能を用いて平均や偏差値等の計算を行ない、この結果を処理データ格納部20に格納する。さらに、処理データ格納部20に格納されたデータを参照してグラフ作成部18によって表やグラフ、図にすることができる。これらの作業は、入力部25から入力制御部24を通して指示を与え、その結果は出力制御部26から出力部27を用いて表示される（処理工程）。たとえば、この例では、1～100番の番号をIDとして用いているが、このIDから未回答者のリストアップや回答率の計算等ができる。

【0016】以上のように、この実施例1では、通信回線に接続されたコンピュータに、アンケート用紙を作成する作成手段と、特別な属性とIDを付加して配布する配布手段あるいはアンケート用紙に付けられた属性とIDを解析してアンケート用紙を受信する受信手段と、アンケートに回答する手段と、回答にアンケートと同じ属性とIDを付加して発信する回答手段あるいは回答に付けられた属性とIDを解析して回答を回収する回収手段と、回答の集計を行なう処理手段を設けたものを説明した。

【0017】実施例2。なお、上記実施例では、アンケート用紙の作成・配布に係わる作成配布部100と、回収・集計に係わる回収処理部200とが異なるコンピュータ上で動作する場合を示したが、これらの機能は同一のコンピュータ上で動作しても良い。図2にこの場合の

ブロック図を示す。図2においては、作成配布部100と回収処理部300が、同一のコンピュータ上で動作する場合を示している。受信回答部200は、上記実施例とわなじである。

【0018】実施例3。また、上記実施例では、アンケート用紙や回答の発信や受信の際の属性やIDの管理を行なう機能を、アンケート用紙の作成手段23や回答の作成手段14や集計手段16において利用する場合を示したが、これらの機能は他の手段、たとえば、メール操作依頼部23等のアンケートの配布や回収の手段において利用しても良い。

【0019】実施例4。また、上記実施例では、属性を「アンケート」とし、IDを「番号」とする場合を示したが、これらは、アンケートを他の電子メールデータ等の他の情報から区別するとともに、集計用の識別情報として用いられるものであり、この点で識別情報、あるいは、集計情報と呼ばれるものが付加されればよい。この識別情報、あるいは、集計情報は、アンケートを実施する者がアンケートの内容と目的に応じて千差万別に指定できるものであり、そのサイズ、文字種、個数、組合せはあらかじめ自由に設定できるものである。たとえば、男女の回答差をみたいときは、男用と女用のIDをつけておけばよいし、歳次ごとの傾向をみたいときは、郵便番号をIDとしてもよい。あるいは年齢別傾向をみたいときは、年齢別IDを付せばよい。また、上記実施例では、属性を「アンケート」とし、IDを「番号」とする場合を示したが、属性とIDを両方備えている必要はない。どちらか一方を備えている場合でも良いし、また、ひとつの識別情報、あるいは、ひとつの集計情報が、属性とIDの両方の機能を備えている場合でも良い。

【0020】実施例5。また、アンケートの種別がいくつかある場合、たとえば属性=Aを住宅用アンケート、属性=Bを人事用アンケート等にしてもかまわない。

【0021】実施例6。また、属性とIDに分ける必要もなく集計情報があればよい。処理手段は、この集計情報により各種集計及び統計処理を行なうことになる。

【0022】実施例7。また、上記実施例では、受信回答部200が属性管理部21により受信したアンケート用紙と同じ属性やIDを付加する場合を示したが、受信

回答部200が受信したアンケート用紙の書式に回答を付加する場合は、そのまま、アンケート用紙を転送してもよい。

【0023】

【発明の効果】以上のように、この発明によれば、アンケート用紙や回答に付加された集計情報に従ったアンケート処理が、オンライン上で行なえるように構成したので、アンケートを実施するのに必要となっていた多量の紙を削減することができ、また、アンケートの実施者や集計者、配布や回収に携わる人の労力を省くことができる。

【図面の簡単な説明】

【図1】この発明の一実施例による電子式アンケート処理装置を示すブロック図である。

【図2】この発明の他の実施例による電子式アンケート処理装置を示すブロック図である。

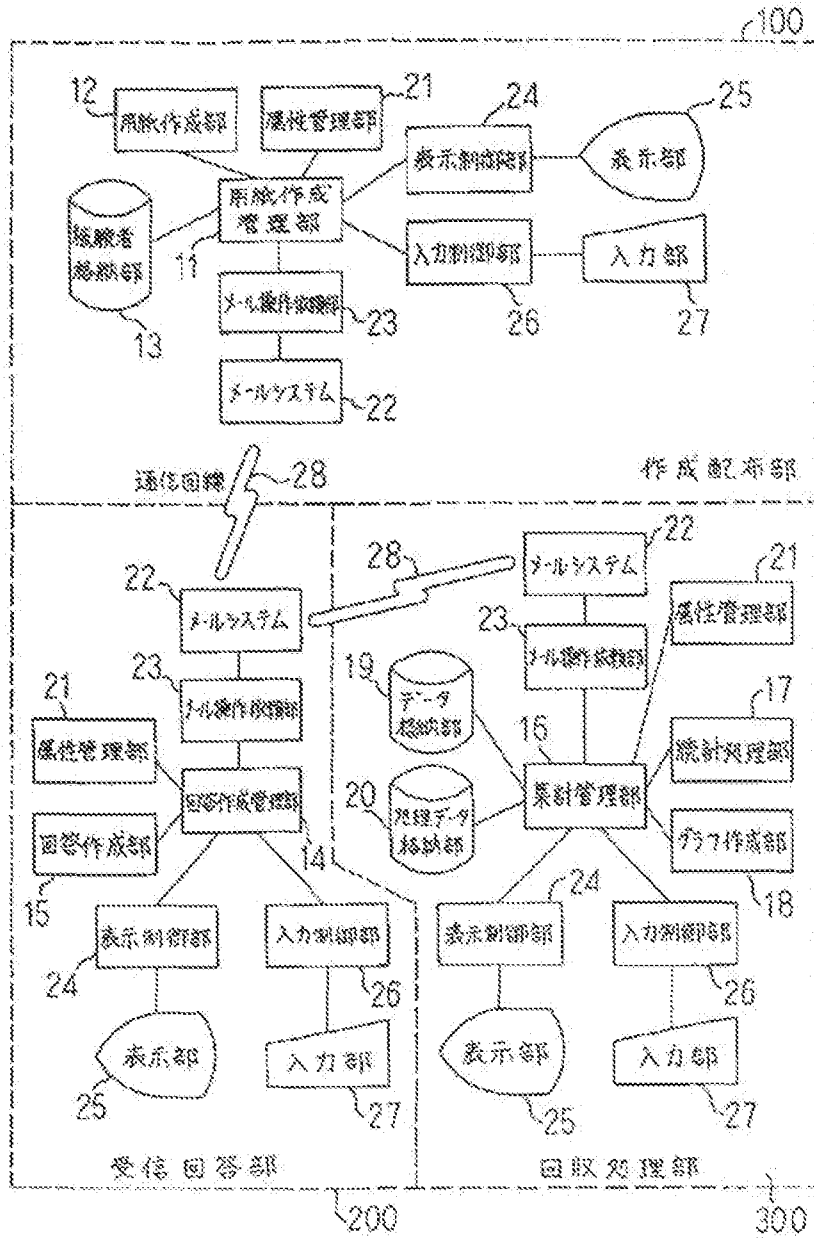
【図3】従来のアンケート方式を示す流れ図である。

【符号の説明】

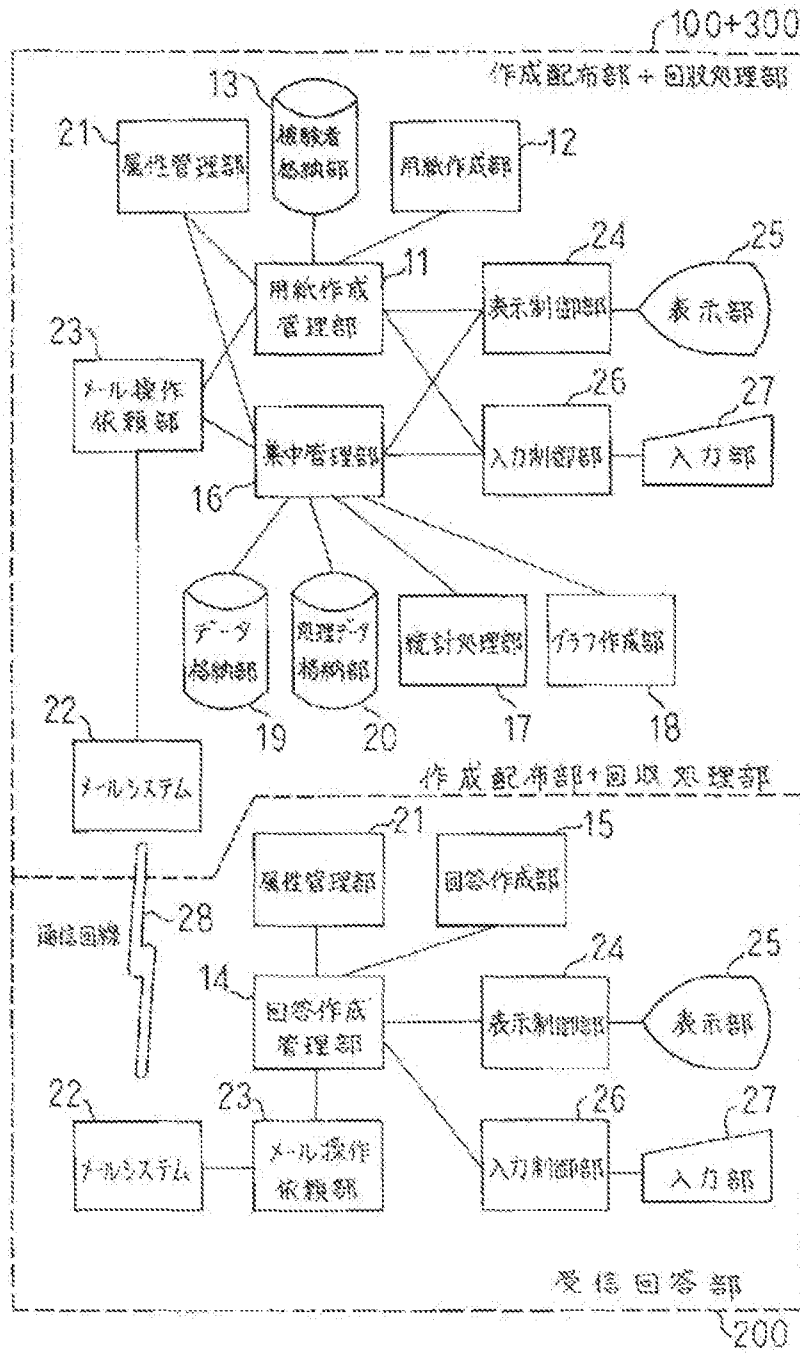
- 100 作成配布部
- 200 受信回答部
- 300 回収処理部
- 11 用紙作成管理部
- 12 用紙作成部
- 13 被験者格納部
- 14 回答作成管理部
- 15 回答作成部
- 16 集計管理部
- 17 統計処理部
- 18 グラフ作成部
- 19 データ格納部
- 20 処理データ格納部
- 21 属性管理部
- 22 メールシステム
- 23 メール操作依頼部
- 24 表示制御部
- 25 表示部
- 26 入力制御部
- 27 入力部
- 28 通信回線



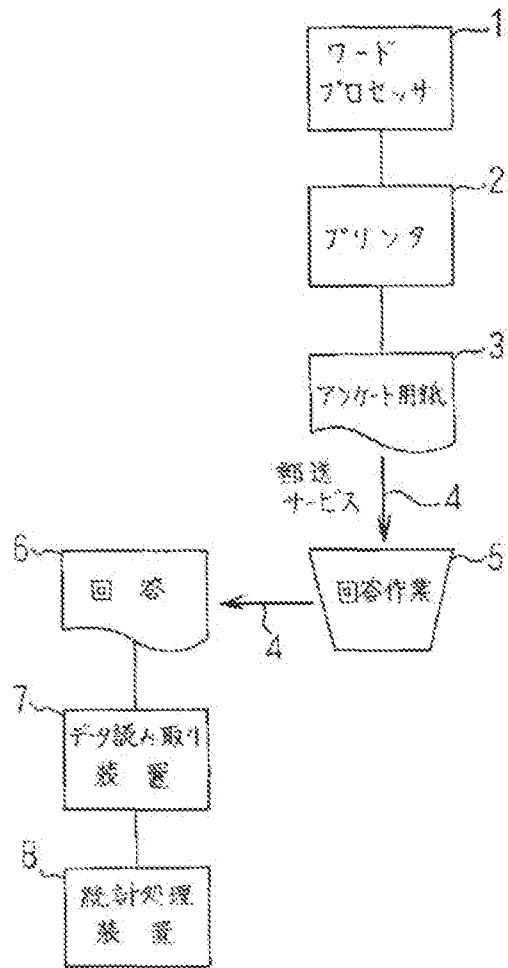
【図1】



【図2】



【図7】



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(71) Asian bencheonet Applicant

Yiminyoung

Replace 3-dong, Gangnam-gu, Seoul 946-18 won Bldg.

(72) Inventors Soo

Yeoksam-dong Gangnam-gu, Seoul Apartments 35 East 202, forsythia 712-328-5

(74) agents gimsujin

Yunuiseop

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(54) mobile wireless networks, surveys and marketing research methods used

## Abstract of KR 20020006393 (A)

**PURPOSE:** A questionnaire and market research method using a wireless mobile communication network is provided to precisely and efficiently obtain a survey research result at a lower cost in a short time by linking the Internet and a mobile network.  
**CONSTITUTION:** If an Internet user accesses a survey research server and trusts the server with survey research, the survey research server makes out a questionnaire(S100). The survey research server grasps the type of survey objects and downloads the mobile numbers and personal information of survey objects, based on the grasped type, from a mobile service provider(S110). The survey research server transmits the prepared questionnaire to each survey object's WAP terminal and executes survey research(S120). Then the survey research server provides a survey research result to the client(S130).

## Summary

The present invention relates to a method for the survey, particularly the Internet and mobile networks in conjunction with an accurate survey is less than the cost of one trillion Four to get the results immediately using a wireless mobile networks on how to survey and marketing research will

According to the present invention, the user receives from the survey, commissioned the first phase; who commissioned the survey determined the type of person according to the survey

Jeonghago, determined according to the survey questionnaires of those types of subjects, including the number of terminals to provide personal information, mobile communications business

Now the second step a request to the server; the carriers from the server based on the type of survey subjects handset number of those questionnaire

Enter the recipient that includes personally identifiable information third stage; the input terminal number of the person receiving the survey questionnaire to transfer the fourth stage

; And receives a response to a questionnaire survey on the statistical data are calculated after the calculated data provide the user

Including the fifth stage with a wireless mobile communication network is provided by surveys and marketing research methods.

A representative

FIG.

To claim

Surveys, internet, wapdanmal,

### **Specification**

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

1 is also in accordance with an embodiment of the present invention using a wireless mobile networks, and marketing survey research methods of indicating the status of the mangjeopsok

Aspect.

FIGS 2a 2g also used in the present invention is a drawing that represents the screen.

3 is also in accordance with an embodiment of the present invention using a wireless mobile communication network is a flow chart of survey and marketing research methods.

4a is a flow chart of Figure 3 is the process of creating the survey.

4b 3 is also the subject of the survey is a flow chart of the process of acquisition of the terminal number.

3 is also a survey of 4c is a flow chart of the process.

"Drawings of the sign on the main part of the description >

110a ~ 110n: User 120: Internet

130: Survey Server 131: Survey Database

140: earache carrier server 141: user database

150: wapseobeo 160a ~ 1600n: wapdanmal

#### **DETAILED DESCRIPTION OF THE INVENTION**

Field of the Invention

Technical Field The invention belongs to the prior art

The present invention relates to a method for the survey, particularly the Internet and mobile networks in conjunction with an accurate survey is less than the cost of one trillion Four to get the results immediately using a wireless mobile networks on how to survey and marketing research will

In general, conventional survey methods to extract the subject of an investigation by the random walk up the phone and call or investigators subjects

Any person with information to the survey questions in person, and of those responding to the survey results, based on information on how to clean up the four

Yonghanda.

In this way, the conventional survey Larger numbers of subjects and costly investigation, a number of subjects in the survey of one person one trillion

Because you can not defeat the lion Alf investigator to participate in general, and because of this, each investigator according to the characteristics of the five  
May cause the car.

In addition, if a professional survey firm, for each survey to extract the appropriate subject population, and according to the survey, the characteristics of subjects

In order to analyze the results, subject to personal questions about the nature of this premise is the hassle-free.

In these cases, subjects are usually asked questions we feel uncomfortable if you do not cooperate in the survey because most investigators

If you do not work properly due to the investigation were Meanwhile, the muscles, including the computer a few years the rapid development of information and communication technology, while the number of people who use the Internet explosion is less

Has been increased. Especially since 1993, the Web (Web) technology, as advertised, previously was the domain of professionals and advanced users of Deulegedo the public Internet, the spread was the instrument.

On the Internet, as well as WWW, e-mail, file transfer, remote access, because the rich features and capabilities, such as contemporary society,

Position as an important means of communication are becoming. Especially in the case of Web-based graphical user-friendly inter-

Pace with the number of its users by improving the communication speed is expanding explosively.

Presented by this new information and communication technology and data collection in social research the possibilities of how to give a new dimension is open.

Internet-based data collection as well as faster and cheaper data processing and analysis can be done quickly when the

The next statement is expected to significantly increase its leverage.

These technological advances as well as external factors of social research in the area inside the pressure for new ways to present

Came. In particular, the huge costs of research hwawa answer contact with the target of the investigation, the normal challenges of increased security limits

Shown. In these circumstances, one trillion postal or telephone surveys, instead of interviews have been spread rapidly.

In particular, computer-assisted telephone interview (CATI) or call random numbers (RDD) survey of the cost of the advertisement as containing significant savings

With a lot of possibilities have been proposed.

However, the telephone survey is impossible and the use of visual materials and investigations of the limited amount of research is still not overcome the limitations  
Is not.

These changes in the Internet-based social research shows the new possibilities, but the reality is still a large part of its hwadoe

Can not support.

## SUMMARY OF THE INVENTION

As mentioned above, the present invention to solve the same problem as anchuldoen gaeu, internet and mobile networks in conjunction with a smaller  
The exact cost of the survey results to be obtained in a short time, an effective survey and marketing research to provide the resources to  
Aims.

## DESCRIPTION OF THE INVENTION

To achieve these objectives, according to the invention, the user receives from the survey, commissioned the first phase; commissioned the survey received

Determine the type of person according to the survey, and determined according to the survey questionnaires of those types of subjects, including the person's handset number  
Carriers to provide personal information to the server to request a second stage; the carriers from the server on the type of survey subjects

Based survey that includes a number of those terminals to enter personal information to receive the third stage; surveys of those who enter the terminal time

Enclosed in a fourth step to transfer the survey; and receives a response to a questionnaire survey on the statistical data are calculated after the calculated

The data provided to the user, including a fifth step is characterized in that takes place.

Now, even less than 1 Referring to the drawings a preferred embodiment of the present invention will be described in detail.

1 is also in accordance with an embodiment of the present invention using a wireless mobile networks, and marketing survey research methods of indicating the status of the mangjeopsok  
Aspect.

Referring to the drawings, the present invention, according to an embodiment of the wireless mobile communication network using the network status of surveys and marketing research methods, the number of

Internet users (110a ~ 110n) Internet (120) through a survey server 130 is connected to.

And, the survey server (130) different types of surveys and statistical processing of survey data for the store

The survey database (131) are equipped with mobile communication users' personal information database hwahayeo

Save the user database (141) carriers that are equipped with a server (140) is connected to.

Meanwhile, the survey server 130, the wapseobeo (150) through the multiple wapdanmal (160a ~ 160n) can provide services to the swap.

In less than an embodiment of the invention according to the network using the survey method will be described in detail.

First of all, Internet user (110a ~ 110n) of the survey server 130 by connecting to, also as shown in FIG 2a transmits the login screen

Camera takes the ID and password and click the OK button you can log in by. Internet users do not subscribe to the members

(110a ~ 110n) after joining the membership should be logged.

And Internet users (110a ~ 110n) as illustrated in FIG 2b, creating the framework for the

questionnaire survey to transfer a web page

Select a category and fill out questionnaires after the subject by pressing the button, and then you can start writing the questionnaire information.

The survey provides information for creating web pages is an example of a 2c is in the city, and Internet users (110a ~ 110n) FIG.

Content of Web pages cached prompt questions (210), enter the information in the questions and check boxes, select the type of questions (211) the type of questions in Select the Next button (212) by pressing the selection screen also bogisu of 2d can be sent. Next, you can see bogisu Internet users in the selection screen (110a ~ 110n) if selected, also the same view and input screen 2e

Will provide Internet users (110a ~ 110n) to enter the view, as the survey also view and edit screens, such as 2f is provided.

View and edit survey seomuntteul Modify button on the screen (220), and add a button to survey questions (221), and the survey is provided. Internet Users

(110a ~ 110n) viewing screen for the survey can be found through the survey information.

Meanwhile, the survey server (130) Internet users (110a ~ 110n) commissioned the survey, the mobile operator server (140) butterfly

Belong to the survey required age, sex, occupation of the mobile users to transfer personal information is requested.

And, the survey server 130 of the carrier server 140, from the age, sex, occupation privacy of mobile users

After receiving the transfer, the transfer of mobile phone users received wapdanmal (160a ~ 160n) is transmitted to the survey, the survey includes the transfer

There was also an example of the screen are shown in 2g.

Afterwards, the survey server (130) is wapdanmal (160a ~ 160n) in response to a user survey to collect responses and sends back a response via

Internet users after the calculated mechanical data (110a ~ 110n) will provide.

3 is also in accordance with an embodiment of the present invention using a wireless mobile communication network is a flow chart of survey and marketing research methods.

First, if the Internet user survey, the survey commissioned by writing (step S100), surveys to identify the type of person, identified

According to the type of terminal numbers of subjects, including survey information, personal carriers are provided from (step S110).

Next, the written questionnaire survey of the person performing the survey and wapdanmalro transfer (step S120), the results of a survey to sponsors

Should provide (step S130).

4a is a flow chart of Figure 3 is the process of creating the survey.

First, login to access the Internet when the user (step S210), create a web page survey provides the framework necessary to create a survey frame

Writing to enter data to the survey frame (step S211).

Next, the written survey questionnaire in order to create a framework for entering survey information to create a web page to provide users of the Internet

Offers Internet users information from the survey is to complete questionnaires (Step S212).



Afterwards, the questionnaire and determine if modifications (step S213), to modify the questionnaire to the survey if you have to modify (step S214).

4b 3 is also the subject of the survey is a flow chart of the process of acquisition of the terminal number.

First, the survey by identifying the type of person (step S220), according to the survey identified the type of personal information, including the number of those terminals

Asks the carrier (Step S221). What type of survey where 20 subjects, age 30, including the type, M

Now, a woman's sex type, occupation type, and refers to many.

Next, the survey subjects, including the personal information of the terminal number of carriers are provided from (step S222).

3 is also a survey of 4c is a flow chart of the process.

First, a large number of questionnaires sent wapdanmal a (step S230), wapdanmal are sent from the user, so the answer to (but

Total S231). At that point, roughly 40 percent response rate is expected to be

Next, the received questionnaire responses hwahayeo database (step S232), the statistical analysis of the database (step S233), setting

Research commissioned by the door offers Internet users.

Than using the preferred embodiment of the invention described in detail, but the scope of the invention is limited to a particular embodiment ah

Nimyee, by the appended claims should be interpreted.

The effect of the invention

According to the present invention, in conjunction with internet and mobile networks is less than the cost of short-accurate survey results

The amount of time to get into effect.

#### (57), the claims

Claim 1.

Receiving a request from a user survey, the first step;

Who commissioned the survey to determine the type of person according to the survey, and determined according to the survey questionnaires of those types of devices subject

Provide personal information, including number of carriers to request a second stage;

The carrier according to the type of person from a survey questionnaire that includes a number of those devices ipryeakbat personal information

The third stage;

Enter the terminal number of the person receiving the survey questionnaire to transfer the fourth step; and

Receives a response to a questionnaire survey on the statistical data are calculated after the data was determined to provide the user

Step 5 consists of surveys and marketing research methods, including:

Claim 2.

The method of claim 1,

The first step,

Login to access the Internet users, the survey provides the framework to create a web page step 6;

The housing survey from Internet users enter the data required to create a framework to create a 7 step receiving survey;

Written survey questionnaire in order to create a framework for entering survey information to create a web page that provides Internet users step 8

; And

The Internet offers users information from the survey questionnaires, including the steps to create the ninth made the surveys and marketing research

Methods.

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1 or 2, wherein

The fifth stage,

In the fourth step of transmitting a response sent questionnaires received numerous  
wapdanmalrobuteo step 10;

The first step 10 questionnaire responses received from the database hwahaneun Step 11;  
and

The eleventh stage of the database by performing a statistical analysis to calculate the  
survey results, including the steps made by the 12th

Gene surveys and marketing research methods.

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(71) 출원인 마시멜벤처넷  
이필영  
서울 강남구 테헤란동 946-18 배원빌딩 5층

(72) 발명자 김경수  
서울특별시강남구역삼동712-328-5개나리아파트35동202호

(74) 대리인 임수전  
홍석철

심사형식 : 있음

(54) 무선 이동통신망을 이용한 설문 및 마케팅 조사 방법

요약

본 발명은 설문 조사 방법에 관한 것으로서, 특히 인터넷과 이동통신망을 연동하여 보다 작은 비용으로 정확한 설문 조사 결과를 즉시 얻을 수 있도록 하는 무선 이동통신망을 이용한 설문 및 마케팅 조사 방법에 관한 것이다.

본 발명에 따르면, 사용자로부터 설문 조사를 의뢰받는 제 1 단계; 의뢰받은 설문 조사에 따른 설문 대상자의 유형을 결정하고, 결정된 설문 대상자의 유형에 따른 설문 대상자의 단말기 번호를 포함한 개인 신상 정보 제공을 이동통신 사업자 서버에 요청하는 제 2 단계; 상기 이동통신 사업자 서버로부터 설문 대상자 유형에 따른 설문 대상자의 단말기 번호를 포함하는 개인 신상 정보를 입력받는 제 3 단계; 입력받은 설문 대상자의 단말기 번호로 설문문을 전송하는 제 4 단계; 및 설문에 대한 응답을 입력받아 설문에 대한 통계적 데이터를 산출한 후에, 산출된 데이터를 상기 사용자에게 제공하는 제 5 단계를 포함하여 이루어진 무선이동통신망을 이용한 설문 및 마케팅 조사 방법이 제공된다.

도표도  
도 3

색인어  
설문조사, 인터넷, 웹단말, WAP

발명서

도면의 간단한 설명

도 1은 본 발명의 일실시예에 따른 무선 이동통신망을 이용한 설문 및 마케팅 조사 방법의 발명속 상태를 나타내는 도면이다.

도 2a 내지 도 2g는 본 발명에 이용되는 화면을 나타내는 도면이다.

도 3은 본 발명의 일실시예에 따른 무선 이동통신망을 이용한 설문 및 마케팅 조사 방법의 흐름도이다.

도 4a는 도 3의 설문 작성 과정의 흐름도이다.

도 4b는 도 3의 설문 대상자의 단말 번호 획득 과정의 흐름도이다.

도 4c는 도 3의 설문 조사 과정의 흐름도이다.

< 도면의 주요 부분에 대한 부호의 설명 >

110a~110n : 사용자 120 : 인터넷

130 : 설문 조사 서버 131 : 설문 조사 데이터베이스

140 : 이동통신사업자 서버 141 : 사용자 데이터베이스

150 : 웹서버 160a~160n :용단말

발명의 상세한 설명

발명의 목적

발명이 속하는 기술 및 그 분야의 종래기술

본 발명은 설문 조사 방법에 관한 것으로서, 특히 인터넷과 이동통신망을 연동하여 보다 작은 비용으로 정확한 설문 조사 결과를 즉시 얻을 수 있도록 하는 무선 이동통신망을 이용한 설문 및 마케팅 조사 방법에 관한 것이다.

일반적으로 종래의 설문 조사 방법은 조사자가 임의의 대상자를 추출하여 전화를 걸어서 대상자와 통화하거나 조사자가 임의의 대상자를 직접 만나서 설문 내용을 질문하고, 대상자의 응답 내용을 토대로 설문 결과를 정리하는 방법을 사용한다.

종래의 이러한 방법에서는 설문 대상자의 수가 많아질수록 조사 비용이 많이 들고, 다수의 설문 대상자를 한 사람의 조사자가 상대할 수 없기 때문에 일반적으로 여러명의 조사자가 참여하게 되고, 이로 인하여 각 조사자의 특성에 따른 오차가 발생할 수 있다.

또한, 전문 설문 조사 기관인 경우, 매 설문 조사마다 적절한 대상자 집단을 추출하고, 대상자의 특성에 따른 설문 조사 결과를 분석하기 위하여, 대상자 개인의 특성에 관한 설문 사항이 전체되는 번거로움이 있다.

이러한 경우, 대체로 설문을 받는 대상자들이 불쾌함을 느껴서 설문 조사에 협조하지 않는 경우가 대부분이므로 조사자에 의한 조사가 제대로 이루어지지 않는 경우가 많았다.

한편, 근 몇년 동안 컴퓨터를 비롯한 정보통신기술이 급격하게 발달하면서 인터넷을 이용하는 사람들의 수가 폭발적으로 증가되어 왔다. 특히 1993년 이후 웹(Web) 기술이 보급되면서, 이전에는 전문가나 고급 사용자들의 영역이었던 인터넷이 일반인들에게도 확산되는 계기가 되었다.

인터넷에서는 WWW뿐만 아니라, 전자우편, 화상회의, 원격접속 등과 같은 다양한 기능이 제공되기 때문에, 현대 사회에서 중요한 커뮤니케이션 수단으로 자리를 잡아가고 있다. 특히 Web의 경우에는 그래픽에 기반한 편리한 사용자 인터페이스와 더불어 통신 속도의 향상으로 그 이용자 수가 폭발적으로 확대되고 있다.

이러한 새로운 정보통신기술이 제시하고 있는 가능성은 사회조사에서 자료 수집 방법에 새로운 자원을 열어주고 있다. 인터넷을 이용한 자료수집은 신속하고 비용이 적게 들 뿐만 아니라 자료 처리와 분석도 신속하게 이루어질 수 있기 때문에 앞으로 그 활용이 크게 늘어날 것으로 기대된다.

이러한 기술적인 발전이라는 외부적인 요인과 더불어, 사회조사 영역 내부에서도 새로운 방법에 대한 알력이 존재하여 왔다. 특히 조사에 소요되는 비용의 기대화와 응답 대상자의 접촉의 어려움 등은 일반적인 조사의 증가되는 한계를 보여준다. 이러한 상황에서 우편조사나 면접조사 대신에 전화조사가 급속하게 보급되어 왔다.

특히 컴퓨터를 이용한 전화면접(CATI)이나 무작위 면호호출(RDD)이 보급되면서 조사비용의 상당한 절감효과를 포함한 많은 가능성을 제시하여 왔다.

그러나, 전화 조사는 시각적인 자료의 활용이 불가능하고 조사분량이나 조사내용의 제한이라는 한계는 여전히 극복되지 못하고 있다.

이러한 면화 속에서 인터넷을 이용한 사회조사는 새로운 가능성을 보여주고 있으나, 그 중 많은 부분이 아직 현실화되지 못하고 있다.

#### 발명의 이루고자 하는 기술적 과제

본 발명은 상기한 바와 같은 문제점을 해결하기 위하여 안출된 것으로서, 인터넷망과 이동통신망을 연동하여 보다 작은 비용으로 정확한 설문 조사 결과를 짧은 시간안에 얻을 수 있는 효율적인 설문 및 마케팅 조사 방법을 제공하는 것을 그 목적으로 한다.

#### 발명의 구성 및 작용

이러한 목적을 달성하기 위하여 본 발명에 따르면, 사용자로부터 설문 조사를 의뢰받는 제 1 단계; 의뢰받은 설문 조사에 따른 설문 대상자의 유형을 결정하고, 결정된 설문 대상자의 유형에 따른 설문 대상자의 단말기 번호를 포함한 개인 신상 정보 제공을 이동통신 사업자 서버에 요청하는 제 2 단계; 상기 이동통신 사업자 서버로부터 설문 대상자 유형에 따른 설문 대상자의 단말기 번호를 포함하는 개인 신상 정보를 입력받는 제 3 단계; 입력받은 설문 대상자의 단말기 번호로 설문을 전송하는 제 4 단계; 및 질문에 대한 응답을 입력받아 질문에 대한 통계적 데이터를 산출한 후에, 산출된 데이터를 상기 사용자에게 제공하는 제 5 단계를 포함하여 이루어지는 것을 특징으로 한다.

이제, 도 1 이하의 도면을 참조하여 본 발명의 바람직한 일실시예를 상세히 설명하면 다음과 같다.

도 1은 본 발명의 일실시예에 따른 무선 이동통신망을 이용한 설문 및 마케팅 조사 방법의 발질속 상태를 나타내는 도면이다.

도면을 참조하면, 본 발명의 일실시예에 따른 무선 이동통신망을 이용한 설문 및 마케팅 조사 방법의 발질속 상태는, 다수의 인터넷 사용자(110a~110n)가 인터넷(120)을 통하여 설문 조사 서버(130)에 접속되어 있다.

그리고, 설문 조사 서버(130)는 설문 조사의 여러 가지 유형이나 설문 조사 결과의 통계적 처리를 위한 데이터를 저장하고 있는 설문 조사 데이터베이스(131)를 구비하고 있으며, 이동통신 사용자의 개인 신상 정보를 데이터베이스화하여 저장하고 있는 사용자 데이터베이스(141)를 구비하고 있는 이동통신 사업자 서버(140)에 접속되어 있다.

한편, 설문 조사 서버(130)는 웹서버(150)를 통하여 다수의 웹단말(160a~160n)로 웹 서비스를 제공할 수 있다.

이하에서는 본 발명의 일실시예에 따른 통신망을 이용한 설문 조사 방법을 상세히 설명한다.

먼저, 인터넷 사용자(110a~110n)는 설문 조사 서버(130)에 접속하여, 도 2a에 도시된 바와 같은 로그인 화면을 전송받아 ID와 비밀번호를 기재하고 확인 버튼을 클릭함으로써 로그인할 수 있다. 이때 회원에 가입하지 않은 인터넷 사용자(110a~110n)는 회원에 가입한 후에 로그인하여야 한다.

그리고, 인터넷 사용자(110a~110n)는 도 2b에 도시된 바와 같은 설문지를 작성을 위한 웹페이지를 전송받아 설문 문항을 선택하고, 설문 주제를 기입한 후에 다음 버튼을 누름으로써 설문지 내용 작성을 시작할 수 있다.

설문지 내용 작성을 위하여 제공되는 웹페이지의 일예가 도 2c에 도시되어 있으며, 인터넷 사용자(110a~110n)는 도시된 웹페이지의 문항 내용 입력창(210)에 문항 내용을 입력하고, 문항 유형 선택 체크 박스(211)에서 문항 유형을 선택한 다음 다음 버튼(212)을 누름으로써 도 2d의 보기수 선택 화면을 전송받을 수 있다.

다음으로, 보기수 선택 화면에서 보기수를 인터넷 사용자(110a~110n)가 선택하면, 도 2e와 같은 보기 입력 화면이 제공되며, 인터넷 사용자(110a~110n)가 보기를 입력함에 따라 도 2f와 같은 설문 보기 및 수정 화면이 제공된다.

설문 보기 및 수정 화면에는 설문물 수정 버튼(220)과, 설문 문항 추가 버튼(221)과, 설문이 제공된다. 인터넷 사용자(110a~110n)은 설문 내용 보기 화면을 통하여 설문 내용을 확인할 수 있다.

한편, 설문 조사 서버(130)는 인터넷 사용자(110a~110n)가 설문 조사를 의뢰하면, 이동통신 사업자 서버(140)에 접속하여 설문 조사에 필요한 연명별, 성별, 직업별 이동통신 사용자의 개인 정보 전송을 요청한다.

그리고, 설문 조사 서버(130)는 이동통신 사업자 서버(140)로부터 연명별, 성별, 직업별 이동통신 사용자의 개인 정보를 전송받은 후에, 전송받은 이동통신 사용자의 웹단말(160a~160n)로 설문을 전송하며, 이때 전송되는 설문은 도 3에 도시된 화면의 일예가 도 2g에 도시되어 있다.

이후에, 설문 조사 서버(130)는 웹단말(160a~160n)의 사용자가 질문에 응하여 응답을 보내오면 응답을 취합하여 통계적 데이터를 전송한 후에 인터넷 사용자(110a~110n)에게 제공한다.

도 3은 본 발명의 일실시예에 따른 무선 이동통신망을 이용한 설문 및 마케팅 조사 방법의 흐름도이다.

먼저, 인터넷 사용자가 설문 조사를 의뢰하면 설문물 작성하여(단계 S100), 설문 대상자의 유형을 파악하고, 파악된 유형에 따른 설문 대상자의 단말 번호를 포함한 개인 신상 정보를 이동통신사업자로부터 제공받는다(단계 S110).

다음에, 작성된 설문을 설문 대상자의 웹단말로 전송하여 설문 조사를 수행하며(단계 S120), 조사 결과를 의뢰자에게 제공한다(단계 S130).

도 4a는 도 3의 설문 작성 과정의 흐름도이다.

먼저, 인터넷 사용자가 접속하여 로그인하면(단계 S210), 설문물 작성 웹페이지를 제공하여 설문물 작성에 필요한 데이터를 입력하도록 하여 설문물을 작성한다(단계 S211).

다음에, 작성된 설문물에 들어갈 설문 내용 작성을 위하여 설문 내용 작성 웹페이지를 인터넷 사용자에게 제공하여 인터넷 사용자로부터 설문 내용을 제공받아 설문을 작성하도록 한다(단계 S212).

이후에, 설문 수정이 있는지를 판단하여(단계 S213), 설문 수정이 있으면 설문을 수정하도록 한다(단계 S214).

도 4b는 도 3의 설문 대상자의 단말 번호 획득 과정의 흐름도이다.

먼저, 설문 대상자의 유형을 파악하여(단계 S220), 파악된 유형에 따른 설문 대상자의 단말 번호를 포함한 개인 정보를 이동통신 사업자에게 요청한다(단계 S221). 여기에서 설문 대상자의 유형이란 20대, 30대 등의 연령별 유형과, 남자, 여자의 성별 유형, 직업별 유형 등 여러가지를 말한다.

다음에, 설문 대상자의 단말 번호를 포함한 개인 정보를 이동통신사업자로부터 제공 받는다(단계 S222).

도 4c는 도 3의 설문 조사 과정의 흐름도이다.

먼저, 설문을 다수의 응답할 사용자에게 전송하여(단계 S230), 응답할 사용자로부터 그에 대한 응답을 전송받는다(단계 S231). 이때 그 응답율은 대략 40% 가량 될 것으로 예상된다.

다음에, 전송받은 설문 응답을 데이터베이스화하여(단계 S232), 데이터베이스의 통계적 분석을 하여(단계 S233), 설문 조사를 의뢰한 인터넷 사용자에게 제공한다.

이상 본 발명을 바람직한 실시예를 사용하여 상세히 설명하였지만, 본 발명의 범위는 특정 실시예에 한정되는 것은 아니며, 첨부된 특허청구범위에 의하여 해석되어야 할 것이다.

#### 발명의 효과

상기와 같은 본 발명에 따르면, 인터넷망과 이동통신망을 연동하여 보다 작은 비용으로 정확한 설문 조사 결과를 짧은 시간안에 얻을 수 있도록 하는 효과가 있다.

#### (57) 청구의 범위

##### 청구항 1.

사용자로부터 설문 조사를 의뢰받는 제 1 단계;

의뢰받은 설문 조사에 따른 설문 대상자의 유형을 결정하고, 결정된 설문 대상자의 유형에 따른 설문 대상자의 단말기 번호를 포함한 개인 신상 정보 제공을 이동통신 사업자에게 요청하는 제 2 단계;

상기 이동통신 사업자로부터 설문 대상자 유형에 따른 설문 대상자의 단말기 번호를 포함하는 개인 신상 정보를 입력받는 제 3 단계;

입력받은 설문 대상자의 단말기 번호로 설문을 전송하는 제 4 단계; 및

설문에 대한 응답을 입력받아 질문에 대한 통계적 데이터를 산출한 후에, 산출된 데이터를 상기 사용자에게 제공하는 제 5 단계를 포함하여 이루어진 설문 및 마케팅 조사 방법.

##### 청구항 2.

제 1 항에 있어서,

상기 제 1 단계는,

인터넷 사용자가 접속하여 로그인하면, 설문을 작성 웹페이지를 제공하는 제 6 단계;

상기 인터넷 사용자로부터 설문 틀 작성에 필요한 데이터를 입력받아 설문 틀을 작성하는 제 7 단계;

작성된 설문 틀에 들어갈 설문 내용 작성을 위하여 설문 내용 작성 웹페이지를 인터넷 사용자에게 제공하는 제 8 단계;  
및

상기 인터넷 사용자로부터 설문 내용을 제공받아 설문을 작성하는 제 9 단계를 포함하여 이루어진 설문 및 마케팅 조사 방법.

청구항 3.

제 1 항 또는 제 2 항에 있어서,

상기 제 5 단계는,

상기 제 4 단계에서 전송한 다수의 응답으로부터 설문 응답을 전송받는 제 10 단계;

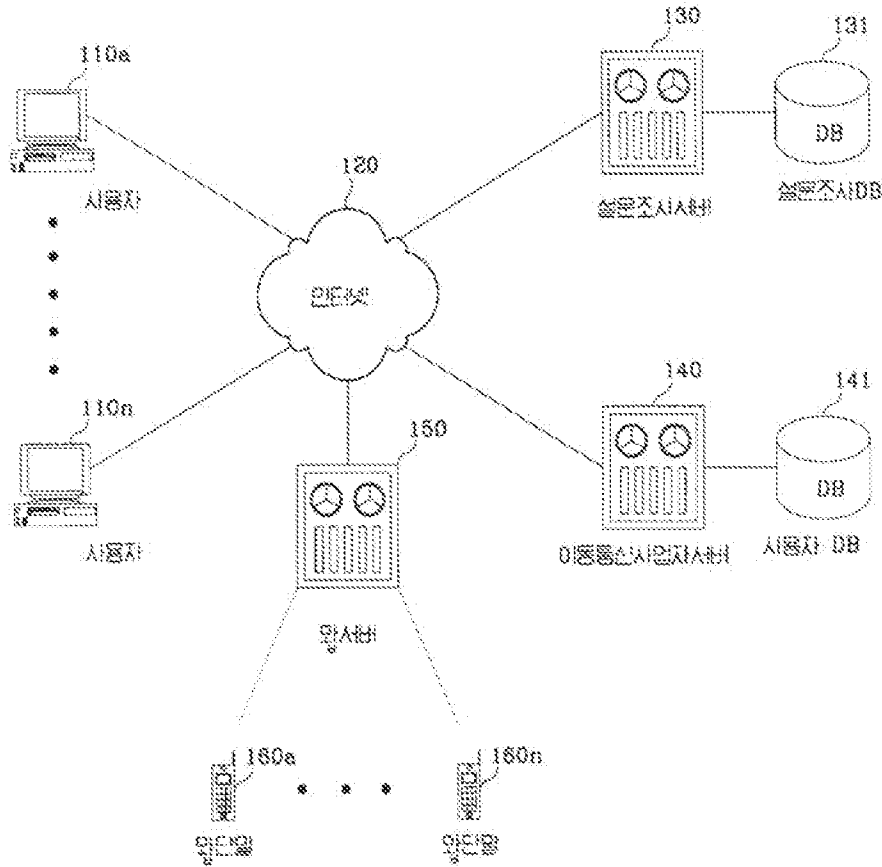
상기 제 10 단계에서 전송받은 설문 응답을 데이터베이스화하는 제 11 단계; 및

상기 제 11 단계의 데이터베이스의 통계적 분석을 수행하여 설문 조사 결과를 산출하는 제 12 단계를 포함하여 이루어진 설문 및 마케팅 조사 방법.



도면

도면 1



도면 2a

회원 ID	<input type="text"/>	
비밀번호	<input type="text"/>	
<input type="button" value="확인"/>	<input type="button" value="지움"/>	<input type="button" value="회원가입"/>

도면 2b

설문지 틀 작성을 위한 기본구성을 입력하세요

설문분류	<input type="text" value="스포츠/오락"/>	<input type="button" value="▼"/>
설문주제	<input type="text" value="인기여감"/>	

도면 2c

설문지 내용 작성을 시작합니다

설문분류      스포츠/오락

설문주제      인기여감

문항내용      이정현의 "너"는 뜰 것인가?  
210

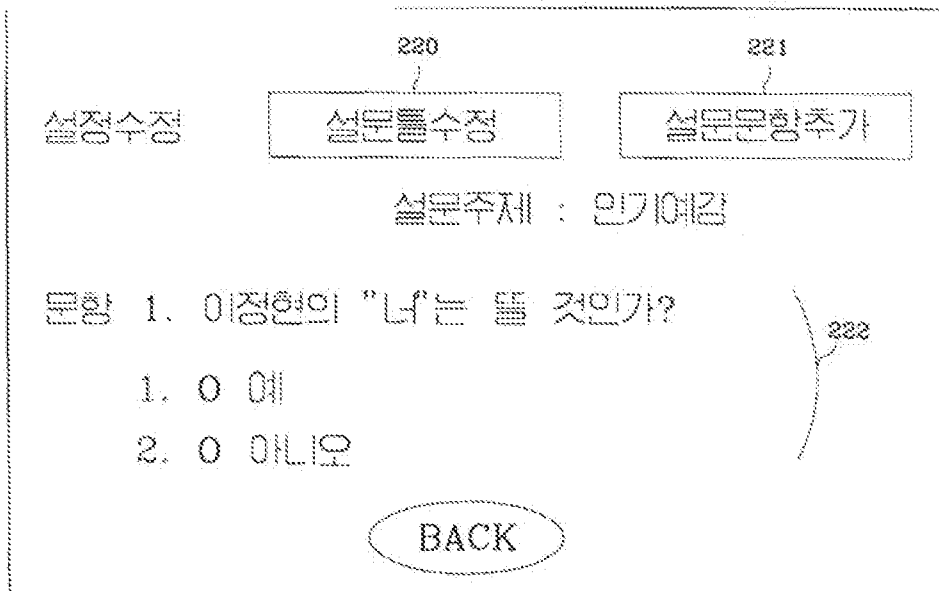
문항유형     객관식 /  객+주관식 /  주관식  
211

다음  
212

도면 24



도면 25



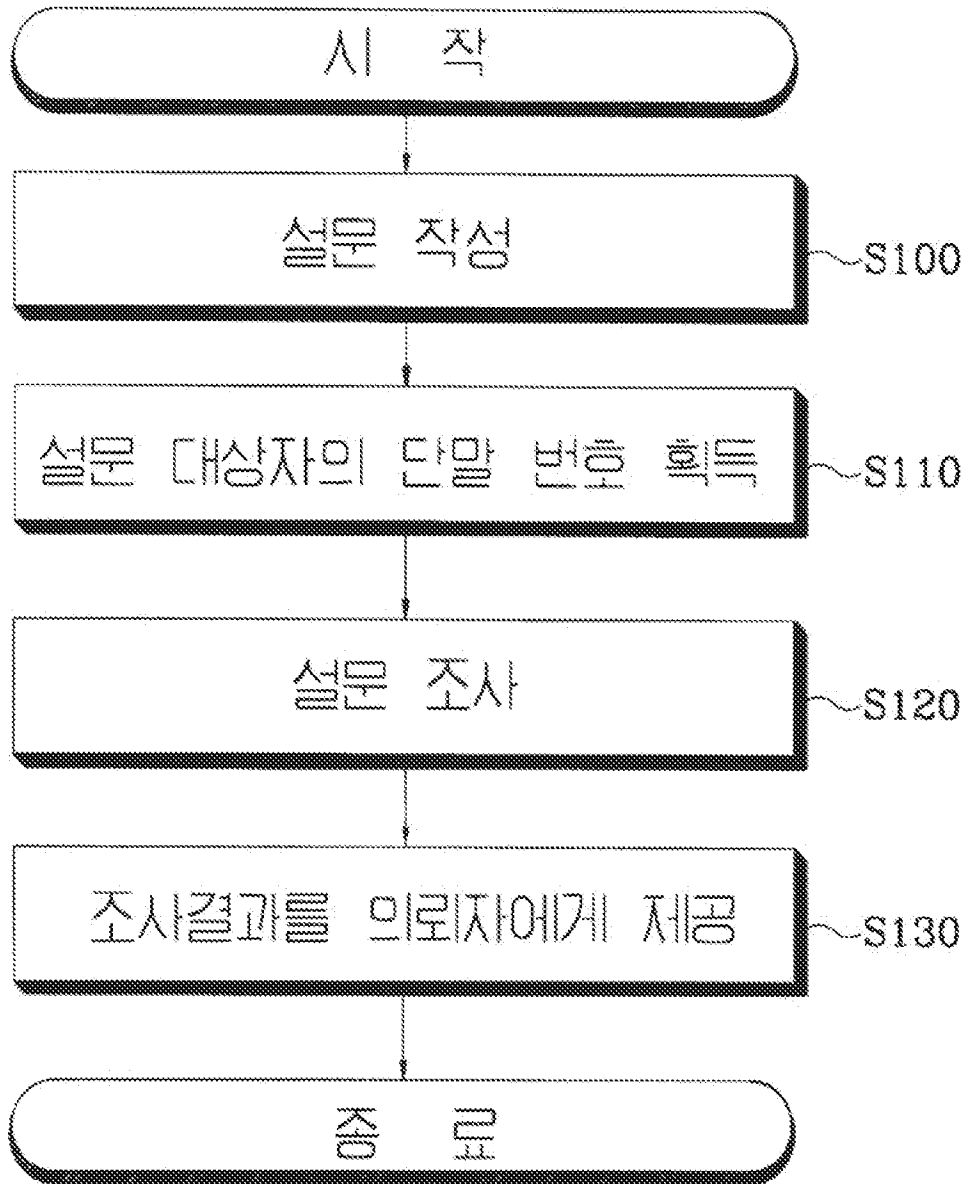
도면 2g

문항 1. 이정현의 "너"는 틀 것인가?

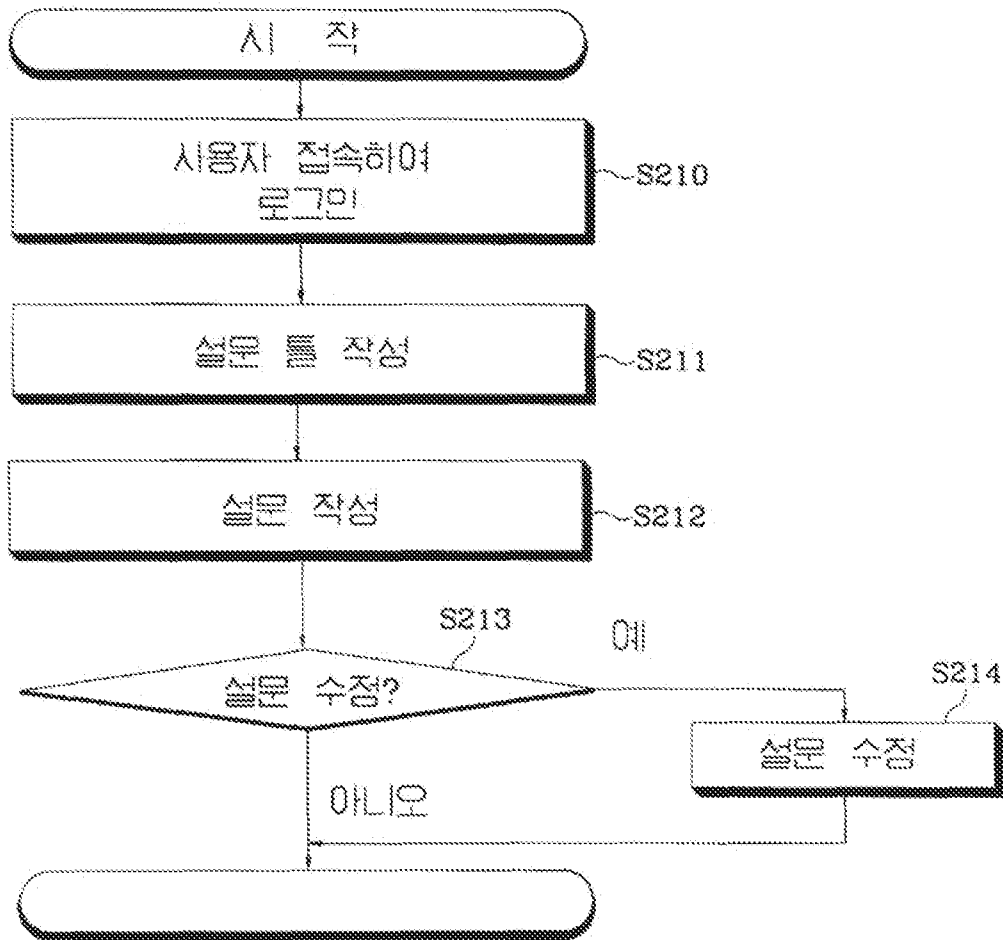
1. 0 예
2. 0 아니오

전송

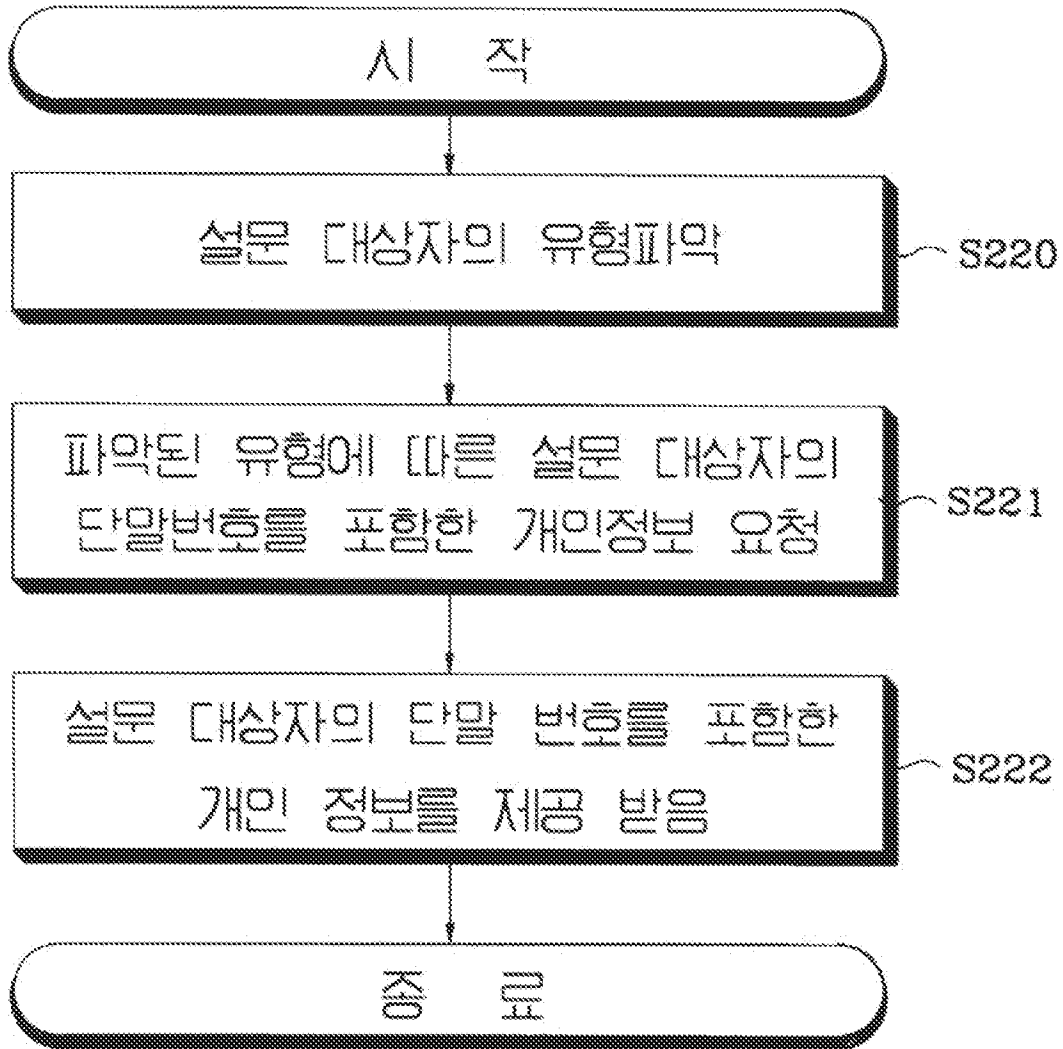
도면 2



도면 4a

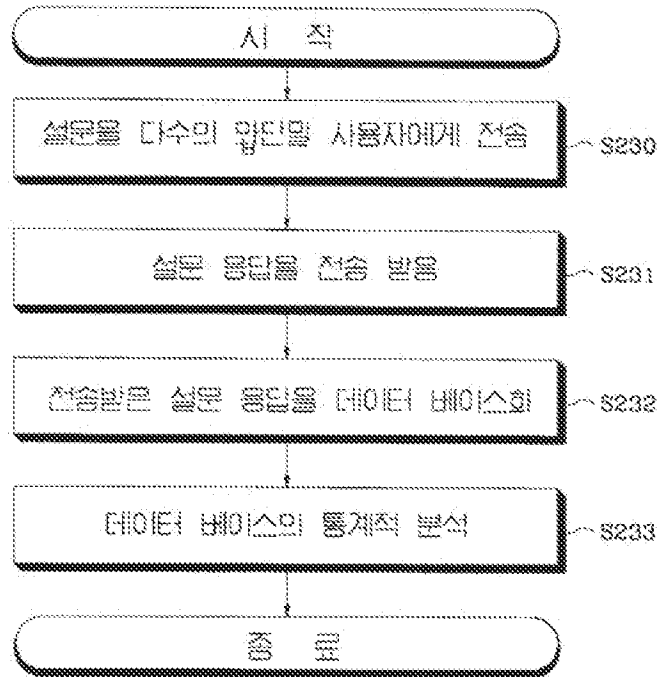


도면 4b





도면 4c





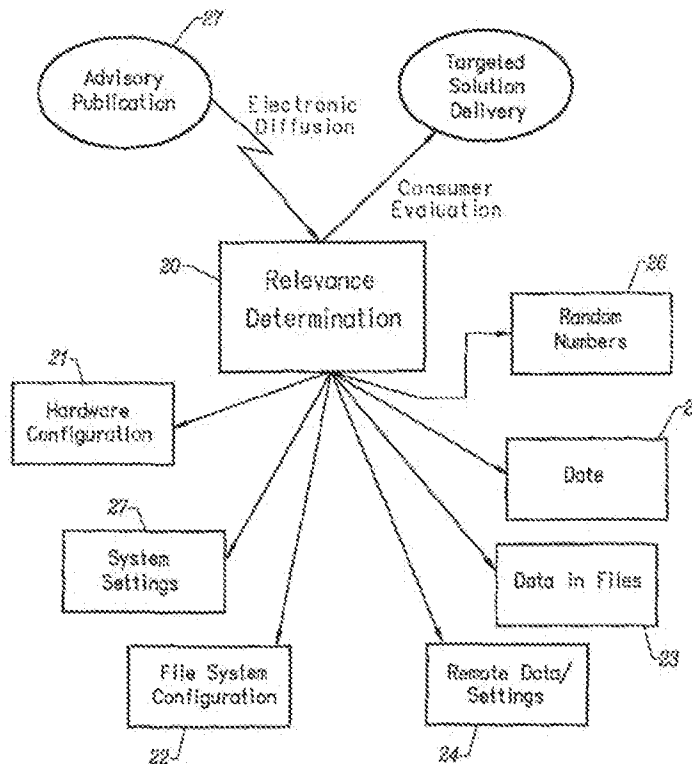
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(71) Applicant: UNIVERSE COMMUNICATIONS, INC. [US/US]; 2180 Dwight Way, Suite C, Berkeley, CA 94704 (US).		<p><b>Published</b></p> <p><i>With international search report.</i></p> <p><i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>	
(72) Inventors: DONOHO, David, Leigh; 2830 Buena Vista Way, Berkeley, CA 94708 (US); HINDAWI, David, Salim; 179 Forest Lane, Berkeley, CA 94708 (US); LIPPINCOTT, Liza, Ellen; 2117 Haste Street #310, Berkeley, CA 94704 (US).			
(74) Agents: GLENN, Michael, A. et al.; Glenn Patent Group, 125 Lake Road, Portola Valley, CA 94028 (US).			

(54) Title: METHOD AND APPARATUS FOR COMPUTED RELEVANCE MESSAGING

(57) Abstract

The invention disclosed herein enables a collection of computers and associated communications infrastructure to offer a new communications process which allows information providers to broadcast information to a population of information consumers. The information may be targeted to those consumers who have a precisely formulated need for the information. This targeting may be based on information which is inaccessible to other communications protocols. The targeting also includes a time element. Information can be brought to the attention of the consumer precisely when it has become applicable, which may occur immediately upon receipt of the message, but may also occur long after the message arrives. The communications process may operate without intruding on consumers who do not exhibit the precisely-specified need for the information, and it may operate without compromising the security or privacy of the consumers who participate.



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## METHOD AND APPARATUS FOR COMPUTED RELEVANCE MESSAGING

### 5                    BACKGROUND OF THE INVENTION

#### TECHNICAL FIELD

10            The invention relates to a new process of communication using computers and associated communications infrastructure. More particularly, the invention relates to a method and apparatus for computed relevance messaging.

#### DESCRIPTION OF THE PRIOR ART

15            The aim of a communications process is to relay information between pairs of actors who, for purposes of the discussion herein, consist of an information provider and an information consumer. The following briefly discusses the concerns of each party.

#### 20            Concerns of information provider

25            The information provider knows of pieces of information and of corresponding situations in which certain consumers would find those pieces of information interesting, useful, or valuable. For example, such pieces of information may concern problems consumers who have particular attributes might be interested in solving or that concern opportunities of interest to consumers having such particular attributes. The provider wishes to distribute the information to those consumers in those specific situations.

In principle, an information provider might know of thousands or millions of conditions about which it can offer information. The audience for such conditions might involve thousands or millions of consumers.

- 5 A particularly interesting situation is where a typical piece of information should be directed only to consumers having a very special combination of circumstances. A typical piece of information would in principle be of interest to only a small fraction of the consumer base, but where this small fraction nevertheless amounts to large number of consumers.

10

- A challenging but very important case occurs when verifying when the conditions for applicability of a certain piece of information requires knowing a great deal of detailed information about the consumer, his concerns and affiliations, or his property. This information might be considered very sensitive by consumers, who  
15 would not want to participate in a process that required disclosure of the information to the provider. Therefore, it might seem impossible to target the information to consumers because only the consumers have access to the information required to make the determination that the information applies to them, and they are unwilling to expend the effort to make a determination  
20 themselves, or to give others access to the sensitive information required to make the determination on their behalf.

#### Concerns of information consumer

- 25 The consumer is an individual or organization that knows of information providers who have information of potential benefit to them. The consumer may in fact know of tens or hundreds of such providers. Typically, at any given moment, only a small fraction of the information being offered by the information provider is of potential interest to the consumer. The consumer does not want to review all

the information available from the information provider. He would prefer to see the subset consisting of information, which is relevant to the consumer.

Typically, the information which the provider is offering changes with time and the  
5 conditions experienced by the consumer are changing with time. The consumer would prefer not to have to track changes continually in his own status and the status of the information provider's offerings. He would also prefer not to have to remember that pieces of information published some time before could have suddenly become applicable.

10

The consumer would prefer that a procedure be available for automatically detecting the existence of applicable information as it became applicable, either because the consumer's situation had changed, because the information provider's offerings had changed, or because the conditions for applicability of  
15 the information involved time considerations which had become applicable. The consumer would prefer not to reveal to the provider information about his identity or the details of his interests, preferences, and possessions. Rather, the consumer would prefer to receive information in a form where he may carefully study it before using it.

20

The consumer would also prefer to have a method to inform himself about known problems with an information provider or with a certain piece of information before using the information. Typically, the consumer would prefer that if the decision to use a piece of information is made, the application of the information  
25 is painless and essentially automatic. The consumer would prefer to be insulated from the prospect of damage caused by incorrect information.

It would therefore be advantageous to provide a communications technique that addressed each of the above concerns with regard to both the information  
30 provider and the information consumer.

### SUMMARY OF THE INVENTION

5 The invention disclosed herein enables a collection of computers and associated communications infrastructure to offer a new communications process. This process allows information providers to broadcast information to a population of information consumers. The information may be targeted to those consumers who have a precisely formulated need for the information. This targeting may be based on information which is inaccessible to other communications protocols,  
10 for example because under other protocols the targeting requires each potential recipient to reveal sensitive information, or because under other protocols the targeting requires each potential recipient to reveal information obtainable only after extensive calculations using data available only upon intimate knowledge of the consumer computer, its contents, and local environment.

15 The targeting also includes a time element. Information can be brought to the attention of the consumer precisely when it has become applicable, which may occur immediately upon receipt of the message, but may also occur long after the message arrives. Again, this is a feature inaccessible under other  
20 communication protocols, where the time of distribution of information and the time of consumer notification are closely linked.

The communications process may operate without intruding on consumers who do not exhibit the precisely-specified need for the information, and it may operate  
25 without compromising the security or privacy of the consumers who participate. For example, in one implementation, the information provider does not learn the identity or attributes of the individuals who receive this information.

This process enables efficient solutions to a variety of problems in modern life,  
30 including the automated technical support of modern computers. In the technical

support application, the disclosed invention allows a provider to reach precisely those specific computers in a large consumer population which exhibit a specific combination of hardware, software, system settings, data, and local environment, and to offer the users of those computers appropriate remedies to correct  
5 problems known to affect computers in such situations.

The presently preferred embodiment of the invention is specially tuned to address the concerns of consumers and providers in a technical support application. Many other interesting applications areas and embodiments of the  
10 invention are also described herein.

This particular embodiment of the invention is described as follows:

Actors, referred to herein as advice providers, author advisories, which are  
15 specially structured digital documents which may contain:

- (1) Humanly-interpretable content, such as text and multimedia;
- (2) Computer-interpretable content, such as executable programs and data; and  
20
- (3) Expressions in a special computer language called the relevance language.

The relevance language describes precise conditions under which a given advisory may be relevant to a consumer, by referring to properties of the  
25 environment of the consumer computer interpreting the message, such as system configuration, file system contents, attached peripherals, or remotely accessible data. The humanly-interpretable content in an advisory may describe the condition that triggered the relevance determination and propose an action in response to the condition, which could range from installing software to changing  
30 system settings to purchasing information or software. The computer-



interpretable content may include software which performs a certain computation or effects a certain change in the system environment.

5       Advisories are communicated by a process of publication/subscription over a wide-area network such as the Internet. Advisories are placed by their authors at well-known locations, referred to herein as advice sites. Applications referred to as advice readers running on the computers of advice consumers periodically obtain advisories from advice servers which operate at advice sites.

10       Advice readers process the messages so obtained and automatically interpret the relevance clauses. They determine whether a given message is relevant in the environment defined by the consumer's computer and associated devices. The user is then notified of those messages which are relevant, and the user may read the relevant advisories and invoke the recommended actions.

15       Relevance evaluation is conducted by parsing relevance language clauses into constituent method dispatches. These clauses invoke specific inspectors which can return specific properties of the computer, its configuration, its file system, or other component of interest. In effect, the list of properties of the environment  
20       which may be referred to in the relevance language and verified by the advice reader is determined by the contents of the inspector library installed at run-time.

25       The existence of standard inspector libraries provides the advice provider with a rich vocabulary for describing the state of the consumer computer and its environment. In one implementation, the collection of inspector libraries can be dynamically expanded by advice providers.

30       Advice readers operate continually in an automatic mode, gathering advice from many advice providers distributed across public networks such as the Internet, and diagnosing relevance as it occurs.

Advice readers following an advice gathering protocol, referred to herein as Anonymous Exhaustive Update Protocol, may operate in a manner which fully respects the privacy of the computer's owner. Information resulting from the relevance determination, *i.e.* information obtained from the consumer computer, does not leak out to the server. Information on the consumer computer stays on the consumer computer unless the consumer approves its distribution.

Many variations on this specific embodiment are described in detail, including variations which have very different applications, very different message formats, very different gathering protocols, very different security and privacy attributes, very different methods of describing the consumers to whom a message may be relevant, and very different trust relationships between consumer and provider (*e.g.* master-slave relationships). The disclosed invention is shown to be capable of effective embodiment in all these settings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing the process of matching advisories to consumers according to the invention;

Fig. 2 is a block diagram showing an advisor viewpoint according to the invention;

Fig. 3 is a block diagram showing a consumer viewpoint according to the invention;

Fig. 4 is a flow diagram showing a technical support application according to the invention;

Fig. 5 is a block diagram showing an advice site according to the invention;

Fig. 6 is a block diagram showing an advice reader according to the invention;

5 Fig. 7 is a block diagram showing consumer response to relevance notification according to the invention;

Fig. 8 is a data structure showing an advisory according to the invention;

10 Fig. 9 is a block diagram showing the process of relevance evaluation according to the invention;

Fig. 10 is a flow diagram showing expression tree generation according to the invention;

15

Fig. 11 is a block diagram showing named property method dispatch according to the invention;

20 Fig. 12 is a flow diagram showing an object evaluation model according to the invention;

Fig. 13 is a flow diagram showing an object hierarchy according to the invention;

25 Fig. 14 is a flow diagram showing a new component of an object hierarchy according to the invention;

Fig. 15 is a data structure showing the contents of an inspector library according to the invention;

30 Fig. 16 is a block diagram showing situational advice according to the invention;

Fig. 17 is a block diagram showing simulated conditions according to the invention;

- 5 Fig. 18 is a block diagram showing a commodity market according to the invention;

Fig. 19 is a flow diagram showing a relevance-adapted document according to the invention;

10

Fig. 20 is a flow diagram showing questionnaire processing according to the invention;

- 15 Fig. 21 is a flow diagram showing a mandatory feedback variant according to the invention;

Fig. 22 is a flow diagram showing a consumer feedback variant according to the invention;

- 20 Fig. 23 is a flow diagram showing masked bi-directional communication by an anonymous server according to the invention;

Fig. 24 is a flow diagram showing a further mandatory advice variant according to the invention; and

25

Fig. 25 is a block diagram showing remove relevance invocation according to the invention.

### DETAILED DESCRIPTION OF THE INVENTION

The invention implements a process of communication which systematically solves the problem of linking an information provider to information consumer.

5 The invention provides a system which depends on the use of computational devices connected by communications networks. In actual practice, these devices could range from traditional large-scale computers to personal computers to handheld personal information managers to embedded computational devices in the ambient environment, including consumer  
10 appliances such as remote controls and smart TVs, or other common computationally-dense environments, such as transportation vehicles. The communications mechanisms could include a modem or other wired media, or wireless communications, using the Internet or other protocols, and could include the physical distribution of media. Whatever the specific instance, for purposes of  
15 the discussion herein, the computational device shall be referred to as a computer and the communications infrastructure shall be referred to as a network. Typical examples of such infrastructure include intranets (private computer networks), and the Internet, the large public computer network that hosts the World Wide Web and related services.

20 The invention architecture is best understood if a specific terminology is adopted, which evokes a focused instance of the above described communications problem. The specific units of information to be shared henceforth are referred to as pieces of advice (see Fig. 1). The special digital documents conveying advice  
25 are referred to as advisories. An advice provider 10 is an organization or individual which offers information in the form of advisories 12a-12d. The provider is represented by a server computer in a communicating network of computers. An advice consumer 14a-14c is an organization or individual which receives information in the form of advisories. The consumer is represented by a

computer referred to as the consumer computer in a communicating network of computers.

5 It is helpful to think in concrete terms, and to suppose that the advice provider is in fact a large organization running a large-scale server computer; that the advice consumer is in fact an individual represented by a single personal computer, smart TV, personal information manager, or other personal computational device; and to suppose that the network of computers may communicate according to a protocol similar to the TCP/IP protocol now in use by the Internet. In actual  
10 practice, many variations can be expected. For example, an advice provider may constitute an individual represented by a personal computer, an advice consumer may be a corporation represented by a large-scale computing engine, and the communications process underlying the invention may be realized with other protocols operating over other physical means of communication.

15 Using this terminology, it is now possible to describe a key purpose of the invention. The invention allows one to relay advisories from advice providers to advice consumers. The communications protocol allows narrowly-focused targeting by automatically matching advisories with consumers for whom those  
20 advisories are relevant.

Relevance determination (see Fig. 2) is carried out by an applications program, referred to as the advice reader 20 which runs on the consumer computer and may automatically evaluate relevance based on a potentially complex  
25 combination of conditions, including:

- Hardware attributes. These are, for example, the type of computer on which the evaluation is performed, the type of hardware configuration 21, the capacity and uses of the hardware, the type of peripherals attached, and the  
30 attributes of peripherals.

- 5       • Configuration attributes. These are, for example, values of settings for variables defined in the system configuration 22, the types of software applications installed, the version numbers and other attributes of the software, and other details of the software installation 27.
  
- 10       • Database attributes. These are, for example, attributes of files 23 and databases on the computer where evaluation is performed, which may include existence, name, size, date of creation and modification, version, and contents.
  
- 15       • Environmental attributes. These are, for example, attributes which can be determined after querying attached peripherals to learn the state of the environment in which the computer is located. Attributes may include results of thermal, acoustic, optical, geographic positioning, and other measuring devices.
  
- 20       • Computed attributes. These are, for example, attributes which can be determined after appropriate computations based on knowledge of hardware, configuration, and database and environmental attributes, by applying specific mathematico-logical formulas, or specific computational algorithms.
  
- 25       • Remote attributes 24. These are, for example, hardware, configuration, database, environmental, and computed attributes that are available by communicating with other computers having an affinity for the consumer or his computer.

- Timeliness 25. These are, for example, attributes based on the current time, or a time which has elapsed since a key event, such as relevance evaluation or advice gathering.
- 5 • Personal attributes. These are, for example, attributes about the human user(s) of the computer which can either be inferred by analysis of the hardware, the system configuration, the database attributes, the environmental attributes, the remote attributes, or else can be obtained by soliciting the information directly from the user(s) or their agents.
- 10 • Randomization 26. These are, for example, attributes resulting from the application of random and pseudo-random number generators.
- Advice Attributes 27. These are, for example, attributes describing the configuration of the invention and the existence of certain advisories or types  
15 of advisories in the pool of advice.

In this way, whatever information is actually on the consumer computer or reachable from the consumer computer may in principle be used to determine  
20 relevance. The information accessible in this way can be quite general, ranging from personal data to professional work product to the state of specific hardware devices. As a result, an extremely broad range of assertions can be made the subject of relevance determination.

25 The advice reader 30 (see Fig. 3) may operate automatically to determine relevance. It may present to the consumer a display of relevant advisories 32 only from several advice sites 33a-33c, so that the consumer is not burdened with the task of reading irrelevant advisories. In this way advisories may provide



an automatic diagnosis 34 to any problem which a relevance clause may describe.

5       Advisories are digital documents which may contain an explanatory component, describing in terms the consumer can easily understand the reason that the advisory is relevant and the purpose and effects of the action which is being recommended to the consumer. These digital documents may also contain, as another component, executable computer programs, or links to executable computer programs. In this way advisories may provide an automatic solution to  
10       any problem which the relevance message may have diagnosed, and which may be activated at the consumer's discretion.

15       In short, the invention posits a situation where proactive advice providers identify situations of interest to consumers and provide advice about dealing with such situations.

#### Computer Technical Support Application.

20       To make the above generalities more concrete, a particular application area is described where this communications process may be of considerable utility (see Fig. 4).

25       In the technical support application, the advice provider offers a computer-related product or service, such as hardware, software, Internet service, or data processing service. The advice provider has a potentially large, potentially widely distributed customer base 40. In part from user input 42, the advice provider knows of problematic situations 41 which may affect certain computers belonging to the customers. The advice provider identifies these problematic situations 43, which may include the use of out-of-date versions of software,  
30       improper system settings, conflicting combinations of software applications,

inadequate physical resources, corrupted files, other similar phenomena. The advice provider may know, for each problematic situation, a precise combination of hardware, system configuration, database configuration, timeliness, and other attributes which may signal the situation. The advice provider may know a  
5 precise solution 44 to each problematic situation, which may include:

- A suggestion to the user to modify usage patterns;
- A suggestion to the user to read a document;
- 10 • A proposal to upgrade to a new software version;
- A proposal to modify system settings;
- 15 • A proposal to run a certain script to effect a solution; or
- A proposal to download and execute special applications to correct the situation.

20 The advice provider authors an advisory 45, which is then preferably tested 46, and made available to relevant users at an advice site 47. In this way, the advice provider can use invention to reach the consumer population efficiently. The provider packages the information about the specific situation as a formal advisory concerning the situation. This digital document may include:

- 25
- A precise formal-language specification of conditions under which the situation occurs;

- \* Explanatory information intended for consumers who are in the given situation, describing to those consumers the situation they are in, the implications of the situation, and the providers proposed actions to correct the situation; or

5

- \* Digital content providing automatic solution or response.

The advice provider publishes the advisory 40 over the Internet or an Intranet, through an advice server running at the provider's advice site. For example (see 10 Fig. 5), the advice site may comprise a directory of advice files 51a-51b and inspector files 52a-52b (discussed below). These advisories may be communicated to the outside world 54 via such media as a directory message server 55, an HTTP server 56, and FTP server 57, or a file server 58.

15 The advice consumer is a user of the products and services of the advice provider who knows of the advice provider's advice site and generally trusts the provider's organization and the advice that it authors. The advice consumer has available on his computer the advice reader application. The advice consumer instructs his advice reader to subscribe to the advice site offered by the advice 20 provider.

The advice reader 20 (see Fig. 6), at scheduled intervals or under user manual control via a user interface 65, gathers advisories to which the user subscribes. Subscription to advisories are entered with a subscription manager 67 based, at 25 least in part, on information in various user site definition files 68. Advisories are gathered from the advice provider's advice sites 33a-33b using a gatherer 60. The reader then parses the advisories using an unwrapper 61 and adds these advisories to any already existing body of advisories. Advisories may be provided to the reader via any of several sources, including alternate input 30 streams 62. The advice reader determines the relevance of any of the existing or

new advisories with a relevance evaluation module 63. This determination is made either continuously, at scheduled intervals, or under user manual control. The advice reader includes a user interface 65 that receives relevant advisories and a display and management system 66 that displays relevant advisories for inspection by the consumer the relevant advisories. In some embodiments of the invention, an advisory may also be subject to digital verification using a verification module 64 (discussed in greater detail below).

A typical relevant advisory is reported to a consumer as follows:

10

Your computer has a certain combination of hardware and software and settings. Computers with this combination have frequently been reporting a particular problem. Our company has a solution. It will change your computer settings. If you accept to use this solution, your problem will go away. This solution has been rigorously tested before release, and represents our best known way of dealing with this problem.

15

The advice consumer reviews such relevant advisories 100 (see Fig. 7), and acts on the advisories 110, for example by ignoring the advisory 111. Otherwise, the user potentially deliberates, which deliberation may include informing himself further about the advisory or its author 112, informing others of the advisory 113, or taking some other offline action 114 and then, depending on the outcome of the deliberation, he approves or denies approval. If the consumer gives approval, an automatic solution may result, which may involve a variety of activities, including software downloading 72, installation, and execution 71, an automatic electronic response 73, or the purchase or order of a digital object 70.

25

This particular application area shows how invention can be used to diagnose and fix problems on a computer automatically. There are many other applications

areas of the invention, which may involve making commercial transactions rather than fixing computer problems, or offering new forms of private communications.

Responsiveness to Concerns

5

The invention is fully responsive to the concerns discussed above.

Provider Concerns

10 Large Scale Communications. In common with other computer-mediated communications systems, such as the world-wide web, the invention is able to reach a large number of consumers and convey to them a large body of informational messages, at low cost.

15 Automatic Operation. The matching of information to consumers is done without the need for case-by-case intervention of skilled human operatives.

Exclusive Targeting. The invention enables information to flow precisely to the appropriate consumers. The provider can guarantee this by carefully specifying  
20 the conditions under which a piece of advice is relevant.

Targeting with Intimate Knowledge. Information targeting in the invention is precisely focused on the attributes of the consumer because it has access to intimate knowledge of the inner details of the consumer computers state, without  
25 necessarily disclosing this knowledge to the provider. This degree of targeting is not possible under other protocols because other protocols require disclosure of this information to the provider to determine if a piece of information is relevant.

Consumer Concerns

The invention satisfies the main consumer concerns mentioned earlier.

5 Automatic Unattended Operation. The invention is an automated messaging system which operates successfully with infrequent consumer involvement. The advice reader can periodically gather new advice from advice sites that it subscribes to. This process may be fully automatic (manual intervention is also available). The databases of advice resident on the consumer computer may be  
10 continually evaluated for relevance by automated unattended operation of the advice reader.

Provision of Narrowly Targeted information. In a typical mode of operation, the consumer only sees information relevant to his precise attributes, including  
15 attributes derivable from the contents of his computer, associated peripherals and affiliated computers.

Timely Provision of information. In a typical mode of operation, a piece of advice may enter the consumer computer and remain resident for an extended period of  
20 time before becoming relevant. Information is displayed when it has become applicable, not before it does.

Opportunity for Deliberation. Typically, the advice reader does not automatically apply a recommended solution operator. Rather, the advice reader gives the  
25 consumer the chance to study the diagnosis and recommendation, and to evaluate the credibility of the provider, before proceeding. There are three special aspects to the deliberation process available in invention:

- \* Disclosure of Potential Risks. By exploiting known user interface methods,  
30 such as HTML display with hypertext links, the invention enables advice

providers to inform consumers fully about potential risks associated with following a certain recommended course of action.

- 5     \* Discovery of Consumer Complaints. Via devices to be discussed below (such as the Better Advice Bureau) consumers may use the advisory mechanism to inform themselves about the existence of known and foreseeable privacy and security risks associated with specific advisories and/or advice providers before accepting proposed solutions.
- 10    \* Correction of Known Defects. The invention allows advice providers to retract their own faulty advice. An instance of this is the UrgentAdviceNet mechanism (discussed below) for rapidly distributing advisories to the invention population.
- 15    Automated Solution. Typically the advice provider authors an advisory in such a way that the advice reader offers it to the user to apply a recommended solution operator automatically after the user has given approval. Thus, the invention offers an automated solution to the user's condition under user guidance.
- 20    In short, the invention provides a mechanism to match consumers with highly specific relevant advisories efficiently in a communications structure which is responsive to consumer concerns.

#### Security and Privacy Technique: One-Way Membrane

25

The disclosed invention offers a comprehensive process for computed-relevance messaging. This is a broad idea, with many possible applications. In certain settings, this type of messaging must be implemented in a fashion which pays special attention to security and privacy concerns, *i.e.* a one-way membrane 35

(see Fig. 3). For a concrete instance, consider the technical support application (discussed above), where:

- Communication must take place over public networks such as the Internet;
- The advice provider is a large business or other concern; and
- Advice consumers make up a widely distributed group of lay users.

10 In this setting, consumers have special concerns about any process which functions as if it had intimate knowledge of the consumer's computer and its contents. These concerns are legitimate because the Internet is widely known as an insecure communications medium. Hence, systems which interact with the Internet, and which appear to function as if they had intimate knowledge about a  
15 user, might appear to enable privacy intrusions.

The invention addresses this problem by proposing a method of interaction between the consumer computer and the Internet which protects the consumer's privacy. This mechanism need not be used in other settings. For example, in  
20 certain private computer networks, commonly referred to as intranets, the invention has a variety of applications. In such settings, security and privacy are considered guaranteed by physical control of the computer and communications infrastructure involved, and possibly by contracts creating obligations on the participants in the process.

25 The invention employs a special protocol for subscription and gathering in the security and privacy critical setting. For purposes of the discussion herein, this setting is referred to as the Anonymous Exhaustive Update Protocol (AEUP). The intention of this interaction protocol is to create a one-way membrane, where  
30 information can enter the consumer computer in the form of advisories, but



information about the consumer does not leave the consumer computer unless it is the consumer who initiates the transfer.

5 The AEUP protocol is described as the default protocol of the invention. The reasons that this protocol offers consumers privacy is discussed below. This document also describes many applications where security and privacy are not critical to acceptance by the consumer. Thus, it is possible to provide a certain degree of security and privacy protection without using this protocol. See below for a discussion of alternative protocols, such as the Anonymous Selective  
10 Update Protocol (ASUP).

A comprehensive discussion of privacy and security concerns is given below. The invention addresses:

- 15 • Consumer Privacy Concerns. The invention fully respects consumer privacy concerns. In an implementation offering AEUP, consumers may benefit from narrowly-targeted advice without ever needing to reveal their identity, nor any of the attributes that were checked in determining relevance, nor the fact of relevance itself.  
20
- Consumer initiative. In a typical mode of operation, no advice is received by the advice reader unless the consumer initiated the subscription. This protects the consumer from unwanted communications.
- 25 • Privacy of Automatic Operations. Under AEUP, the operation of gathering advice from sites, the operation of evaluating relevance, and the operation of displaying relevant advice to the consumer need not result in the disclosure of consumer data to the advice provider.

- Frustration of Intrusions. Certain embodiments of the invention contain mechanisms, described below, to prevent compromises of privacy even in case of certain illegal eavesdropping activities.
- 5
- Consumer Security Concerns. The invention fully respects consumer security concerns. In an implementation offering AEUP, consumers may benefit from narrowly-targeted advice without exposing themselves to security threats from malicious sources.
- 10
- Consumer Initiates Subscriptions. In a typical mode of operation, no advice is received by the advice reader unless the consumer initiated the subscription. The process of subscription to an advice site connotes limited trust by the consumer for the provider. Hence, in typical operation, advice is only received from trusted sites.
- 15
- Harmlessness of Automatic Operations. Typically, the process of gathering and evaluating advisories has no noticeable effects on the computer system. Any recommended solution is applied only upon prior notification of the user and subsequent approval. Consumers who use
- 20
- invention to merely peruse relevant messages, but do not follow the recommended actions, face no significant risk.
- 25
- Disclosure of Potential Risks. By exploiting known user interface methods, such as HTML display with hypertext links, the invention enable advice providers to inform consumers fully about potential risks associated with following a certain recommended course of action.
- Discovery of Consumer Complaints. Via devices that are discussed below (such as the Better Advice Bureau), consumers may use the advisory

mechanism disclosed herein to inform themselves about the existence of known and foreseeable privacy and security risks associated with specific advisories and/or advice providers before accepting proposed solutions.

- 5       • Correction of Known Defects. The invention allows advice providers to retract their own faulty advice. It allows other people to criticize an advice providers faulty advice.
- 10       • Automated Solution. The advice provides typically authors an advisory in such a way that the advice reader offers to apply a recommended solution operator automatically to the user system after the user has given approval.

15       Thus, the invention provides a mechanism for efficiently matching consumer with highly specific relevant advisories in a communications structure which is responsive to consumer concerns.

#### Layers of Invention

20       The present document describes computed relevance messaging from many viewpoints, *i.e.* from one extreme of a general communications process to the other extreme of a set of specific protocols that have been implemented by Universe Communications, Inc. of Berkeley, California. It is worthwhile to classify the several layers of the invention as described herein:

- 25       Relevance Guided Messaging. The general communications process used by the invention has five elements (see Fig. 8):
- 30       • A Relevance Clause 80. An assertion about the state of a consumer computer, its contents, or environment which can be automatically evaluated by comparing the assertion with the consumer computer's actual state.

Typically, the relevance clause is preceded by a subject line 82 which gives a general description of the advisory's subject matter.

- 5     • An Associated message 81. A message or messages associated with the clause whose suitability for the consumer is determined at least partially by the evaluation of the clause.
  
- 10    • A Gatherer 60 (see Fig. 6). An application that sees to it that relevance clauses flow into the consumer computer from various locations, perhaps by regular synchronization.
  
- 15    • A Watcher 63 (see Fig. 6). An application that has the ability to evaluate relevance clauses, *i.e.* assertions about consumer computer's own environment, by comparing them with the actual state of the environment, and by inspecting properties of the consumer computer and its environment  
20    and checking if these point towards or away from relevance.
  
- 20    • A Notifier 65, 66 (see Fig. 6). An application that has the ability to display messages to a user under at least partial guidance of an evaluated relevance clause.

25     A key difference of the invention from other targeted information providers is that the invention provides a detailed tool for tapping into very highly defined targets, which other protocols for targeting information cannot match because they do not routinely have access to the state of the consumer's environment.

The details of relevance guarded messaging are less important than this five-part model. For example, in one implementation, the five-part model is run on a computer network in a secure network such as a corporate intranet. In another

implementation, the five-part model is run on a public computer network such as the Internet. Certain concerns that affect the public setting (e.g. security and privacy) might be completely irrelevant in the private setting, where those concerns are addressed by the physical control of the network. In either setting,  
5 the basic five-part model of relevance guarded messaging makes a valuable contribution to connecting providers with consumers.

It is important to note that this five-part model may have embodiments in which these five parts are not immediately evident. Potential implementations which  
10 make it clear that there can be many superficially different ways of achieving this basic structure are described below. For example, the relevance clause and the associated message may be packaged together in the same file and communicated simultaneously. In a different embodiment, the relevance guarded message can be communicated in two stages, where the first stage sends a  
15 relevance clause, and the second part is sent only if the first part leads to a relevant result and if the consumer computer asks the provider for the second part. Conceptually, the same useful effect can be obtained using either of these two messaging protocols. Both methods are embodiments of the same invention.

20 Relevance Guarding with Security and Privacy. Owing to the tremendous importance of public networks, such as the Internet, an implementation of the five-part model which also addresses fundamental privacy and security concerns is of great significance. The mechanism by which the basic five-part model is extended (e.g. through AEUP, ASUP, or substantially equivalent protocols) to  
25 become a secure and private system over public networks is an important embodiment of the disclosed invention. It is potentially helpful for the broad consumer acceptance of computed relevance messaging.

30 Preferred Embodiment of the Invention. The presently preferred embodiment of the invention consists of a large collection of different interacting components,

carefully designed to meet the goals underlying this system. The many subsystems illustrate the potential of the invention in the technical support application. Those skilled in the art will appreciate that there are many other applications to which the invention may be put.

5

Variant Implementations. The specific implementation was arrived at after a long series of different application areas were examined and carefully studied. This document describes in considerable detail a large number of variant implementations modify the basic operation of the central implementation for other market areas or other demands. For example, in certain settings, the use of low communications bandwidth is important and privacy is unimportant. A variation for that setting is discussed below.

10

#### Invention Components

15

The following discussion describes the key components in what is currently regarded as the best mode of implementing the disclosed invention. In this implementation it is assumed that communications are via standard Internet techniques, and that the advice provider and advice consumer are both relying upon standard network connected computers.

20

#### Advice Provider Components

The following is a listing of component names, followed in various subsections by a brief discussion of each component:

25

- advice site
  
- advisories

30

- site signature
- site description file
- 5 • inspector library files
- supplementary files

10 While these general components may be implemented in many ways, it easiest to describe their form and function in the currently understood best mode, based on the use of Internet communications protocols. Those skilled in the art will appreciate that this is not the only possible implementation.

advise site

15

This is a standard place on the Internet (see Fig. 5), e.g. a URL-addressable directory on a server computer, combined with server software that responds to certain TCP/IP requests for information.

20 The site directory may contain a plurality of files, including advisories, digests of advisories, and inspector libraries.

25 The software associated with the server may perform the functions of an HTTP server, an FTP server, or a file server, thereby providing access to the files stored in the directory using well-known communications protocols. The software associated with the server may also perform the functions of a specialized server, implementing invention-specific communications protocols.

These protocols may include:

- The ability to serve a directory message describing the contents of the site directory, including filenames, sizes, and dates;
- 5 • The ability to serve an abstract message which describes in abbreviated form the contents of the files in the directory;
- The ability to engage in security handshaking;
- 10 • The ability to perform challenges to advice readers to validate their authenticity; and
- The ability to meter traffic through the site, and compute summaries of traffic levels.

15

The function of advice site server software is to process certain requests made by an advice reader running on a consumer computer. The advice reader may request information about the directory of the site, may ask for abstracts of advisories, and may ask for contents of individual advisories. The transaction  
20 between advice server and advice reader is described further below.

#### Advisories

25 The advisories in an advice site are digital files. Advisories typically have some of the following components:

- A relevance precondition written in a formal relevance language, which is used to describe attributes of a computer and/or its contents and/or its environment. For more information on the relevance language, see below.



- \* A humanly-intelligible component which may summarize the purpose of the message, may describe the author, may explain the precondition in human language, and may explain the solution in human language.

5

- \* A computer-intelligible component which potentially offers either software tools to solve the problem or Internet access to software tools solving the problem. In the currently understood best method for this implementation, an advisory is a specially formatted ASCII file built using the MIME Internet standards track specification documented in RFC 1521 *et seq.* (see N. Borenstein, N. Freed, *MIME (Multipurpose Internet Mail Extensions) Part One: Mechanisms for Specifying and Describing the Format of Internet Message Bodies*, Internet Standards Track RFC 1521(1993)). This format is currently used for transport of Internet mail; it contains headers documenting the sender of the message and its subject, and mechanisms for including digital signatures. A MIME file is easily transported over the Internet and is easily broken into its constituent components using parsing algorithms well-known in the Internet community. The advisory file format is described further below (see, also *A Guide to Writing Advisories for AdviceNet*, Universe Communications, Inc., Berkeley, CA. (1998)).

10

15

20

#### Authoring Advisories.

#### Site Signature

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Associated with an advice site may be a certain digital signature mechanism, for example one of the standard signature mechanisms using public-key/private-key pairs. The signature mechanism may be used to sign advisories in a fashion that allows advice readers to verify that the advisory was in fact authored by the

30

Site description files

5 The site description file (SDF) is a specially structured ASCII text file authored by the advice provider. It describes the provider's advice site and serves as the basis for a consumer to initiate a subscription. This file specifies the site location (URL), the site name, and site security characteristics, such as whether the site avows only advice which has been digitally signed. It also provides various parameters of the subscription process intended for use by the advice reader (for  
10 example, the recommended frequency of synchronization, and the type of subscription relationship (free/fee)). It may contain humanly interpretable text indicating the purpose of the site.

15 The SDF may also contain the public key associated with advice authored by the site. This public key is needed to verify signatures on advice authored by the site.

20 The SDF may also be signed by a trusted authority, to establish the authenticity of this site description file. For example, it may be signed by advisories.com or the Better Advice Bureau: see below.

25 The SDF may also contain a ratings block, provided by a trusted ratings service, to establish trust in the respect for privacy and security and the usefulness of advice at this site. See, for example, below.

Inspector Libraries

Inspector libraries are libraries of special purpose executable code, which may be accessed by advice readers for the purpose of extending the capabilities of the relevance language. In effect, inspector libraries provide a mechanism for advice site specific extensions to the relevance language.

Supplementary files

The contents of the advice site discussed so far play important roles in the ordinary conduct of the invention. In one typical implementation, additional files may be present in the advice site directory. In such an implementation, data and applications files which do not play a role in the conduct of the invention *per se* may be included in the advice site directory. These files are distributed as are other files at the advice site. This implementation allows the distribution of installers, uninstallers, shell scripts, JAVA, and Visual Basic programs, *i.e.* in general, packages of data, applications, and other resources, that may play a supporting role in evaluating and following advice issued at the site. For example, such additional files may play a role as databases searched by the advice provider's own inspector libraries or as applications used in implementing the advice providers recommended solutions.

Advice Consumer Components

The following is a listing of component names from the advice consumer perspective, followed in various subsections by a brief discussion of each component:

\* advice reader

- subscription database
- advice database
- 5 • user profile
- inspectors
- solution wizards
- 10 • advice reader

The advice reader is an application running on the consumer computer. It is responsible for liaison with the advice site and for managing interactions with the user. The advice reader maintains a directory of files on the consumer computer. Inside that directory are contained various files described below which are used/managed in the course of advice reader operation.

The advice reader has a number of jobs, which are listed below without elaboration:

- Manage subscriptions
- Synchronize with advice site
- 25 • Gather advisory files
- Unwrap advisory messages

- Manage advice Database
- Manage relevance Evaluation
- 5 • Evaluate relevance of Individual advisories
- Invoke inspectors
- Display relevant advisories to User

10

The process is described in detail below.

#### Subscription Database

- 15 The advice reader maintains a database of subscription information which allows for the scheduling and conduct of site synchronization by the gatherer component. The subscription database contains information about the address of the advice site; information and recommendations provided by the advice sites site description file, such as recommended frequency of synchronization;
- 20 information needed to verify digital signatures associated with the advice site; and information associated with the users experience with the advice site.

#### Advice Database

- 25 The advice reader maintains a database of advice that has been received from various advice sites. These may be indexed according to the site from which they were received according to the systems that the advice concerns, or according to other principles which would be helpful to the consumer or to the author.

The advice reader may organize advice into pools of advice which share a common basis for treatment. Examples of this principle include a pool of advice specially targeted to the concerns of one user of a multi-user consumer computer, a pool of advice scheduled for manual relevance evaluation only, and  
5 a pool of advice scheduled for nightly evaluation at a certain time.

#### User Profile

The advice reader maintains a special file or files containing data which have  
10 been obtained from interviews with the user, deduced from his actions, or deduced from the properties of the computer or its environment. Such data may describe the computer or its environment, and may also describe preferences, interests, requirements, capabilities, and possessions and plans of the user, including things unrelated to computer operations.

15

The file or files may be encrypted. The file or files may be organized by advice site so that they describe interests, preferences, and so forth to be accessed by relevance queries associated with a specific site only.

20 inspectors

inspector libraries contain executable code which may be invoked by the advice reader as part of the relevance evaluation process. Inspectors can examine properties of the consumer computer, storage devices, peripherals, environment,  
25 or remote affiliated computers. These are further described below.

### Solution Wizards

Solution wizards support the process of automated solution. They are applications which can perform stereotyped functions that are frequently of use  
5 for solving problems on computers. These are described further below.

### Transaction Overview

The following discussion describes the basic model for an Internet-based  
10 transaction using the invention.

### Subscription Model

In the invention, the initiative to begin an interaction typically comes from the  
15 consumer. The consumer becomes aware of the existence of an advice provider and associated advice site(s), for example, as part of installing a new hardware or software product on his computer, or as a result of advertising, or sharing experiences with other consumers. The consumer, after potentially informing himself about the kind of advice being offered at that site and its reliability, makes  
20 a decision to subscribe. The consumer, interacting with a piece of the advice reader called the subscription manager 67 (see Fig. 6), configures the advice reader to subscribe to the given advice site, by supplying it with either the corresponding site description file 68, or with a pointer to such a file, or with a pointer to the site itself which contains an instance of such a file. The consumer,  
25 after studying the terms of interaction recommended in the SDF, configures the parameters associated with the subscription, which control how frequently advice from the site is gathered.

Advice Gathering Using AEUP

Periodically, under the terms of the subscription, or manually under user control, the advice reader initiates a site synchronization. A component of the advice reader, referred to as the gatherer, has the duty to synchronize the consumer site image with the current image of the advice site. These states can be different if the advice site has retracted advice or authored new advice since the most recent synchronization. The gatherer makes sure that there is a one-to-one correspondence between advisories at the advice site and advisories in the consumer machine. The gatherer opens a connection to the directory message server at the advice site. After an optional security handshake to verify the authenticity of the advice reader and server, the gatherer queries the server for a directory message. The gatherer inspects the response and checks whether the site directory has changed since the previous synchronization. If not, there is no need to obtain any files from the advice site, and the session may end. If the directory has changed, or if this is the first synchronization ever, the gatherer initiates FTP and/or HTTP and/or file server access to the new files. The gatherer also deletes any advisories on the consumer computer which no longer correspond to advisories on the server, and this terminates the synchronization of the consumer site image with the true site image.

The protocol just described is the AEUP protocol that is described above. The gatherer is allowed, by the advice server, to gather all the files at the advice site anonymously or, at any rate, all files which have not previously been gathered. The intention is that the advice stored on the consumer machine consists at any given moment of all the advisories offered at the advice site at the time of the last synchronization, other than those that the user has specifically deleted. Hence, there is no selective gathering. Rather, gathering is exhaustive, i.e. every piece of advice is gathered. The implications of this protocol and alternative protocols are discussed below.



### Unpacking Advisories

As described below, an advisory file is a potentially complex hierarchical structure, which may contain one or more than one message. The advice reader  
5 unpacks all the components of this structure. Components of the structure may be signed using a digital signature method, *i.e.* at unpacking time those signatures are verified. After unpacking, the advisories are entered in a pool of all advice, old and new, to be evaluated. In one typical implementation, the  
10 invention may suppress entry into the system of unsigned advisories or of advisories whose signatures cannot be verified.

### Relevance Evaluation

15 As a matter separate from gathering, the pool of all advice to be evaluated may be processed, either continuously, or according to a consumer-defined schedule, or an immediate user request, or some specified trigger event (see Fig. 9). The advice reader parses the individual message and identifies the clauses determining relevance. These clauses are expressions in the formal relevance  
20 language which is described below. The advice reader parses the clauses using an expression tree generator 91 into a tree of elementary subexpressions (see Fig. 10) and then evaluates each subexpression of the tree using an expression tree evaluator. If evaluation proceeds successfully and results in a value of True, the message is deemed relevant 93. A dispatch method 94 is then used to  
25 consume the advisory which may include a file system inspector that identifies appropriate directory and file name references 96 in various user volumes 97, 98; a registry inspector 99 that inspects an operating system registry 120; an operating system inspector 121 that inspects various system elements 122; or a hardware device inspector 123 that inspects various system devices 124.

30

### inspectors

Evaluation of subexpressions is performed by methods called inspectors (see Fig. 11) which may perform mathematico-logical calculations, execute  
5 computational algorithms, return the results of system calls, access the contents of storage devices, and query devices or remote computers. These methods are called inspectors because a frequent purpose is to inspect the properties of the consumer computer, its configuration, or contents of its storage devices. Inspectors may come built in to the reader, and may also be plugged in via DLL  
10 or similar mechanisms. Thus, an object 130, property name 131, and/or string selector 132 is dispatched to a reader using a method dispatch module 134 in accordance with dispatch information contained within a method dispatch table 133. Various inspectors 135, 136 are provided at a user location, each of which includes an inspector library 137, 139 and associated methods 138, 140.  
15 Inspectors are described in greater detail below.

### User Interface

After relevance has been decided for an item in the advice pool, a relevant item  
20 may be entered into a list of items to be displayed. This list may be displayed to the consumer according to typical user-interface models. The user-interface may inform the user about the author of the advisory, about the date the advisory was acquired, about the date the advisory became relevant, about the subject of the advisory, and about other attributes of the advisory message. The user interface  
25 may offer the user to display the explanatory content of individual advisories. Depending on the advisory, the explanatory content may contain simple text explanations, or may contain more elaborate multimedia explanations. Depending on the advisory, the explanation may identify the situation which caused the advisory to be relevant, the implications of relevance, the  
30 recommended action or actions to take at this point, the anticipated effects of

taking those actions or of not taking them, or the experiences of other users or other organizations with the proposed actions. The user studies this explanatory content, perhaps performing additional research (for example studying the trustworthiness of the provider, or the opinions of other users).

5

#### Recommended Response

As part of the display of a relevant advisory, the user is typically offered the possibility of an action in response to the situation. Possible outcomes include:

10

- consumer ignores information/proposal. The consumer reviews the advisory, decides he does not wish to pursue it, ignores the content, and deletes the advisory.

15

- consumer is notified. The consumer reviews the advisory, or some other document it refers to, and learns something important or interesting.

20

- consumer is entertained. The consumer reviews the advisory, or some other document it refers to, or some multimedia content it contains, or some multimedia content it refers to, and is exposed to a stimulating presentation.

25

- consumer forwards information to another. This may include friends, family, colleagues, or associates. Forwarding may involve off line transport or electronic transport, such as e-mail.

- consumer initiates correspondence with provider or other. This may include contact by mail, phone, fax, or e-mail. This may also include participation in an information exchange, including for technical support, training, or market

survey purposes, as well as participation in a sale or other commercial interaction.

- consumer initiates on-line participation in a timely event.
- 5
- consumer purchases object by e-commerce. This may include a purchase entered by clicking on a button in the advice reader window which entry to e-commerce mode.
- 10
- consumer fills out a form. This may include a form rendered by a Web browser, or a text file form intended to be returned by e-mail, or a form intended to be filled out and faxed or mailed back.
- consumer initiates off line action in real world. This may include any off line action ranging from actions associated with the computer modifying the state of hardware devices, gathering information in the environment surrounding the computer, or reading some instructions in a manual before beginning an online process. This action may also include purely personal items.
- 15
- consumer modifies system setting or data field on computer. This may involve the consumer executing a series of manual operations on the computer to change settings of some system component or software application or to modify an entry in a database.
- 20
- consumer initiates an Install/Uninstall/Execute solution. This may involve the consumer clicking on a button in the advice reader, followed by automatic execution of a sequence of download/install/uninstall/execute steps, or it may require the consumer to access physical media such as floppy disk or CD-ROM to perform an install under direct supervision. It may involve automatic
- 25

execution, or execution under user control, following instructions indicated for the user by the advisory.

- 5 • consumer invokes Script file for solution. The advisory may offer a series of instructions in a high-level system-affecting language, such as AppleScript, DOS Shell, UNIX Shell, Visual Basic, which the consumer is expected to store as a file and then pass to a standard interpreter (e.g. AppleScript Editor, DOS Command Line Interpreter, UNIX Shell Command Line Interpreter, or Visual basic Interpreter). This action may alternatively involve the consumer  
10 executing a series of manual operations on the computer that involve typing in commands one by one in a certain window of a certain application.

Many concrete outcomes can be grouped among the outcomes in this list.

## 15 Advisory File Format

The advisory file format provides a mechanism to encode one single advisory or several advisories for transport across computer networks and other digital transport media, and to offer one or several variants of same basic explanatory  
20 material. The following discussion describes the components of an advisory in general terms and describes the currently understood best method for implementing advisories using MIME.

### Components of a Basic advisory

25

The most elementary advisory may have these logical components (see Fig. 8):

- Wrapper. Components designed to package the information for transport and subsequent decoding.  
30

- From Line. Component identifying the advice author.
- Subject Line. Component identifying briefly the concern of the advisory.
- 5 • Relevance Clause. Component in the formal relevance language precisely specifying the conditions under which the advisory could be relevant.
- Message Body. Component providing explanatory material potentially explaining to the user what condition has been found relevant, why the user is  
10 concerned, and what action is recommended.
- Action Button. Component providing the user the ability to invoke an automatic execution of the recommended action.

#### 15 Clause Variations

Elaboration on the basic scheme may also be valuable:

- The advisory may contain an expires-when clause. This is an expression in  
20 the formal relevance language which causes the message to expire if it evaluates to True.
- The advisory may contain an evaluate-when clause. This is an expression in  
the formal relevance language which causes the message to be evaluated for  
25 relevance if it evaluates to True.
- The advisory may contain an requires-inspector-library clause. This may give the name of an inspector library and a URL where it can be found. This

indicates that a certain inspector library must be installed for relevance to be evaluated correctly.

- 5 \* The advisory may contain a refers-to clause, giving keyword labeling of systems referenced by the condition associated with the advisory.
  - \* The advisory may contain a solution-affects clause, giving keyword labeling of possible effects of the recommended response.
- 10 Other variations may be recognized as useful in the future. Such variations are not excluded from the scope of the invention.

#### Display Variations

15 The message body may occur in at least three forms:

Text. The explanatory material may be an unconstrained ASCII text document. This has no embedded variations in presentation style (e.g. no changes in font and/or no hypertext references to outside documents).

20

HTML. The explanatory material making up the message body may be an HTML document. This is familiar from Web browsers. HTML documents may contain variations in the presentation of text, may contain tables and visual formatting features, may contain references to external documents, and may contain  
25 references to external graphics files.

Text/HTML. The explanatory material making up the message body may be given in both text and HTML forms. The advice reader has the option of using whichever form is more appropriate to the user.

30

Further variations in message content, including audio and video content, are not excluded from the scope of the invention.

#### Digital Integrity and Authenticity

5

The message body may have digital authentication features appended to the message to insure its integrity and authenticity.

10

A digital digest may be appended to the message to ensure message integrity. At the time that the message is compiled by the author, a specialized functional of the message body may be computed and appended to the message. The recipient of the message can verify the integrity of the message by computing the same functional and verifying that it produces the same result as that appended to the message. Known examples of digital digests include CRC, MD5, and SHA.

15

Digital digests are familiar in the computer programming community under the name hashing. The idea is that certain mathematical operations based on modular arithmetic are applied to a numerical representation of a body of text, producing a numerical output ranging in magnitude from a small number to a number requiring some dozens of digits to represent, depending upon the details of the digest mechanism. These arithmetic operations typically produce an output which depends on the original body of text in a discontinuous way which is not easily invertible. That is, slightly different messages tend to have very different digests. Also, it may be difficult to find any two messages with the same digest, and if one of the two messages is previously specified, it is particularly difficult to find another message which happens to have the same digest.

25

The practical implication is that a transmission or recording error which causes the advisory document to be modified in some way from the authors original intent does not typically result in a modified document that generates the

30



appropriate digital digest. In this way, modified documents can be identified and suppressed from consideration.

5 A digital signature may be appended to the message to ensure message authenticity (see C. Pfleeger, Security in Computing, Second Edition, Prentice-Hall (1996); and PGP 4.0 Users Manual, PGP Pretty Good Privacy, Inc. (1997)). This is a refinement of the digital digest idea, rendering the digest secure against malicious tampering.

10 Digital signatures generally work as follows: At the time that the message is compiled by the author, a digital digest of the message is calculated. The digest is then encrypted using an encryption scheme that is well known and widely associated with the advice site. The encrypted digest is considered the advice site's signature on the message, and is appended to the message itself, labeled  
15 as a signature.

The advice reader, in seeking to verify the signature of the site, attempts to decrypt the signature using the well-known decryption algorithm associated with the advice site. A successful decryption produces a digital digest which agrees  
20 with the value that the advice reader calculates directly from the message. An unsuccessful decryption produces a result that does not agree with the digital digest of the received message.

It is commonly accepted (see C. Pfleeger, Security in Computing, Second  
25 Edition, Prentice-Hall (1996); and PGP 4.0 Users Manual, PGP Pretty Good Privacy, Inc. (1997)) that this approach, when used in conjunction with certain well-know encryption systems, produces a secure digital document. That is, it is accepted that a malicious agent cannot easily modify a given valid advisory to produce an impostor advisory which produce a successful decryption.

30

Indeed, to deceive this system successfully, it is necessary for the impostor to generate the digital digest of the modified document correctly and then apply the encryption algorithm associated with the advice site. While the impostor may be assumed to have learned the workings of the digital digest mechanism, it is  
5 assumed that he is not able to encrypt documents as if he were the advice site.

The fundamental assumption of modern cryptography systems as applied to public communication is that certain encryption/decryption algorithms can have widely known decryption algorithms and keep the encryption algorithms secret.  
10 Until this fundamental assumption is disproved, the digital signature mechanism is widely considered an effective authentication mechanism.

### MIME

15 In the currently understood best method for structuring advice for Internet transport, an advisory document is packaged as a single ASCII text file which is a valid instance of MIME file (see N. Borenstein, N. Freed, MIME (Multipurpose Internet Mail Extensions) Part One: Mechanisms for Specifying and Describing the Format of Internet Message Bodies, Internet Standards Track RFC 1521  
20 (1993)). Actually, only a special subset of the full MIME format is used. Special extensions to MIME are added to accommodate the invention.

MIME is an Internet standards track format extending the classical e-mail Internet standard commonly referred to as RFC 822. The MIME format is widely used for  
25 Internet transport of electronic mail. It has four features of particular usefulness in connection with advisories:

Header Lines. MIME specifies that a message body may be preceded by an extensive message header consisting of a variety of header lines, where  
30 individual lines begin with a well known phrase and contain addressing, dating,

and related commentary. Some of these lines can be easily adapted to serve the purposes of the invention. For example, the From Line and Subject Line components of an advisory can be implemented by the From: and Subject: header lines that are already part of the MIME standard.

5

Extensibility. MIME provides a method for creating new message lines in messages. This includes a method for embedding the new message lines in messages and a method for registering the new line with the MIME authorities. Key invention constructs relevant-when and expires-when may therefore easily  
10 be added to the MIME language in that fashion.

Alternation. MIME provides a method, *i.e.* Multipart-Alternate, for offering two different versions of the same message, with the destination picking the appropriate display method. Therefore, the invention construct of transmitting  
15 one or more ways to display the same information may easily be implemented using the MIME standard and its Multipart-Alternate feature.

Digesting Mechanism. MIME provides a well-understood mechanism, *i.e.* Multipart/mixed, for packing several complete MIME messages into a single file  
20 for Internet transport. MIME posits a recursive digest structure, in which a message can have several related components, and each component can itself be a MIME file inserted verbatim. Using this feature, a MIME file can be used to digest many component advisories, organized in a tree structure reminiscent of the branching structure of a modern personal computer file system.

25

Thus, MIME becomes a tool, not for packaging e-mail, but instead for packaging a new kind of document, *i.e.* the advisory. To avoid confusion, it should be appreciated that an advisory is unlike e-mail because an advisory does not have an intended recipient or list of recipients. Rather, it is a broadcast message. An  
30 advisory typically has relevance and related clauses, and an advisory typically

has active content. E-mail does not have relevance and related clauses, and does not typically have active content. The advisory is part of a new form of communications which can be implemented within the MIME standard. The advisory application of MIME addresses a different problem than e-mail by omitting certain MIME clauses which were used for e-mail, and by adding new specialized clauses which are used in the relevance determination and advice management process. In a certain sense, the relationship of advisories to e-mail is comparable to the relationship between USENET and e-mail. Both advisories and USENET news systems use MIME as a packaging mechanism. However, both offer means of communications which are distinct from e-mail.

Although MIME is a convenient method of realizing the form of an advisory, there is no necessary connection of the invention to MIME. There are many other common formats in the Internet world, such as XML, which may be used for representing advisories. In this disclosure, only the currently understood best method for implementing the advice file is discussed.

#### Example

The following is an example of an advisory file:

```
Date: Sat Mar 21 1998 17:06:12 +0800
From: Jeremiah Adviser <jeremiah@advisories.com>
MIME-Version: 1.0
Organization: Universe Communications, Inc.
Subject: A better version of the advice reader is now available
relevant-When: version of application "advice.exe" < version "5.0"
Content-Type: text/html; charset=us-ascii

<HTML><BODY>
```

A better version of the advice reader is available.

Click to <A HREF="http://www.advisories.com/win98/advice50.exe">

Download </A> the latest version of advice reader.

</BODY></HTML>

5

Here the reader can see the various components of an advisory embodied as MIME components:

- Wrapper. MIME-Version and Content-Type header lines.

10

- From Line. From: Jeremiah Adviser ...

- Subject Line. Subject: A better version of ...

15

- Message Body. An HTML fragment, beginning <HTML> and ending </HTML>.

20

- Action Button. Not present in this advisory. The active component of the message (downloading) is handled by the HTML HREF link. The user sees the word Download and typically understands that a mouse click on that word causes the indicated action.

#### Ratings Blocks

25

In an additional variation, it is possible for an advisory to contain ratings blocks containing information rating the advisory according to criteria such as privacy, security, and usefulness. There exist standard formats for such ratings blocks (see Khare, Rohit, *Digital Signature Label Architecture*, The World Wide Web Journal, Vol. 2, Number 3, pp. 49-64 O'Reilly (Summer 1997),

<http://www.wg.org/DSIG>) and these are easily appended to messages with MIME structure. See also below.

#### Relevance Language

5

Advisories have a format resembling the format of e-mail messages, with many of the same components in the message/digest headers. One key extension offered by advisories is the institution of a new clause in the message, *i.e.* the relevance clause. The relevance clause is preceded by the keyword phrase relevant-When:. An expression from the relevance language follows the keyword.  
10 The following discussion describes the currently understood best method for describing the state of a consumer computer.

#### Descriptive Language

15

The purpose of a relevance clause is to examine the state of an individual computer and determine whether it meets various conditions which combine to imply the relevance of a certain advisory.

20 In the currently understood best method for implementing the invention, the language itself, *i.e.* in the allowable phrases of the language and the underlying semantics of the phrases, provides an intellectual model of the components of the consumer computer, its peripherals, storage devices, files, and related concepts. This is distinct from the usual model of computer languages, in which  
25 the language itself provides a rather meager picture of the problem it is used to address.

In common with traditional languages, the relevance language contains a few elementary data types, such as Boolean, integer, and string. Also in common

with traditional languages, it is permissible to write arithmetico-logical expressions such as:

$$(2346 + (-1234) / (1 + 2)) > 0$$

5

The meaning of a typical subexpression, e.g. 1+2, is apply method + to the pair of objects resulting from evaluating the two subexpressions 1 and 2. The pair of objects in question are objects of type Integer having values of 1 and 2, respectively. In the currently understood best method, the relevance language  
10 has a full range of arithmetic, string, and logical operations available, which are expressed as built in methods set to operate on the built in concrete data types (see Fig. 12).

Unlike traditional languages, the relevance language contains an abstract data  
15 type, World, which may be thought of as the overall environment of the personal computer on which the relevance clause is evaluated. This object has properties. These properties yield objects of various types, and these objects may have further properties (see Fig. 13).

20 World is a data type that, depending on the specific implementation and on the specific system configuration, may have many properties.

in the technical support application discussed above, these properties may include the system folder property, the CPU property, and the monitor property.  
25 Properties of an object are obtained by applying assessor methods to the object. The assessor method for the system folder of data type World returns an object of type system folder. The assessor method for the CPU property of data type World returns an object of type CPU. These derived objects, in turn, have properties of their own. For example, an object of type CPU may have a  
30 collection of properties such as speed, manufacturer, model, MMX, and cache. A

method corresponds to each of these properties which, when applied to the object of type CPU, returns a result. For sake of discussion, it can be assumed that speed results in an integer, manufacturer results in a string naming the manufacturer, model results also in a string, naming the model type, and MMX and cache return the more specialized object types MMX, and cache.

The relevance language implicitly postulates that the set of inspectable properties of the consumer computer is identical to the set of properties of data type World and the set of properties derivable from World by repeated applications of asking for properties of an object derived from World (see Fig. 14). ObjectWorld gives an idea of the richness of the object world derivable in this way in the technical support application.

#### Example Relevance Clauses

15

The following are examples of relevance clauses as used in a technical support application:

#### Existence of a certain application on the consumer computer

20

relevant-When: exists application "Photoshop"

The intent of this fragment is that application is a property of World which takes an extra string parameter and returns an object of type application. exists is a property of any object, which returns the Boolean True if the object exists. If the application named Photoshop cannot be found by the method implementing the application property, then the result is a non-existent object, for which exists returns the Boolean False.



Comparison of version numbers

relevant-When: version of Control Panel "MacTCP" is version "2.02"

- 5 The intent of this fragment is that Control Panel is a property of the World which takes an extra string parameter and returns an object of type Control Panel. If the Control Panel named MacTCP cannot be found by the method implementing the Control Panel property, then the result is a non-existent object, for which version is not an allowed property, and evaluation fails. If the Control Panel named
- 10 MacTCP is found, then version, being an allowable property of Control Panels, leads to invocation of a method which returns an object of type version containing the version number of that Control Panel, recorded in a particular format. This result is compared with the result of subexpression version "2.02". This time version refers to a property of World, which takes an extra string
- 15 parameter and returns an object of type version. If evaluation succeeds, the result of this comparison is Boolean: either True or False.

Compare modification dates

- 20 relevant-When: modification time of Photoshop Plugin "Picture Enhancer" is greater than time "10 January 1997 12:34:56 +0800"

- The intent of this fragment is that Photoshop Plugin is a property of the World which takes an extra string parameter and returns an object of type Photoshop
- 25 Plugin. If the Photoshop Plugin named PictureEnhancer cannot be found by the method implementing the Photoshop Plugin property, then the result is a non-existent object, for which modification time is not an allowed property, and evaluation fails. If the Photoshop Plugin named PictureEnhancer is found, then modification time, being an allowable property of a Photoshop Plugin, leads to
- 30 invocation of a method which returns an object of type time. This result is

compared with the result of subexpression time "10 January 1997". Here, time refers to a property of World which takes an extra string parameter and returns an object of type time. If evaluation succeeds, the result of this whole expression is Boolean: either True or False.

5

#### Automatic Parsing and Evaluation

A key purpose of the relevance language is to enable an advice provider to publish advisories which can be accessed by the advice reader, running on a consumer computer, and be automatically read to determine, without intervention from the consumer, whether the advisory is relevant to the consumer.

In the currently understood best-method, the relevance language is implemented as a context free grammar which can be automatically parsed into a tree of subexpressions. The tree of subexpressions can be understood as an abstract structure whose nodes are methods and whose branches are subexpressions.

This tree is represented using a standard notation in computer science:

20           (node (expr-1) (expr-2) .... (expr-n))

where node gives the name of the method to be applied, and (expr-k) stands for the k-th subexpression to be furnished to the method. For example, the expression:

25

$$(2346 + (-1234)/(1 + 2)) > 0$$

can be parsed into the expression tree:

```

5      (>      (+      (Integer 2346)
                    (/      (Integer -1234)
                    (+      (Integer 1) (Integer 2))
                    )
                )
        (Integer 0)
    )
10

```

The expression:

exists application "Photoshop"

15 can be parsed into:

(exists (application "Photoshop"))

The expression version of Control Panel "MacTCP" is version "2.02" parses into:

```

20 (is (version (Control-Panel "MacTCP"))
    (version (string "2.02")))
    )

```

25 Finally, the expression:

modification time of Photoshop Plugin "Picture Enhancer" is greater than  
time "10 January 1997"

30 parses into

```
(is-greater-than (modification-time (Photoshop-Plugin "Picture Enhancer"))
                  (time (string "10 January 1997")))
)
```

5

In short, the goal of parsing is to identify a sequence of method invocations to be applied. Procedures for parsing context-free grammars into expression trees are well-understood (see A. Aho, J. Ullman, Principles of Compiler Design, Addison-Wesley (1977)). A lexer breaks the input into a series of tokens. In the currently

10 understood best method, these tokens may take of the following forms:

[String] A string of printable ASCII characters enclosed in quotation marks (").

[Integer] A string of decimal digits.

15

[Minus] The character -.

[SumOp] The characters +, -.

20 [PrdOp] The characters \*, / and the string mod.

[RelOp] The character sequences = > >= <= != and the relational phrases and or is not.

25 [Phrase] A sequence of one or more unquoted words, a word being an alphanumeric string beginning alphabetically and not containing embedded blanks. Phrases break at reserved phrases.

Parsing proceeds mechanically according to a precedence table giving the productions of a grammar. In the currently understood best method, the productions in the grammar are as follows:

```

5      <Goal>           := <Expr>
      <Expr>           := <Expr> or <AndClause> | <AndClause>
      <AndClause>      := <AndClause> and <Relation> | <Relation>
      <Relation>       := <SumClause>[RelOp]<SumClause> | <SumClause>
      <SumClause>      := <SumClause> [SumOp] <Product>
10     | <SumClause> [Minus] <Product>
      | <Product>
      <Product>       := <Product> [PrdOp] <Unary>
      | <Unary>
      <Unary>          := [Minus] <Unary>
15     | [UnyOp] <Unary>
      | <Cast>
      <Cast>          := <Cast> as [Phrase]
      | <Reference>
      <Reference>     := [Phrase] of <Reference>
20     | [Phrase] [string] <Restrict> of <Reference>
      | [Phrase] [integer] <Restrict> of <Reference>
      | [Phrase] [string] of <Reference>
      | [Phrase] [integer] of <Reference>
      | [Phrase] <Restrict> of <Reference>
25     | [Phrase] [string]
      | [Phrase] [integer]
      | [Phrase] <Restrict>
      | [Phrase]
      | exists <Reference>
30     | number of <Reference>

```

```

| [string]
| [integer]
| it
| ( <Expr> )
5 <Restrict> := whose ( <Expr> )

```

In this display, word stands for a reserved word in the language, [Phrase] stands for a phrase as defined in the discussion of lexical analysis on the previous page.

10 A grammar can be used to generate a parser by any of several means (see A. Aho, J. Ullman, Principles of Compiler Design, Addison-Wesley (1977)). These may include automatic parser generators, such as YACC, which create a table driven finite state automaton that recognizes the grammar. The table is created directly from the production forms above, and also by hand generation of  
 15 recursive descent parsers based on mimicking the productions of the grammar in modules whose naming and internal structure mimic the structure of the productions of the grammar.

All such approaches have the same basic result. New tokens are input, one-at-a-  
 20 time, and compared with the current state and also with a table giving allowable type and mandated action on receiving that token, if any. The mandated action can be interpreted as specifying the individual steps in the systematic building up of an expression tree. A typical action is that associated with the production:

```

25 <Relation> := <SumClause> [RelOp] <SumClause>

```

which could be written, in a standard notation, as:

```

30 $$ = ($2 $1 $2)

```

This is interpreted as follows:  $\$ \$$  refers to the result of the production,  $\$ 1$ ,  $\$ 2$ ,  $\$ 3$  refer to the component subexpression trees, and the parentheses are notational devices that are used to delimit expression trees. This action calls for the association of the recognized  $\langle \text{Relation} \rangle$  with an expression tree. This results  
5 from joining expression trees which are associated with the left-subexpression and the right sub-expression with a root method that compares the two expressions. Consider the expression version of Control Panel "MacTCP" is version "2.02". Consider the state of the parser at the moment that it attempts to apply the  $\langle \text{Relation} \rangle$  production with [RelOp]. The expression tree already  
10 associated with the left subexpression,  $\$ 1$ , has representation (Control-Panel "MacTCP") and that associated with the right subexpression,  $\$ 3$ , has representation (version (string "2.02")). The expression tree associated to the overall  $\langle \text{Relation} \rangle$  expression is the merger of these two according to the pattern (is  $\$ 1$   $\$ 3$  ). Hence, the resulting expression tree is representable as (is (Control-  
15 Panel "MacTCP") (version (string "2.02"))).

Associated with each production is an action of appropriate form which describes how the tree is built. In certain implementations, the tree may only be built up implicitly.

20 Parsing can continue normally, if at every step of the parsing the next available symbol matches an allowable type; or it can fail, if an unexpected combination occurs. As soon as parsing fails, the piece of advice may be declared not relevant.

25 In the currently understood best method of implementing the invention, each valid method is already known to the parser at parse time. Unlike some other languages, parsing can fail if a clause is syntactically correct but uses phrases that name currently unknown methods.

30

In the currently understood best method of implementing the invention, each subexpression takes values which are strongly typed and for which the type is known in advance. Example data types include integer, string, and Boolean. Each method is known at parse time to work with certain combinations of data types of inputs and to give certain definite data types as outputs. Attempts to apply methods to forbidden data types are diagnosed as failure of the parse. If so, the piece of advice may be declared not relevant.

At the successful completion of parsing, an expression tree is built up consisting in essence of a collection of method invocations and associated arguments and associated data types of those arguments. Evaluation of the expression is the process of performing the appropriate method dispatching in the appropriate order.

Evaluation can be successful, or it can fail. It can fail, for example, from excessive use of system resources, unavailability of a resource, excessive delay in obtaining a resource, or for some other reason. Successful evaluation can yield a Boolean value of True or False or some other value. The interpretation of a piece of advice as relevant is equivalent to saying that the evaluation is successful, the value was Boolean, and is true.

In particular, if a certain subexpression cannot be interpreted as a valid expression in the language, if the subexpression attempts to apply methods to forbidden data types, or if the subexpression cannot currently be evaluated, the whole expression can fail, and the advice is automatically declared not relevant.



Extensible Language

The purpose of the relevance language is to describe precisely the state of a computer, its contents, attachments, and environment. This state can change as  
5 the consumer purchases new software and/or hardware, or as new software/hardware objects are invented. This state can change as consumer computers are used to represent consumers in new problem areas, for example, in personal finance, management of communicating devices in the home, or other areas.

10

Consequently it is not possible to delimit in advance the components of state that may be of interest to which the invention provides access. It is desirable for the relevance language to give future authors the ability to extend the relevance language to express concepts about system state that have not yet been  
15 conceived.

In one implementation of the invention, the vocabulary of the relevance language may be extended by the authorities and by authors at individual advice sites.

20 In that implementation, the relevance language is extensible by developing dynamically loaded libraries which add new vocabulary and semantics to the language and/or modify existing vocabulary and methods. These are referred to herein as inspector libraries and may be downloaded from an advice site and installed on a given consumer computer, thereby changing the meaning of the  
25 relevance language on that computer, and allowing new bodies of advice to be interpreted on that computer.

30 These dynamically loaded libraries contain declarations of the new data types which must be added to the language, of the new properties associated with the data types, of the data type resulting when a specific property is obtained for an

object of a specific type, and of methods, *i.e.* executable code that implements access to the properties.

#### Non-Procedural Language

5

Unlike many languages used in connection with the operation and/or maintenance of computers, the relevance language does not need to be procedural. That is, it need not specify how to manipulate the contents of various fragments of memory. This is the opposite of being descriptive. It is not  
10 necessary to enable traditional procedural services, such as loops, assignments, and conditionals.

On the contrary, making these services available in an expansive fashion may pose various security and privacy threats, by making it easy for carelessly written  
15 or maliciously written advisories to consume excessive resources at evaluation time.

In the currently understood best method of implementing the invention, procedural services are not made available in the relevance language. As  
20 inspection of the above grammar description shows the language has:

- no named variables
- no assignment statements
- 25 • no function calls, or at least no explicit function calls with variable arguments
- no loops or conditional execution

These differences in appearance between the relevance language and other common languages are rooted in the following view:

- 5 • Because of concerns about unattended evaluation, the language should ideally have no side effects on the computer or environment.
- To inspire consumer confidence, consumers must have be able to see for themselves that the language has no effects on the computer or environment.
- 10 • A descriptive language, unlike a procedural one, has the appearance of having no side effects.

In short, the structure of the language and the visible limitations should communicate a message of security to the consumer.

15

The following discussion addresses two key differences of the relevance language from procedural languages:

20 Function Calls. The relevance language has method dispatches which correspond to function calls in some other languages, but they are of a more tightly constrained form.

25 First, there are the unary methods and the binary methods that occur in arithmetic and logical operations: +, -, \*, /, and, or, =, and similar operations. These can be thought of as unary or binary function calls, but they are of a very restricted form, implementing well understood methods that typically pose little danger or resource burden.

30 Second, there are unnamed properties such as modification time.

Third, there are named properties such as application Photoshop'.

The unnamed properties can be thought of as function calls applied to an object, but very bland ones, because no parameters are involved. Typically, a property  
5 is computed by extracting a certain value from a certain slot of a data structure. They typically pose little danger or resource burden. The named properties may be thought of as two-variable function calls. The first variable is the object and the second object is the string name-specifier. However, these also are not very  
10 general operations because the string name-specifier, in one implementation, may not itself be a computed result. It must instead be string constant. The types of calculations that can be specified in this way are tightly constrained. Again, typically a named property is computed by extracting a certain value from a  
certain slot of a data structure, so it poses little danger or resource burden.

#### 15 Loops and Conditional Execution.

The relevance language has no for, while, or if statements, but it does have a limited ability to perform iteration. It does this using a construct referred to as plural properties. In the relevance language there can be both singular and plural  
20 properties, e.g. both entry and entries properties, the first referring to a result which must be a singleton and the second referring to a result which may be a plurality. Typically, pluralities are further qualified by the use of the whose () clause to restrict to subcollections.

25 By the plural-singular dichotomy, certain fine distinctions of meaning may be maintained. For example:

exists application "Photoshop"

30 has the meaning that there exists exactly one such application; and

exists applications "Photoshop" whose( version of it is version "4.0")

5 has the meaning that there exists one or more than one application called "Photoshop", and among those there exists one with version 4.0.

In the second example, an iteration is implicitly performed over the collection of all applications called "Photoshop" on the system in question, so the effect of a loop is obtained without using traditional procedural programming.

10

The restrictions on the expressiveness of the language help make the language safer from the viewpoint of privacy and security guarantees (see below). Nevertheless, the language is designed to be powerful in that it is intended to be highly expressive. A few words in this language provide access to answers  
15 about the system state which would be impossible to obtain in traditional procedural languages short of writing hundreds of lines of code and invoking many specialized functions in system libraries.

20 If an apparent need should arise for the kind of services that traditionally are handled by procedural languages, it may typically be satisfied by extending the relevance language using the inspector library mechanism mentioned earlier, and described in more detail below. This has two advantages:

[Efficiency] including new inspectors by this extension mechanism, rather than by  
25 offering procedural services in the relevance language, leads to more efficient execution. Inspectors typically make available efficient compiled methods of execution, minimizing burden on system resources at relevance evaluation time while the relevance language is interpreted, which is typically slower.

[Security] including new inspectors by this extension mechanism allows one to correct problematic situations. If a certain complex expression is used in many places and has bad side effects, then it can be very hard to correct. If an equivalent piece of code is included as an inspector library, then one can identify the problematic code by using the relevance language to identify whether that  
5 inspector is installed on the user computer. This makes it possible to write counter advisories against advice that depends on inspector libraries.

#### Consumer-Accessibility

10

The relevance language controls the execution of a system on a potentially vast number of computers. It is highly desirable, though not strictly necessary, for a relevance clause to be something which, in principle, a consumer could read and form an approximate understanding of, though few users may choose to do this  
15 in most cases.

In the currently understood best method of implementing the invention, the syntax of the relevance language resembles the syntax of plain English, with key roles in the language played by clauses formed from articles such as of, as,  
20 whose, and verbs such as exists.

The highly constrained nature of the language fosters consumer understanding. The language avoids constructs which assume a computer programming background by suppressing concepts such as arrays, loops, and conditional  
25 evaluation.

Inspector librariesComponents of inspector libraries

5 Parsing of a clause in the relevance language results, conceptually, in the generation of a list of method dispatches (see Fig. 11), in which certain methods are called in a certain order with certain argument lists. This evaluation is a process of systematically carrying out the sequence of method dispatches in the appropriate order. Method dispatches are an important aspect the relevance  
10 process.

An inspector library is a collection of methods (see Fig. 15) and associated interfaces which allows for the installation of methods into the advice reader. Because of the structure of the parser and the evaluation process, an inspector  
15 library may contain some of the following components:

- Declaration of a [Phrase] to be used in the relevance language.
- Association of that [Phrase] to a specific method.
- 20 • Declaration of a new data type to be used in the evaluation process.
- Declaration of the calling prototype of the method. This includes the number and the required data types of the arguments to be supplied to the method.
- 25 • Declaration of the result data type of the method.
- Implementation of that method in executable form.

- Declaration of special hooks associating code to be called on events, such as advice reader initialization, advice reader termination, beginning of advice reader main evaluation loop, and ending of advice reader main evaluation loop.
- 5
- Declaration of special hooks associated with creation and maintenance of special caches associated with the method.
- Implementation of special event methods and cache methods in executable
- 10 form.

Conceptually, an inspector library can be linked into the advice reader with all the declarations evaluated, resulting in changes to the advice reader's internal data structures, so that new method invocations become available.

- 15
- These declarations affect two fundamental data structures of the system. The first is a syntax table giving all allowed phrases and the associated data types on which they may operate and the associated data types that result. This is used at lexical analysis time. The second is a method dispatch table, giving a systematic
- 20 way to determine the associated executable method for a given phrase and data types. This is used at evaluation time.

#### Object-Oriented Structure

- 25 A convenient way to implement the above inspector library structure is to rely on the features of a modern object-oriented programming language, such as C++. In effect, the built-in features of such a language, *i.e.* object declarations, polymorphism, and operator overloading, are ways of declaring that certain phrases have a certain meaning when applied to certain data types, and of
- 30 systematically organizing that information. Other features, such as constructors,



copy-constructors, and destructors, are ways of defining certain initialize time and terminate time code bodies.

In the currently understood best method, such features of modern object oriented  
5 languages are used to provide the various features of inspector libraries.

#### Extension

In one implementation, as described above, it is possible to install several  
10 inspector libraries in an instance of the advice reader. The inspector libraries that are so installed define the set of recognized [Phrase]s in the relevance language, the set of allowable data types at evaluation time, and the set of methods associated with those data types.

15 In short, the relevance language may be dynamically constituted. In one implementation, inspector libraries may be created by advice providers and downloaded to the consumer computer as part of the site synchronization. Such libraries may be managed by the advice reader, for example, by storage in a well known location, such as a subdirectory of the overall directory managed by the  
20 advice reader. The inspector libraries in this directory may be linked into the advice reader at the time the advice reader is initialized.

When this linking happens, declaration routines are invoked, installing new  
[Phrase]s in the lexical analysis table of the relevance language, and associating  
25 these [Phrase]s to certain method invocations. The language expands in this way to include new descriptive possibilities.

Layered Language Definition

The relevance language may therefore be open ended, built up in layer upon layer of extensions. Hence, to understand a completely installed system is to understand the layers which have been installed, and to understand the methods that each layer provides. In a typical installation, these layers are as follows:

- Base Layer. Contains the basic mechanics of clause evaluation: a number of basic built-in phrases and associated methods. It is expected that the base layer is the same on every consumer computer carrying the advice reader.
- System-Specific Layer. This consists of a layer associated with a certain operating system, giving information about the characteristics of a certain family of computers and their attached devices and environment. For example, such a layer, in one implementation, provides methods to get the system date and time, the sizes of various files, the contents of the PRAM, or the names of attached peripheral devices.
- Vendor-Specific Layers. This collection of potentially a large number of extensions layers is typically produced by third parties, giving special access to the internals of certain hardware devices and software products. One can think of potential authors ranging a span of products from hardware producers (e.g. of cable modems) to software producers (e.g. of Photoshop and plug-ins) to service providers (e.g. America On-Line).

Example: Version inspector

The following is an example of an inspector for the version property of data type Application under the Macintosh OS. This inspector declares the following:

- A new [Phrase] to be added to the relevance language: version;
- A new data type, version, which has already been referred to in several examples above;

5

- Several properties of this data type which are available under Macintosh OS:

Major Revision. The leading numeric field of the revision number.

10

Minor Revision. The secondary numeric field of the revision number.

Stage. A String, such as Alpha, Beta.

Country. A String, such as USA or France.

15

String1. A String.

String2. A String.

- 20 • Methods, in the form of executable code, which implement the above properties by opening the resource fork of the application, extracting the desired information, and converting into the required data types.

- 25 • A new named property of World, version, which casts a string property specifier, such as the 1.1 in version 1.1, into a version data type.

Upon installation, this inspector makes available to the system a series of data types and properties which may be as depicted in Fig. 14. As an example, to

check if the beta version of an application with version number 0.99 is used, one might write the relevance clause:

- 5           Stage of application "Netscape Navigator" is "Beta"  
          and Minor Revision of application "Netscape Navigator" is 99  
          and Major Revision of application "Netscape Navigator" is 0

#### Special Inspectors

- 10   The language extension mechanism described above has powerful consequences, for example, as described in the following:

#### OS Inspectors

- 15   A system specific inspector can access the properties of the operating system and allow advice to be written to verify the existence and configuration of attached devices and other subsystems.

- 20   The following is an example of a valid fragment written for use with the Macintosh OS inspector library:

          exists serial device "Modem Port"

- 25   The intent of this fragment is to check if this is the type of Macintosh having a dedicated modem port, which is to be distinguished from a Modem/Printer Port. The property of World referred to as serial device potentially matches several different devices. The qualifier selects from among those the one which has the name "Modem Port." If there are any such devices, the phrase evaluates to True. If not, the phrase evaluates to False.

30

input name of serial device "Modem Port" is ".Ain"

The intent of this fragment is to check if the modem port is using the standard serial driver for that port. The specific property of World referred to as serial device "Modem Port" is an object with property input name. The fragment checks to see if this is equal to .Ain, its usual value in the Mac OS.

Examples of other properties and data types available in the Macintosh OS inspector library include:

10

- Physical RAM. Property of World. Integer-valued: number of bytes of installed RAM memory.

15

- Logical RAM. Property of World. Integer-valued: number of bytes of installed RAM memory and virtual memory.

- Virtual Memory. Property of World. Boolean-valued: True if the virtual memory option is enabled.

20

- PowerPC. Property of World. Boolean-valued: True if the CPU is a PowerPC.

- System version. Property of World. Data type: version. Version of system which is currently installed.

25

- ROM version. Property of World. Data type: version. Version of ROM which is currently installed.

These examples make it clear that one can write relevance clauses which target machines having, for example, a small amount of memory, outdated ROMs, or old system versions.

5 Registry Inspector

Modern personal computer operating systems, such as Windows 95 and Macintosh OS 8, have special databases referred to as registries which record a considerable amount of information about the configuration of the system, and  
10 the installation of certain pieces of software. A registry inspector is an inspector library which, when installed in the advice reader, enables the relevance language to refer to and evaluate properties of the registry database.

The following is an example on the Macintosh platform:

15

22 = integer value of entry "APPL.interrupt" of entry "bandit" of  
entry "Device Tree" of entry "devices" of Registry

The intent of the fragment is to enter the Macintosh name registry, find entry  
20 "devices", look for the entry "Device Tree" within that, and descend to the subentry "bandit" and then the subsubentry "APPL.interrupt". The resulting entry is then converted into an integer value and compared with code 22.

The registry may contain a vast amount of information about the computer on  
25 which it operates. The registry inspector makes all this information accessible to the relevance language.

Preferences Inspector

Typical application programs on modern computers, such as Netscape and Microsoft Word, have special databases, referred to as preferences files, which record a considerable amount of information about the configuration of a certain program. A preferences inspector is an inspector library which, when installed in the advice reader, enables the relevance language to refer to and evaluate properties of the preferences file of a specific application.

10 The following is an example:

Suppose that the Web browser application Netscape Navigator has a preferences file, which associates to various content types. A helper application knows how to process that content type. For example, a helper application associated with a graphics file of type JPEG might be JPEGView, and a helper application associated with type x-pn-realaudio might be RealAudio Player.

Suppose that an advice provider called RealAudio wants to author advisories which target users whose Web browsers are misconfigured, and to provide them with automatic corrections to the configuration.

Suppose that there is available a Netscape Navigator Preferences Inspector and that, after installation of that inspector in the advice reader, Netscape Navigator Preferences becomes a property of World.

25 This provider could then target consumers with RealAudio products, but improperly configured Web browsers, by authoring an advisory with relevance clause:

exists application "RealAudio Player 4.0"  
and exists application "Netscape Navigator"  
and ( (helper name of entry "x-pn-realaudio" of entry "Helper Table"  
of Netscape Navigator Preferences )  
5 is not "RealAudio Player 4.0"  
)

The intent of the fragment is to access the Netscape Navigator Preferences file,  
find entry "Helper Table", look for the entry "x-pn-realaudio" within that, and  
10 extract the associated helper name. The resulting entry is a string which is  
compared with "RealAudio Player 4.0."

The preferences file of a modern software application contains a considerable  
amount of information about the working of the application, and a preferences  
15 inspector makes all this information accessible to the relevance language.

#### Database Inspector

Many consumer computers contain, either explicitly or implicitly, a commercial  
20 database which stores information about the consumer. Examples include:

- Databases associated with personal finance programs. Consumers who use  
Check Free, Quicken, and similar programs implicitly have databases on their  
25 machine.
- Databases associated with small office suites. Consumers who are running  
small businesses have customer databases, supplier databases, and  
accounting databases on their machines.



A database inspector is an extension to the base relevance language whose purpose is to allow the relevance language to access fields in a database. An example syntax is as follows:

5           numeric field "CURRENT BALANCE" of FoxBase Database  
          "Personal.DBF" < 0

The intent of this fragment is as follows: The advice provider is attempting to reach consumers who use CheckFree. Users of CheckFree have a FoxBase-  
10       created database resident on their machine which is identified as Personal.DBF. The fragment intends to reach such consumers whose current bank balance, as indicated by the database, is negative. The semantics of the evaluation depend on the implementation of the FoxBase Database Inspector.

15       It may be assumed that this works as follows: A database named Personal.DBF is located on the consumer computer's mass storage, is interpreted as if in FoxBase format, and the numeric field with field name CURRENT BALANCE is extracted. The fragment then compares the extracted value to the value 0.

20       Note that if the consumer does not have a database of the indicated type, the clause above fails to parse or fails to evaluate. Either way, it is not declared relevant. This reduces the need to worry about qualifying clauses of this type by lengthy preambles which check if the software of a certain type is available. Parse time failure could occur because the consumer computer does not have  
25       the FoxBase Database Inspector installed. Evaluation time failure could occur because the file Personal.DBF cannot be located.

An application of this technology is in the technical support arena. Suppose that an advice provider publishes software which, as with CheckFree, creates and  
30       manages a database, and the provider would like to help consumers keep the

database well updated. The advice provider could author advisories which target common problems in the consumer database, e.g. consumers who forgot to initialize the database with the correct balance. Such advisories would call these problems to the attention of consumers who have them, as well as specifying solutions to the problems.

#### User Profile Inspector

The invention maintains a file or files offering a user profile, consisting of certain identifying phrases and associated values.

A user profile inspector is an inspector library that can be installed in the advice reader and which enables the relevance language to refer to data stored in the user profile. At a high level of abstraction, this is the same type of function that is enabled by the database inspectors or registry inspectors, only with a different database being inspected.

As an example of how such an inspector might be used, suppose it was desired to reach users with Zip Codes of the form 947XX. Supposing that the user profile has a variable referred to as Zip Code, the relevance clause:

$$947 = (\text{value of variable "Zip Code" of User Profile as integer})/100$$

would provide the needed functionality. The intent of this clause is as follows: The user profile is inspected, the variable named Zip Code is extracted, it is converted from string to integer, and the resulting integer is divided by 100. The two trailing digits are lost in the process, leaving an integer with three digits that may be compared to 947.

In one implementation, the user profile is a dynamically expanding database, with new variables added as advice providers need them. A mechanism is provided so that an advice provider can author a template file which describes a collection of variables to which the advice provider plans to refer in advisories and would like the consumer to specify. The template file is placed at the advice site and is automatically gathered at synchronization time. The template file is used to drive an editing module on the consumer computer which presents the user a list of the template variable names and a list of their current values or blanks if they have not previously been defined. The user can then fill in the blank fields and edit other fields. In this way, the variables which the provider wants defined can be brought to the attention of the user and edited.

The portion of the user profile associated with the specific advice site in this way is called the site profile. The advisory with relevance clause:

15

not exists Data file of site Profile

checks whether the site profile has been initialized for this site. If not, the advisory should have, as human-interpretable content, a message which indicates that the advice provider would like the user to fill out the user profile variables needed for correct functioning of advice associated with that site. It should have as computer interpretable content an invocation of an editing module which uses the new template to present the user with choices for editing a new user profile.

25

The advisory with relevance clause:

Modification Time of Data file of site Profile <

Modification Time of Template file of site Profile

30

checks whether the site profile has been updated since the last new template file. If not, the advisory should have, as human interpretable content, a message which indicates that the advice provider would like the user to add some new user profile variables needed for the future correct functioning of advice associated with that site. It should have as computer interpretable content an invocation of an editing module which uses the new template and the old profile to present the user with choices for editing.

#### Remote Inspector

10

In principle, inspector libraries can also give the relevance language the ability to inspect properties of other communicating devices. These include:

- 15 • Remote Physical Measurements. Ask other devices for information which those devices can measure, the information possibly to include position, temperature, voltage, or status of a process.
- 20 • Remote Device Queries. Ask other devices for information about themselves or about their state.
- Remote Computation. Ask other computers for the result of a calculation, for example a calculation specified by a formula, program, or script provided by the inspector.
- 25 • Remote Database Queries. Ask other computers with databases to answer queries concerning contents of those databases.

- \* Remote relevance Invocation. Pass a relevance clause to another computer and obtain the result, as evaluated by the other computer in that computer's environment.

5 The following is an example of a remote physical measurement. Suppose there is an inspector library which defines a property of the World called Internet atomic clock and which has the ability to make queries to an authoritative timekeeper by Internet protocols that can return the result as a relevance language time data type. Suppose that it also defines a property of the World referred to as system Greenwich Time which gives the Greenwich Mean Time equivalent of the system clock. The following relevance clause targets consumers whose system time is incorrectly set:

```
abs((Greenwich Time of Internet Atomic Clock) - System Greenwich Time)  
15 > time "10 Seconds"
```

The following is an example of a remote device query. Suppose there is an inspector library which defines a property of the World called network Postscript printer and which has the ability to make queries to the currently selected printer to determine if it is properly configured. A valid relevance clause is:

```
Model of Network Postscript Printer is "LaserJet 5" and  
ROM Version of Network Postscript Printer < version "2.0"
```

25 which targets those consumers with LaserJet 5 printers having old ROMs.

The following is an example of a remote database inspector. Suppose that the advice provider is a large organization that serves a population of advice consumers who are employees, who have small hand held computational devices, and who keep important data on a remote computer which has a trust

relationship via security handshaking with these small devices. Suppose that the employees use organizational data which is accessible via a Lightweight directory Access Protocol (LDAP) database server accessible over Internet (see W. Yeong, T. Howes, S. Kille, *LDAP (Lightweight Directory Access Protocol)*,  
5 Internet Standards Track RFC 1777(1995)). The advice provider would like to serve up advice which asserts conditions about the employees assigned project which is not available on the hand held machine, but instead is available by LDAP queries to the LDAP server. In addition, it asserts conditions about the employees status which are only available on the hand held machine.

10

The provider develops an inspector library which can access data on the LDAP server, and an inspector library which can access data on the hand held device. Suppose that the installation of these inspectors includes steps to configure the LDAP queries with appropriate passwords and appropriate usernames. A valid  
15 phrase in the relevance language is:

sponsor of assigned project of Employee LDAP record is "U.S. Government" and (per diem charges of current daily expense of Employee Handheld record > 35)

20

The intent of this fragment is for a certain entry to be extracted from the LDAP database associated with this employee, and the sponsor name compared to "U.S. Government." If that condition holds, the current travel expense record is queried for a *per diem* claim.

25

This approach provides a way of anonymously and proactively targeting employees listed in the organizational database as subject to a *per diem* rate lower than the expenses they are generating. Thus, the invention provides a method of checking expense claims during travel, well before submission.

30

Important issues arise in the specification of the interfaces with remote systems. One aspect is that there must be a trust relationship between the consumer computer requesting the remote service and the other device or computer fulfilling the request to allow automatic evaluation of relevance. The  
5 communications must be encrypted in some cases. The degree of resource use must be monitored. Digital authentication must be available in some cases. These are all details that can be handled by well-known mechanisms.

The provision of a process whereby an advice provider can author advisories  
10 which refer not only to properties of the consumer computer and its environment, but also to properties accessible by query from the consumer computer, creates a new communications protocol described below, *i.e.* the personal information access protocol.

#### 15 Inspecting program log Files

Many computer software applications and processes maintain a log file or files the contain a record of the history of execution of the application or process. Standard examples of this include transaction logs kept by mail servers and by  
20 login daemons, backup logs kept by backup software, and error logs kept by user programs.

A program log inspector is an inspector library that can be installed in the advice reader and which enables the relevance language to refer to data stored in a  
25 certain log file or files. At a high level of abstraction, this is the same type of function that is enabled by database inspectors, registry inspectors, or user profile inspectors, only with a different database being inspected.

Such an inspector library defines access methods the allow one to obtain key  
30 data items from log files.

As an example of how such an inspector is used, suppose it was desired to reach users who run the application GraphMaker, where the log file generated by Graphmaker contained an error entry with error code 93456.

5

Suppose that this error code indicates that a certain PostScript printer was unable to process the file output by Graphmaker. It is desirable to communicate to consumers in this situation the fact that there is a workaround for this problem. Suppose that Graphmaker has an inspector library available at its advice site which implements a set of methods associated with the central data type, which is referred to as GraphMaker error log. Assume that when this inspector library is installed in the advice reader, GraphMaker error log is a property of World. Assume that GraphMaker error log has a property referred to as entry, and that the result of such a property is an object of type GraphMaker error log entry with properties error code and error message, yielding integer and string data types, respectively. Then, there:

1.0  
1.5

exists entries "Error" of GraphMaker error log whose (Error Code of it = 93456)

2.0

provides the needed functionality. The intent of this clause is as follows: The file associated with the GraphMaker error log is located and opened, and a search is made through this file for entries of type error as opposed to warning. These entries are examined to determine if any of them is associated with an error code of the indicated type.

2.5

This enables a technical support organization to develop a process for maintenance of complex products in the field where:



- \* The product is developed so that exceptional conditions are identified and logged;
- \* Inspectors for this log are developed and published at an advice site; and
- \* Advice is authored which inspects the log to identify and correct problematic situations.

In this way a technical support organization can target consumers experiencing certain program faults.

#### Inspecting the Advice System

The advice reader maintains subscription information, pools of advisories and, in one implementation, logs that indicate the history of relevance evaluation and of automatic solution operation.

An advice system inspector is an inspector library that can be installed in the advice reader and which enables the relevance language to refer to data stored and managed by the advice reader itself. At a high level of abstraction, this is the same type of function that is enabled by database inspectors, registry inspectors, or user profile inspectors, only with a different database being inspected.

Such an inspector library defines access methods that allow one to obtain key data items from important components of the system:

- \* The subscription database: Existence or nonexistence of certain subscriptions, address of advice sites associated with certain subscriptions, synchronization schedule associated with certain subscriptions, digital

authentication information associated with certain subscriptions, other interesting attributes.

- 5     • The advice database: Existence or nonexistence of certain advisory in the advice database. Relevance or irrelevance of certain advisory in the advice database. Existence or nonexistence of certain author in the advice database. Existence or nonexistence of certain subject in the advice database.
  
- 10    • The advice readers log files: Existence of a subscription to a certain site sometime in the past. Existence or nonexistence of certain diagnostic conditions, for example, aborted evaluation of certain advisory due to excessive time to evaluate an advisory. Relevance of certain advisory at some time in the past. Acceptance by user of an automatic solution operator associated with certain advisory at some time in the past.
  
- 15    • The advice readers configuration: Installation of certain inspectors. Parameters of advice reader operation. User Preferences.

20    As an example of how such an inspector is used, suppose that in January 1998 a special piece of patch code was released which modified the application Graphmaker. Suppose that most consumers who installed this patch learned of it through the advisory process described herein. It is desired to reach users running the application GraphMaker which at some point in the past, prompted by an advisory, had installed the patch to the Graphmaker application. Suppose  
25    this is because an improved version of the patch has become available.

A comprehensive strategy for this situation formulates several advisories. The strategy formulates an advisory for users who have a current subscription to the advice site. This is prosaic in construction, and uses mechanisms described

earlier. However, a comprehensive strategy also formulates three other advisories intended ultimately for other users:

5 First, the strategy formulates an advisory for users who no longer subscribe to the advice site, but who may have done so at some time in the past. The advisory is distributed by various means outside the normal subscription mechanism of the invention, for example through a service, e.g. UrgentAdviceNet. This advisory looks to see if GraphMaker is installed, to see if there is no active subscription to the GraphMaker advice site, and then at the log  
10 file generated by the advice reader to see if Graphmaker advisory "98/1/08-1" was relevant at some time in the past and if the user had accepted the proposed solution. Any consumer for whom this is relevant is notified, first that they should resubscribe to the site if possible, and second that when they do they get instructions about updating the patched code.

15

Second, the strategy formulates an advisory for users who have never subscribed to the advice site and never received the earlier advisory. This advisory checks if the affected version of GraphMaker is installed, and then sees if the current subscription database shows no active subscription, and also if the  
20 log shows no formerly active subscription. Any consumer for whom this is relevant is notified, first that they should subscribe to the site if possible, and second that when they do they get instructions about updating the patched code.

Third, the strategy formulates a counter- advisory for users who have somehow  
25 obtained a copy of the former advisory by means other than subscription, and which is somehow still active in the advice database. Such an advisory is not automatically deleted by site synchronization because it is not associated with the originating advice site. The advisory identifies the existence in the advice database of the old advisory. Any consumer for whom this is relevant is notified,  
30 first that this active advisory is no longer avowed by its author, second that the

consumer should subscribe to the site if possible, and third that when they do they get instructions about updating the patched code.

5 Suppose that advice reader has an inspector library installed which implements a set of methods associated with three central data types, referred to as adviceNet subscription inspector, adviceNet advice inspector, and adviceNet history inspector.

10 With such inspectors one may target consumers who may have adopted the proposed solution of the advisory in the past, but who do not currently subscribe:

exists application "GraphMaker" whose(version of it is version "1.01")  
and not exists entry "GraphMaker" of adviceNet Subscription inspector  
and exists entry "relevant" of adviceNet History inspector  
15 whose (author of it is "GraphMaker" and  
identifier of it is "98/01/08-1" and  
adoption status of it is "Accept")

20 With such inspectors one may also target consumers who have never subscribed:

exists application "GraphMaker" whose(version of it is version "1.01")  
and not exists entry "Subscription" of adviceNet History inspector  
whose (name of it is "GraphMaker")  
2.5

With such inspectors one may also target consumers who received the advice by other means than subscription:

exists application "GraphMaker" whose(version of it is version "1.01")  
and exists entry "Advisory" of adviceNet advice Database  
whose (author of it is "GraphMaker" and Identifier of it is "98/01/08-1")

- 5 These inspectors enable a technical support organization to develop a process for maintenance of bodies of advisories and to adapt to the consequences of adoption/non-adoption of previous advisories.

A second type of example is provided by the case where an advice provider  
10 RealAudio wants to author an advisory checking whether a certain inspector is installed and is the correct version, for example, because advice depends on this. Assume that there is an inspector library which, when installed, adds adviceNet configuration as a property of World. RealAudio could serve up advice at its site with the relevance clause:

15

not exists inspector library "Netscape Preferences" of adviceNet Configuration

allowing one to check that an inspector library was not installed. The humanly interpretable content of the associated message is an explanation that for  
20 RealAudio advice to work properly, the user should get the appropriate inspector from the Netscape site. In addition, it could serve up advice qualified by:

25

version of inspector library "Netscape Preferences" of adviceNet Configuration  
is not version "1.0"

to target users with the wrong version of an inspector library.

Such an inspector enables a technical support organization to make sure that the advice reader is correctly configured to use the advice provided by that  
30 organization.

## Variations

### Alternate Transport Mechanisms

5

So far, the discussion herein has centered around a single mechanism for the transport of advisories. In fact, there are many situations where other means of transport are useful and/or desirable. Some such means of transport include:

- 10 \* advice by physical transport. An advisory may arrive at the consumer computer by file copy from a floppy disk, CD-ROM, or similar physically transportable medium.
- \* advice by e-mail. An advisory may arrive as part of an e-mail message,  
15 routed from another consumer, or from an advice provider.
- \* advice by USENet. An advisory may arrive as part of a news message distributed according to the USENet protocol, posted by another consumer, or by an advice provider.  
20
- \* advice by proprietary protocol. An advisory may arrive as part of a message distributed according to a proprietary protocol.
- \* advice by file transfer. An advisory may be obtained by file transfer from  
25 another machine, where said transfer uses an application other than the advice reader. For example, a user might direct a Web browser to download an advisory file that is pointed to by a hypertext link. Or, an application might direct the downloading of an advisory, without user control, using FTP or some file sharing protocol.

There are three different procedures for treating advice that has arrived by one of these routes:

- 5    \* Adding to advice database. The advice is added to the existing database of advice being tested continually for relevance.
  
- \* Situational evaluation. The advice is evaluated for relevance when opened, but not entered into any permanently maintained pool. When closed, the  
10    advisory has no interaction with the system. This type of advice is part of a manual check, for example, in a once only situation.
  
- \* Stockpiling. The advice is stored on the consumer computer's storage device for future use. This means that at some future time it is added to the advice  
15    database or at some future time it undergoes one-time evaluation.

The possibility of situational evaluation, *i.e.* situational advice, bears special notice (see Fig. 16). This can be used to create rather complex digests of  
20    advisories which are opened by the consumer only when special needs or situations arise.

The following are examples of alternate transport mechanisms applied in the technical support application area:

- 25    \* advice before purchase. An advice digest arrives at the consumer computer as part of the shopping process for a new piece of software or hardware on the consumer computer. This collection may arrive by physical transport of media or by electronic transfer, for example, the consumer may obtain the digest from a Web site devoted to shopping. The digest, when processed by

the advice reader, evaluates the consumers hardware situation and informs the consumer about its suitability for various possible purchases. The process is typically run only once.

5 \* advice with installation. An advice digest 160 may arrive at the consumer computer as part of the installation process for a new piece of software or hardware on the consumer computer. This piece of software may have arrived by physical transport of media 161 or by electronic transfer 162. The new advisories may be added as part of an automatic initialization process  
10 whereby a subscription is automatically initiated and the advisories are placed in the advice pool as a way of initiating the local site image. An optional synchronization of the user location with the advice site may occur 163. The user reader opens the advice digest 164 and evaluates advice relevance 165. Advisories are displayed with optional solutions 166 and the user reacts to the  
15 advisories 167. The system may perform a standard software installation 168 and enter a subscription to a post-install advice site 169 to receive post-install advisories 170.

\* problem diagnosis. An advice digest may arrive at the consumer computer as  
20 part of the installation process for a new piece of software or hardware on the consumer computer. However, no use is made of the digest at installation time. Instead, the digest is copied onto the storage device of the computer. Later, the user is informed to open the digest by any of several means for situational use when a certain problem arises. Upon doing so, the user is  
25 notified of various advisories which apply to this specific situation and hardware/software/settings configuration. After the episode is over, the advice is closed, perhaps to be reopened at some later time for possible reuse.

30 Alternate Notification Mechanisms



Advisories can be presented to the user in other ways than through the usual advice reader interface. For example:

- 5
- Via Notify Box in Other Applications. The user may be notified of the existence of a relevant advisory while using another application. Notification uses a mechanism appropriate to that application. For example, the consumer is engaged in another activity, e.g. viewing a video, and is notified in an unobtrusive way, e.g. in this case by picture-in-picture.

10

  - Via Desktop/Screen Saver. The user may be notified of the existence of a relevant advisory when he is not using an application. Notification uses a mechanism appropriate to the default presentation. For example, the desktop has an animated icon depicting the existence of relevant advisories. Another  
15 example, a screensaver presents an animated presentation whose state indicates status of machine, e.g. subsystems affected by advisories.
  - Via e-mail. The user may be notified of the existence of a relevant advisory by electronic messaging using e-mail. This includes textual summaries indicating  
20 the number and type of relevant advisories and the number and type of affected system components.
  - Via messaging. The user may be notified of the existence of a relevant  
25 advisory by electronic messaging driving other modalities of information transmission. This may include standard means of communication, such as pager, phone, and fax transmission. For example, in an environment where consumer appliances are connected to a computer in the home, the invention inspects properties of the devices and pages the consumer with urgent messages. An advisory is written referencing the temperature in the home,

with the effect that if the temperature were excessively high or low, an advisory is relevant. Assuming that the relevance notification is set up to use alphanumeric paging, the consumer is paged to indicate that the temperature in the house was out of normal bounds.

5

#### Frequency of Relevance Evaluation

As so far described, relevance evaluation is a process carried out by the advice reader. A typical implementation continually evaluates all advice in the advice  
10 database for relevance, metering total CPU resource usage, and keeping resource consumption measured over intervals of, e.g. 1 second, below a certain fraction of available CPU time.

A typical implementation allows user involvement in three ways:

15

First, by allowing the user to set parameters controlling the fraction of CPU resource used during continuous evaluation.

Second, by allowing the user to group advisories into special pools which are  
20 evaluated according to a differing schedules. For example, a manual pool is evaluated only under manual evaluation, while a nightly pool is evaluated only at a certain user specified time in the evening.

Third, by allowing the user to schedule relevance evaluation for an individual  
25 piece of advice manually, overriding all pool membership parameters.

There are a variety of important variations on this approach:

• Skipping evaluation. In certain settings, it may be desirable not to evaluate  
30 each piece of advice in a pool with each pass through the pool. For example,

those pieces of advice which take a very long time to evaluate are periodically skipped, or skipped based on the CPU usage of other applications running on the consumer computer. A piece of advice which is unevaluated retains the relevance status of the previous evaluation.

5

- Scheduling based on author comments. In one implementation, the author of the advisory can specify the scheduling of relevance evaluation. He includes in the advisory file an Evaluate-When line that specifies details of evaluation scheduling. Options may include either a periodic schedule for relevance evaluation, a condition for relevance evaluation, or membership in a well known advice pool with a standard evaluation schedule.
- Scheduling based on advice reader analysis. The process of evaluating relevance may be viewed as analogous to the process of running various processes in a computer operating system. Using traditional operating systems scheduling ideas, it is possible to allocate priorities to advisories and to assign lower priorities to certain processes. A special case of this is the procedure skipping evaluation, discussed above.

## 20 Variations in Relevance Evaluation

Simulated Conditions. In certain situations (see Fig. 17), it is useful to the consumer to simulate evaluation of advice in an environment other than the one which actually obtains.

25

In one implementation of the advice reader, a method is provided to simulate conditions which do not in fact obtain. Such an advice reader has a modification to the method invocation dispatcher of the advice reader. In this modification, the name of the method and the involved data types are compared with a simulation table 172 in a proxy layer 173 before a method dispatch occurs. The simulation

30

table contents are user editable 171. If there is no match, dispatch occurs as normally, *i.e.* an advisory received from an expression tree evaluator 174 is dispatched by the method dispatcher 175. If there is a match, dispatch is suspended, and instead the value of the method is obtained by look-up from the associated cell of the simulation table. The result in either case is passed by the proxy layer to the system, *e.g.* to the file system inspector 176 or registry inspector 177.

Such an implementation allows the consumer to simulate conditions. The consumer overrides the usual relevance evaluation procedure by editing the simulation table, and by installing names of methods and argument types to be bypassed and the associated values to be returned.

In this way it is possible to provide a tool to:

- Pretend the existence of devices which are typically connected, but are currently unreachable;
- Determine whether a certain advisory or family of advisories goes away (*i.e.* become irrelevant) if certain modifications to the consumer computer are made, without actually making the modification;
- Determine if the installation of a product causes certain advisories to become relevant.

There are many other applications of this approach.

- User filtering. It has been tacitly assumed that a user typically wants to see all relevant advisories from all sites. In practice, a user might be interested in

filtering the display of advisories, focusing on items from a certain site, from a certain pool, focusing on advisories which exhibiting certain keyword labels in the Refers-to or Solution-Affects.

## 5 Promotion of Trust

The invention provides a powerful tool for connecting advice consumers with advice provided by advice authors.

10 In certain settings, the invention must be security and privacy aware. For an extensive discussion of security and privacy considerations, see below. A typical instance of such a setting is where invention is:

- 15 • connecting an advice provider and a provider consumer via a public network, such as the Internet;
- the typical advice consumer is a lay person; and
- 20 • the advice provider is a large business or other concern which needs to protect and enhance its reputation.

In such a setting, it is important to take into account the widely perceived insecurity of public networks, and to offer tools so that consumers and providers behave wisely.

25

The communications process disclosed herein is designed to support the development of wise habits on the parts of both advice consumers and advice providers. A cornerstone of the process is that users should only interact with trusted providers, and to this end, the invention provides technology supporting

the evaluation of trustworthiness by consumers and maintenance of trustworthy status by providers.

#### Importance of Trust

5

In general a trustworthy advice site has several qualitative attributes.

- Quality. The advice is perceived by consumers as being well-intentioned, well-conceived, and well-executed.
- 10 • Security. The advice is perceived by consumers as being secure, having no intent to harm, and having both an intent to help and being carefully tested and responsibly maintained.
- 15 • Privacy. The advice is perceived by consumers as being private, having no intent to snoop or pry, and having both an intent to keep private and being carefully designed and responsibly maintained to maintain that intent.
- 20 • Relevance. The advice is perceived by consumers as being tightly targeted, having no intent to go to wide populations of users as would a broadcast message (this is a practice sometimes called spamming in other messaging modalities, such as e-mail), and having both an intent to reach narrow groups of consumers with a focused need to know, and being carefully designed and responsibly maintained to achieve that intent.

25

The invention offers a number of technological tools facilitating open communication between consumer and provider which lead to proper attributions of trust. The invention, in one implementation, may offer mechanisms allowing

interested providers to promote consumer trust and consumers to learn how to discriminate between trustworthy and untrustworthy providers:

- 5      • Disclosure. Advice providers may have the ability to disclose the potential effects of advice, to describe experiences during testing or in the field.
  
- 10     • Discovery. Advice consumers may have the ability to learn about the potential effects of advice, and about the experiences of others with certain advice providers, or with certain advice sites.
  
- 15     • Feedback. Advice consumers may have the ability to comment on their experiences with certain pieces of advice.
  
- 20     • Correction. Advice providers may have the ability to retract faulty advice.
  
- Certification. Advice providers may have the ability to seek certification of their advice as safe and effective by an outside ratings service. The advice reader may have the ability to block advisories which are not rated in accordance with the consumer specifications.

The following is a more detailed discussion of these mechanisms.

Disclosure Mechanisms

The invention offers advice providers the ability to describe, in the humanly interpretable component of the message, the potential effects of advice, about the experiences of the advice provider in testing or from user feedback.

By using several methods of disclosure, an advice provider can gain consumer trust and visibility.

In one implementation, a more formal method of documenting and monitoring the effects of the advice is offered, enabling an advice provider to disclose names of potential effects through stereotyped keywords.

A central authority, such as Better Advice Bureau, publishes a registered list of keywords which are used to describe the subsystems of the user computer or its environment which may be affected by the proposed solution, or the effects of the proposed solution on personal privacy. An advice provider, in authoring advice, uses this mechanism to disclose potential effects of a recommended solution operator through stereotyped keywords in a header line Solution-Affects.

In one implementation of the advice reader, these keywords are searchable, and indexable and relevance evaluation is subsidiary to it.

Consumer ease of use may be bolstered, in one implementation, by allowing various kinds of user side filtering based on these keywords. For example, a user plagued by enormous numbers of advisories whenever he detached the CD-ROM drive temporarily could use this feature to simplify his life. He would declare irrelevant all advisories referring to the CD-ROM drive in their keywords fields, and then afterwards detach the CD-ROM drive. In this way, even if there were advisories ordinarily triggered by the non-existence of an attached CD-



ROM drive, the user would not have to see them. For an alternate mechanism, see the discussion of simulated conditions above.

5 Consumer confidence may also be bolstered by allowing such kinds of user-side filtering based on these keywords. For example, suppose that an available keyword reveals consumer identity to a provider. By using this when it is the case, a provider has disclosed the effects of a message. A consumer who, as a matter of policy does not participate in surveys and similar information gathering advisories could specify that all advisories which contained this keyword should  
10 be declared irrelevant. In this way, the provider has done his duty to disclose and the consumer who trusts the provider is rewarded with the ability to see only the important messages.

#### Discovery Mechanisms

15

In a typical implementation, the advice consumer can inform himself of potential impacts of a piece of advice before deciding to apply the recommended solution operator. Some of this may already be done using existing Internet technology. The consumer can query other Web sites and search engines to see if there is  
20 any news about a certain advisory.

The invention extends this mechanism through a special Internet server, referred to as the Better Advice Bureau. The Better Advice Bureau serves as a central clearinghouse for information about the effects and side effects of advice. The  
25 user can at any time query the Better Advice Bureau, asking for any recorded comments about a specific advisory or a specific site.

### Feedback Mechanisms

In a typical implementation, the advice consumer can provide feedback to the advice provider and to other consumers describing user experience with a piece of advice. Some of this may already be done using existing Internet technology. The consumer can use e-mail and USENet newsgroups to notify others about experience with a certain advisory.

In one implementation, the invention extends this mechanism through a special Internet server referred to as the Better Advice Bureau. The Better Advice Bureau serves as a central clearinghouse for information about the effects and side effects of advice. The user can at any time submit to the Better Advice Bureau Web site (described below), recording comments about the specific advisory or the specific site. The Better Advice Bureau can relay those comments to the advice provider, who can respond to them. In one implementation, the Better Advice Bureau protects the identity of the consumer by stripping off identifiers before mailing or posting. The Better Advice Bureau compiles all the information submitted by consumers, and provider responses, into a database available for queries over the network.

In one implementation, the advice reader offers a direct access to this feature by including an easy way to create a message automatically about a certain advisory in the standard advisory display, and address it to the authorities at Better Advice Bureau. For example, a button is placed as part of the advice browser window. By clicking on that button, a mailer window opens up with the sending and recipient addresses, and with the advisory number and subject already supplied. The user is then always one click away from being able to record a commentary about certain advice.

Correction Mechanisms

In a typical implementation, the advice provider can disown advice that it has posted in error. This is done by removing the advisory from the provider's advice site. Over time, as subscribing advice readers synchronize with the provider's site, the advisory automatically disappears from those consumer computers.

In certain settings, this is not a sufficiently proactive solution. For example, certain advisories may be distributed by means other than the usual the advice reader/advice site model. To the extent that certain consumers may have such advisories in their advice pool, but without associating them with a subscription, they need to be dealt with by a counter advisory. This is an advisory which acts as advice against another piece of advice. Using an advice inspector library as described above, it is possible to write an advisory that is relevant when the consumer computer has a certain advisory in its main advice pool. Such an advisory is typically as follows:

The advisory 40139 which we released on 5/31/98 has been recalled, and we recommend that you delete it from your advice system immediately.

If you agree to this, click the <Dolt> button below.  
(signed) <Authors Name>.

Such counter advice is distributed by submitting it to UrgentAdviceNet, a special advice site to which all advice readers subscribe. The piece of advice is rapidly diffused to users.

In summary, the invention offers the following process for dealing with faulty advice:

- Removing the bad advisory from the providers advice site.
- Writing a counter advisory and submitting it to UrgentAdviceNet.
- 5
- Writing a better advisory.
- Placing the better advisory at the providers advice site.

10 Certification Mechanisms

One technique to further consumer acceptance of the use of advisories and the associated solutions is to remove some of the burden for determining the trustworthiness of messages from the individual consumer. A method to do this

15 is for a ratings service at a central site to offer a service to advice providers that certifies advice as being in accord with certain publicly known privacy and security standards. Under existing Web protocols (see Khare, Rohit, *Digital Signature Label Architecture*, The World Wide Web Journal, Vol. 2, Number 3, pp. 49-64, O'Reilly (Summer 1997) <http://www.w3.org/DSIG>) there is a method for

20 the establishment of URL ratings services, via a message block that can reliably certify that a certain ratings agency asserts that certain information resources have certain properties. The credibility of such assertions, i.e. that the advice is actually being certified by the service and not by an impostor, is based on deployment of standard authentication and encryption devices. Applying this

25 technology, a ratings service can be established at a central site, e.g. Better Advice Bureau.org as described below, to certify that certain advice operates in a fashion generally accepted as appropriate for the advertised task, is used in a manner to protect individual identity, and has generally benign effects. Advice authors seeking certification of the trustworthiness of their advice submit those

advisories to the certification authority, which studies the messages and, at its option, agree to certifies some of those messages. Here certification means that, according to a well known standard, a special ratings block is appended to the message indicating that the message is asserted by the authority to have certain  
5 attributes.

In one embodiment of the invention, the consumer is offered the option of making integral use of one or more ratings services. This functions as follows:

- 10 \* A ratings service uses a well known format, such as PICS (see Khare, Rohit, *Digital Signature Label Architecture*, The World Wide Web Journal, Vol. 2, Number 3, pp. 49-64, O'Reilly (Summer 1997) <http://www.w3.org/DSIG>), for describing it ratings of resources such as advice sites and individual  
advisories.

15

The ratings service publishes a list of descriptive keywords used in the ratings system, such as BAB-Privacy-Standards-Compliant or does not affect file system.

20

The ratings service labels individual advisories using its own defined labeling system, inserting these labels into the advisories as ratings blocks according to a standard labeling format, such as PICS.

25

The ratings service labels individual advice sites by attaching labels to site description files using its own defined labeling system, inserting these labels into the site description files as ratings blocks according to a standard labeling format, such as PICS.

The ratings blocks are interpreted and authenticated by an established cryptographic signature mechanism associated with the service, and part of the ratings labeling standard.

- 5     • The user interface of the advice reader is extended to contain a new component, *i.e.* the certification manager. This component allows the user to permit advisories to be evaluated for relevance only when they have been credibly certified by a trusted privacy ratings service as having properties with which the user is comfortable. For example, the user blocks advisories which
- 10    are not certified by Better Advice Bureau as BAB-Privacy-Standards-Compliant, thereby obtaining a measure of confidence that advisories used in his system do not violate his privacy by revealing information to the outside world.
- 15    The certification manager has two defined roles:
- Eliciting User Desires. The certification manager plays a role in initializing the certification process. It makes available to the user a list of potential ratings services among which the user can select. When a service is selected, the
- 20    certification manager obtains from the ratings service URL a list of the defined ratings keywords, and allows the user to design a filter based on specifying that certain keywords or combinations of keywords must be present (or absent) for a message to be trusted.
- Enforcing Policy. The certification manager also has the responsibility to parse and validate the ratings associated with individual messages, and block the evaluation of uncertified messages, or of certified messages not exhibiting the users desired attributes.
- 25

Privileged Sites

In one implementation, the advice reader is preconfigured with hardwired subscriptions to three privileged advice sites. These built-in subscriptions play a central role in ensuring the security of the invention; together they form an immune system.

advisories.com

10 advisories.com is a Web and FTP site operated by the producer of the advice reader software. This allows users from all over the world to obtain information and updates about the system, about the advice reader, and any updates to the software or the invention's communication protocols.

15 It is also a trusted site for the distribution of subscription information. Digitally authenticated site description files can be found here for many of the major advice sites on the Internet. These site description files are signed with a digital signature mechanism that is automatically intelligible to every copy of the advice reader. This serves an important security function. As described in the section  
20 on security below, it is very important that there be a well known and trusted location that is the source for accurate information about starting a new subscription. By getting site description files from advisories.com, a user has a degree of confidence that he is getting accurate subscription information and is not vulnerable to various security problems.

25

It is also a site for the distribution of authoring information, in particular, coordination of certain authoring conventions. Two specific conventions have already been mentioned:

Keyword Coordination. This concerns the way in which advisories are used by advice authors to disclose descriptions of potential effects of advice on the consumers computer or possessions or environment. A current listing of adopted keywords may be made available at [advisories.com](http://advisories.com) site.

5

Coordination of User Profile Variables. This concerns a mechanism by which new variables may be added to the user profile by different advice providers. A current listing of adopted variables their formats and promulgators may be made available at [advisories.com](http://advisories.com) site.

10

[BetterAdviceBureau.org](http://BetterAdviceBureau.org)

Better Advice Bureau.org is both a Web site and an advice site on the Internet. It is a site dedicated to the maintenance of the communications protocol as a  
15 civilized means of communication.

The Better Advice Bureau.org Web site describes the principles of system operation, describes why the system is useful, and why it protects individual security and privacy. It describes known risks and recommended procedures for  
20 interacting with the system. It serves as a clearing house for user complaints about the operation of advisories, and as a place that consumers may come to for research about the experiences associated with an advisory that they are contemplating to apply.

25 The Better Advice Bureau.org advice site is an advice site to which all advice readers subscribe. It issues what is referred to as meta-advice or counter-advice, in the form of advisories against bad advisories, or against bad sites. By this device, consumers become aware of situations within the advice process which are dangerous from the standpoint of security or privacy, and they can  
30 then take corrective measures.



It is also a site for the distribution of ratings information, in particular, publication of certain rating conventions, as described above. There are commonly accepted methods for rating resources on the Web according to criteria provided by a ratings service (see Khare, Rohit, *Digital Signature Label Architecture*, The World Wide Web Journal, Vol. 2, Number 3, pp. 49-64, O'Reilly (Summer 1997) <http://www.w3.org/DSIG>). The Better Advice Bureau, in one implementation, functions as a certifier of the privacy and security and usefulness of individual advisories. In this role, the Better Advice Bureau rates individual advisories by including in them a certain special ratings block, according to a well known ratings format, such as PICS. The Better Advice Bureau also publishes at its Web site the information needed to interpret such ratings blocks, including:

- A list of descriptive keywords used in the ratings system, such as BAB-Privacy-Standards-Compliant or Does Not Affect file System.
- Public key information associated with the certification process.

#### UrgentAdvice.net

UrgentAdviceNet serves to distribute advisories rapidly to all advisory consumers. It is used sparingly, to deal with urgent situations acutely affecting significant numbers of users. In one implementation, it has a high priority in synchronization, being synchronized every time any synchronization takes place.

#### Other Application Areas

In this document so far, the invention has been described in connection with the technical support application. The following is a partial list of other applications to which the invention may be put.

Consolidator.com

5 An Air Ticket consolidator purchases a block of 50 seats on a flight from New York to London for August 20. The consolidator wants to resell those seats to travelers. The consolidator maintains a relationship with a variety of travel agents.

10 The consolidator uses the invention to market its product more efficiently. The consolidator functions as advice provider, and authors an advisory whose relevance line asserts the existence of a consumer in the travel agency customer database who has reserved a ticket to go to from New York to London on that date, or near that date. The advice provider places the advisory at his advice site.

15 Advice consumers, in this case the various travel agencies working with the ticket consolidator, have their representative computers set to subscribe to the consolidators advice site. They also install a special inspector in their computer which searches the travel agency customer database for customers with certain travel plans. Advisories flow to their computers and are automatically inspected  
20 for relevance. Here relevance means a potential traveler who has plans to travel. The travel agent offers the traveler a ticket at the reduced price provided by the consolidator. The consolidator then makes a sale and the travel agent a commission. All participants win.

25 CheapFlights.com

A large airline frequently has last minute opportunities for travel at bargain rates. The airline wants to match the tickets to consumers with a continuing interest in last minute travel to certain cities. This airline can use the invention to market its  
30 product more efficiently. The airline functions as advice provider and authors

advisories whose relevance line asserts the existence, in the user profile, of an expressed desire to travel to a certain city. The advice provider places the advisory at his advice site.

- 5 Advice consumers, in this case the potential travelers, have their representative computers set to subscribe to the airlines advice site. They add expressions of special interest to their user profiles indicating cities they are willing to fly to on short notice. Advisories flow to their computers and are automatically inspected for relevance. Here, relevance means a potential opportunity for a flight on short  
10 notice.

#### Commodity.com

The system above described works in many other commercial areas, e.g. one  
15 could build as a result, such sites as CheapConcerts.com and CheapHotelSuites.com working on similar principles.

Extending this point, it is possible to run a new type of commodity market using the invention. In one model (see Fig. 18), there is a central site referred to as  
20 Commodity.com that functions as the market maker. This is attractive in a setting currently handled by classified ads, where there are many individual offerors seeking a central marketplace. The process is as follows:

- Offeror submits to Commodity.com an advisory offering object for sale 180.  
25
- Commodity.com advice site staff edits and posts advisories 181, 182.
- Users subscribe to Commodity.com 184.

- \* Subscribers input information about interests to user profile 189, 190.
- \* Relevant advisories concern objects meeting their interests. The process proceeds are described above, where the advice reader gathers advisories from Comodity.com 189. Relevance evaluation is performed 185 in accordance with a user profile 190, as inspected by a user profile inspector 186. The user view the relevant commodities 187 and acts on the information contained therein 188.

10 BalanceTransfer.com

in the world of financial services, there are many companies that attempt to market specific services to customers directly. These include credit cards with specially low rates on cash advances, particularly credit balance transfers from competing financial instruments, and mortgage refinancing offers.

The attempt to reach consumers is expensive and often difficult. Certain consumers, who might otherwise be interested in the financial benefits of the service, do not allow telephone or mail contacts. Other consumers do not disclose sensitive information over the phone, which is typically required to participate.

The following is an example of a financial services offer through use of the invention. This embodiment of the invention is described as a centralized system, although it easily could be a decentralized system.

- \* Offeror submits advisory to BalanceTransfer.com offering balance transfer to those with sufficient balances and incomes.

- BalanceTransfer.com advice site staff edits advisories and posts.
  - User subscribes to BalanceTransfer.com.
- 5 • User fills out information about credit card balance, existing interest rate on balance, and income for User Profile.
- Advice reader uses remote connection to verify balance, preserving privacy.
- 10 • Relevant offers are those which benefit user. The advisory, if well written, uses the income data to test if the applicant is approved. Hence, relevant advisories have credit preapproved.

15 There are many variations on this kind of advice. Home refinancing operates in substantially the same way. The advisory is written mentioning variables associated with the principal, current interest and term of an existing loan. An advisory is relevant if it provides a set of better terms than an existing loan.

20 There is no reason why this service must be globally centralized. In a typical variation, individual mortgage brokers offer their own advice sites.

#### BadPills.com

25 The invention can be used for a variety of consumer product warnings recalls, and safety advisories. The following is one example.

BadPills.com is a site where information is available about drug products and their interactions. The following describes how the site operates to notify pharmacies about potentially damaging drug interactions in their customer base.

- The FDA and other organizations, e.g. pharmaceutical manufacturers and consumer organizations, submit information about interactions and side effects of medications. Each advisory has the following form:

5

The relevance clause asserts the existence in the pharmacy database of customers with active prescriptions for drugs with a known potentially damaging interaction.

10

The human readable content tells about the interaction, tells the pharmacist that he has such an interaction in his client base, and urges the pharmacist to correct the situation.

- Advice site collects submissions, edits and posts.

15

- Pharmacy subscribes to the site. As part of subscription initiation, the pharmacy must install a standard pharmacy customer database inspector on its computer. This inspector can check to see if any patients in the database have a certain prescription.

20

- Pharmacy computer gathers advisories routinely.
- Relevance evaluation generates queries to pharmacy customer database inspector.

25

- Database inspector processes pharmacy database.
- Relevant messages are provided for dangerous drug combinations.

There are many variations on this embodiment of the invention. A similar service for physicians is made available through a physician patient database inspector for those physicians who keep track of patient subscriptions on their office computers. A similar service for patients is made available through an individual  
5 health record database inspector for those Individuals who enter their own subscriptions in the user profile. One way to simplify this is to have an information exchange program, allowing a user to remotely query the pharmacy database for information about himself.

10 Group Anonymous Messaging

Suppose there is a group G of individuals who wish to have an anonymous communication with a provider P. The individuals in G are widely distributed and do not know each other. There is a way to use invention to set up a site for two-  
15 way anonymous communication of this kind.

Such communications are made widely available and are used by many persons. For the anonymity of the participants, it is important that the system be used by many different persons from many different groups.

20

The site is an anonymous posting advice site where any e-mail sent to a certain address has its identity stripped and is posted at the advice site. Such an advice site operates completely automatically. This site may be referred to as SecretFriends.org.

25

This site may be used in conjunction with private-public key cryptosystems. Secure off-line refers to a system where an agent of G arranges with P for a conversation. The agent delivers to P a public-key which is created for G for the purpose of conducting this discussion. This key is not actually public. It is a  
30 secret known only to G and to P. It is only referred to as a public key because it

is the key which is commonly made public in standard applications of public-private key systems. The key is only delivered to P. Similarly, the agent returns a specially created public key from P to G.

5 G and P exchange messages by the following process:

- Subscribing to SecretFriends.org.
- Authoring messages which are relevant only to those holding the decryption  
10 key they have released.
- Using anonymous remailers or other means to post to SecretFriends.org the encrypted messages.

15 This approach provides anonymous communications as follows: A participant's advice reader synchronizes with SecretFriends.org. Potentially, a great number of advisories, actually encrypted messages, are obtained. The only messages that are displayed by the advice reader are those that are actually decryptable using the indicated key. The others are all jettisoned. The relevant advisory is  
20 then decrypted and read.

This approach provides anonymity under the AEUP protocol because, assuming many different people are using SecretFriends.com, there are a great number of messages being placed there, and only a tiny fraction end up being of interest to  
25 a given reader. Because of the structure of AEUP, no one watching the process at the advice site can tell which messages turned out to be relevant to which user.



Distribution of Sensitive Product Information

A variant on the group anonymous messaging embodiment, in a specific setting, is provided as an information service for consumers of products who do not want  
5 it known that they use the indicated product. For example, users of antipsychotic medication or those undergoing cancer treatment.

Users of the sensitive product are given a numerical code with the purchase of the product which serves as the (secret) public key. The users then subscribe to  
10 a certain advice site, arranged in advance, which is, for example, SecretFriends.org, or an industrywide consortium site, for example DrugInfo.org. The users indicate in their subscription the (secret) public key. The advice reader periodically synchronizes with the site, and brings in advisories, some of which may concern the product. The others do not concern the product. Only  
15 the advisories associated with the specific medication pass the digital signature test and become relevant.

Security Issues

20 When the invention disclosed herein is implemented as described above and deployed in the technical support application, it may be operating in a security and privacy critical setting. The implemented system is then typically interacting automatically with the Internet, and obtaining and using resources from remote computers without direct human oversight. These resources remain resident on  
25 the consumer computer, typically over an extended period of time, being evaluated periodically for relevance. When relevant advisories are identified, the advice reader displays to the human consumer the explanatory content of the relevant advisory. This explanatory content may propose to the consumer actions which may have effects on the computer, on attached devices, or

elsewhere. If the consumer gives approval, these actions typically are then carried out automatically.

In short, the advice reader introduces into the consumer computer documents  
5 that are processed automatically and that after processing may propose to the user potentially permanent modifications to the computer or its environment. The consensus opinion of networking professionals (see Anonymous (1997) Maximum Security, Sams.net Publishing, Indianapolis; Oaks, S. (1998), Java Security, Oreilly, Sebastopol, CA; and Baker, R.H. (1995) Network Security,  
10 McGraw-Hill, New York) is that unsupervised interaction with the Internet poses serious risks. In fact the invention, in its standard mode of operation, does not expose the advice consumer or advice provider to risks greater than the baseline risks involved in typical usage of e-mail, browsers, and related Internet tools. Those modes of Internet interaction are currently considered acceptable risks.  
15 The invention, in a typical mode of operation, offers lower risk.

#### Preliminary Comments

Two fundamental points are of interest.

20

- Trusted sites. The concept of trust is discussed above. Users should only subscribe to advice sites that are known to them to provide trustworthy advice. In fact, consumers typically configure their advice reader to subscribe mainly to advice from large concerns which manufacture goods and services  
25 of interest to the consumer such as, for example, a computer manufacturer, a software publisher, or the provider of Internet service. Subscription to substantial organizations of this type is a reasonably secure practice. Such organizations have an interest in providing trustworthy advice so that they maintain rapport with their consumers. It is anticipated that very few risks are

posed to advise consumers who subscribe to advice authored by such concerns.

- 5 • Better Advice Bureau. The Better Advice Bureau.org, which is described above, is a fundamental tool for ensuring the security of invention users. All invention users subscribe to this site. This site compiles counter advice, informing users about dangerous sites and about bad advice which is circulating. The Better Advice Bureau functions in some respects as an immune system for the invention, allowing the correction of dangerous  
10 situations. UrgentAdviceNet is another site to which all users subscribe. It provides a special mechanism for delivering very urgent counter advice to the consumer population.

#### Absence of High Profile Risk

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The following discussion of security considers some of the more well known risks of Internet interaction and then explains why these well known risks actually do not arise under the invention when used in a typical implementation.

#### 20 Inventory of High Profile Risks

Internet operations have in the past suffered a number of active threats that can be symbolized by three figures who have captured the popular imagination:

- 25 • Break-ins: Kevin Mitnick. Over a period of years Mitnick used the Internet systematically to break into computers worldwide, and he managed deliberately to cause some to crash or to lose data permanently. While it is supposed that Mitnick was some sort of evil genius the truth is that sites on the Internet give instructions on how to break into Pentagon computers. A  
30 Pentagon led experiment in 1997 showed that using publicly available

information one could, in fact, access classified DOD computers and cause permanent damage to files.

- 5     • Attacks. The Internet currently makes software tools available for free which allow their users to attack other peoples computers over the Internet, causing those computers to crash. The basic strategy is to connect to various TCP/IP port servers on the intended victim computer and flood it with requests for service. (Anonymous, Maximum Security, Sams.Net 1997)
  
- 10    • Worms: Robert Morris, Jr. In a well-known 1988 episode, Morris released a worm which spread rapidly across the Internet, installing itself in many machines, and while in execution on those machines, spread itself to other machines. In fact, Morris was attempting no more than a prank. The rapid and pervasive spread of the worm surprised him, as did the enormous  
15    amount of time required to eradicate the worm and regain full capabilities of the affected computers. The powerfully disruptive nature of the worm was caused by its ability to spread automatically, and run automatically on whatever machine it reached. This case dramatizes the risks that can arise through the automatic spreading of executable code across the Internet.  
20    (Pfleeger, Security in computing, Prentice Hall 1996)

#### Absence of Consumer Exposure to High-Profile Risk

25    The advice reader does not expose the consumer to additional risk from these high profile sources beyond the baseline risk he suffers now.

The advice reader is not vulnerable to break-in because it does not offer any kind of interactive shell offering log-in access, as the term break-in requires.

The advice reader does not expose the consumer computer to any extra risk of attack beyond the risk the consumer already faces due to Internet connectivity.

5 The advice reader adds no risk because it does not make available any perpetually open TCP/IP port which can be flooded with requests. There is nothing the outside world can do to try to talk to or initiate an interaction with the advice reader.

10 The advice reader does not expose the network to any risks of worms. In a typical configuration, the system does not offer any mechanism by which anything can spread from advice reader to advice reader.

#### Server Exposure

15 Consider the vulnerability of the invention server to active threats. A server using the invention, as with any Internet-based server, exists for the purpose of offering services to the outside world. It is visible on the Internet and open for business, typically around the clock.

20 There is no risk of break-in, because there is no interactive shell offering log-in access, as the term break-in implies. However, the server can be flooded with requests as with any Internet server. There are well known techniques to combat such request floods, and professional Web site operators know about them. The server side users of the invention are professionals who are well equipped to  
25 evaluate and react to this type of standard threat.

The invention's server does not expose the server to any risks of worms. In a typical configuration, the system does not offer any mechanism by which anything can spread from advice reader to advice server, or by which anything

other than an extremely narrow range of functions can be performed by the server.

#### Protective Influence

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There is a certain sense in which the invention actually can help protect against worms, break-ins, and attacks. The advice delivery mechanism allows network security personnel to create advisories warning the consumer when the consumer is behaving in a way that leaves the door open to criminal disruption.

10 The advice delivery mechanism also allows network security personnel to author advisories which diagnose whether a user is currently being attacked, or has been recently attacked. In this way, the invention functions as an immune system, allowing the rapid spread of corrective advice.

#### 1.5 Spoofing Risks

In effect, the invention interaction is never completely unsupervised. The advice reader only interacts with advice sites that have been subscribed to by the user. The user is therefore, in his choice of subscriptions, exerting a kind of permanent  
20 high level supervision. If the user subscribes only to sites offered by organizations with a strong incentive to provide trustworthy advice, he is protected. An individual making harmful advice does not legally have a way to force the introduction of that advice into any given advice reader.

25 There is a very important category of active threat which is not widely known, *i.e.* attack by spoofing. In this category falls spoofing of Internet locations, *i.e.* the user thinks he is communicating with a certain trusted site, but actually is communicating with an impostor site. Another kind of spoofing is the use of mole programs which appear to be standard applications but which actually are not,

and can violate privacy and security in other ways. (Anonymous, Maximum Security, Sams.Net 1997).

DNS Spoofing

In this scenario, an impostor creates a near clone of a popular and trusted site, such as the site of MicroComp. However, the impostor site also contains harmful  
5 advice.

DNS spoofing provides a way for the impostor site to appear to certain users on the network as if it were actually the popular and trusted site of MicroComp. The only way this could happen under current network protocols is for the impostor to  
10 interfere with the DNS lookup process of certain consumers, and misdirect certain consumer advice requests aimed for MicroComp.

DNS spoofing operates as follows: The impostor must have system level access to a machine on the Internet which is physically located in a position to intercept  
15 some of the domain name resolution requests intended for a certain Domain Name Server (DNS). The impostor programs the IP routing logic to inspect the intercepted requests looking for those which refer to MicroComp and, when such a request is found, to return an incorrect TCP/IP address, the returned address referring to his fake advice site. All advice readers situated downstream from the  
20 impostor are in this way misdirected to the fake advice site whenever they try to go to the MicroComp advice site. The fake site appears just like a real site, but distributes harmful advice under the pretense of being a trusted provider. In short, by perpetrating DNS fraud, there is a way for an attacker to introduce damaging advice directly into one or many computers.

25 This sort of activity constitutes criminal fraud under current federal regulations. This type of fraud is reportedly rare (see Anonymous (1997) Maximum Security, Sams.net Publishing, Indianapolis. In addition, a perpetrator able to carry off this type of fraud might find systems using the invention to be less attractive than  
30 other targets. For example, DNS spoofing of large electronic commerce sites



such as bookstores and computer software warehouses is more attractive to the perpetrator, in the sense of offering a more rewarding payoff if the spoof is successful. Indeed, the perpetrator could offer a Web site pretending to be the Web site of a certain merchant, offering up Web pages with the same general  
5 visual appearance as Web pages from the correct site. The fake Web site contains forms which the user fills out to execute the transaction. In reality, those forms are used to capture information about credit card numbers or other sensitive financial data. This seems a more direct way for a perpetrator to benefit from a DNS spoofing scheme.

10

This sort of activity affects only a subset of the users of a large public network such as the Internet. For example, assuming that an individual consumer enjoys a secure connection to a DNS server, and assuming also that the information on the DNS is maintained securely, DNS spoofing is not a material threat for that  
15 particular consumer. In most moderately large corporate environments, DNS services are provided within the corporate intranet. Assuming that the impostor is outside the corporation, then for advice consumers within the corporation, this spoofing threat is stymied by the standard security devices for intranets, i.e. firewalls. Certain noncorporate advice consumers enjoy Internet access through  
20 Internet service providers offering DNS servers located on the Internet in close physical proximity to their modem banks. Assuming that the impostor is not inside the physical domain of the Internet service provider's offices, consumers who use such DNS services may also be secure against DNS spoofing.

25 In effect, spoofing is only a threat for advice readers relying on insecure connections to their DNS. In future network protocols, DNS connections may be digitally authenticated, and the spoofing threat is stymied in such settings as well. Until that time, the invention has a way to stymie this threat under the current regime using digital authentication of advice itself. Digital authentication of  
30 advice is also of interest to those consumers with secure DNS connections

because advice may be distributed, in some implementations, by insecure means such as e-mail or sneakernet. It gives the user additional confidence in the advice he is receiving.

5 In a typical implementation of invention, the term digital authentication refers to the use of existing digital signature mechanisms based on so called public-key/private-key pairs (see PGP 4.0 Users Manual, PGP Pretty Good Privacy, Inc. (1997)). This mechanism is developing into a well understood, mature, and reliable standard. Other forms of digital authentication can be used with equal  
10 validity.

The following describes how the public-private key pair mechanism is used to authenticate advice. The advice provider, e.g. MicroComp, acquires a public-key/private-key pair, of which the private key is a secret known only to the  
15 provider. The provider takes steps, described below, to publicize the correct public key. The provider, knowing both keys of the pair, attaches to each advisory a signature block which is successfully interpreted by an advice reader which knows the correct public key. The ability to interpret the block is considered by the advice reader proof that the author knew both keys, which is  
20 considered proof that the author is in fact MicroComp. In a typical implementation, a user interface component informs the user that a given piece of advice is signed by MicroComp. The precise meaning of this is that the signature block is successfully interpreted by using the known public key.

25 The invention's mechanism for protection from the DNS spoofing threat involves actions by both the consumer and the provider. The provider authors a site description file, containing a listing of the information related to the subscription, including the site's location and the site's digital signature public key. The provider publishes the site description file, for example in physical media such as  
30 a disk or CD-ROM, as part of the distribution of a software product offered by

MicroComp. In this way, many consumers obtain copies of the site description file by secure means. A consumer initializing a subscription to MicroComp presents to the advice reader's subscription manager the site description file for MicroComp. The provider, whenever authoring an advisory, attaches a digital signature block. The advice reader, whenever obtaining a piece of advice, checks that the digital signature is successfully interpreted using the public key known to the reader to correspond to MicroComp. Unless the advisory passes this test, the advice reader refuses to evaluate the advice for relevance. The reader may also notify the user that there is unsigned advice coming from a site whose site description file claims that the site provides only signed advice. The reader also offers to inform Better Advice Bureau of this fact.

To see why this approach protects against DNS spoofing, it is important to understand a basic feature of the public-key/private-key system. It is commonly accepted that an impostor faces a very difficult time trying to fake the digital signature of MicroComp.Com. This conclusion rests on the assumption that the impostor must make a successful fake signature using only the publicly available information associated with the encryption scheme; *i.e.* that the impostor does not have access directly to MicroComp.Com's private key. It is computationally an extremely difficult task for an impostor to fake a digital signature correctly from publicly available data (see C. Pfleeger, Security in Computing, Second Edition, Prentice-Hall(1996); and PGP 4.0 Users Manual, PGP Pretty Good Privacy, Inc. (1997)). It is an equivalent computational task to the task of factoring an integer with hundreds or thousands of digits into its prime factors. Using networks of many thousands of computer workstations over periods of many months, it has been possible to factor individual numbers with about 150-200 digits. However, this has been achieved only by a kind of vast scientific collaborative enterprise. It is unlikely that an impostor has access to the required resources for mounting an effort that would succeed on integers of the lengths commonly used in signature algorithms. Moreover, there is an easy remedy, *i.e.* double the number of digits of

the keys, putting the factorization task beyond reach of any currently conceivable collaborative effort based on currently conceivable computational resources.

5 In short, an impostor is highly unlikely to be able to author advice with a digital signature which is intelligible using the correct MicroComp public key. Unless the impostor can do this, the advice reader refuses to evaluate the advice for relevance, and so the impostors advice poses no substantial threat.

### Key Spoofing

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An apparent hole in the digital authentication system is the possibility of key spoofing. In this scenario, the consumer's advice reader has somehow accepted an incorrect public key for MicroComp, *i.e.* a key which is not the correct key for MicroComp, but is instead the public key of a public-key/private-key pair owned  
15 by the impostor. If this happens, then the advice reader can be deceived because it recognizes the impostor's advice as valid. However, the invention is designed to prevent this scenario from occurring.

20 For key spoofing to occur, the consumer's subscription must be initiated using a site description file that is not obtained through secure channels, such as the original software installation from physical media. The impostor must author fake site description files and distribute these on the Internet.

25 A typical implementation of invention cannot be fooled by key spoofing. There are three mechanisms for this, any combination of which may be effective:

- Certification of site description files. In one implementation, site description files may include a digital signature by a central authority, the Better Advice Bureau, testifying that the site description file purporting to be authored by  
30 MicroComp is, in fact, so authored. The digital signature of Better Advice

Bureau is hard wired into the advice reader, thereby avoiding the possibility of spoofing the Better Advice Bureau certification.

- 5       • Spoof-Proof Key Verification. A typical implementation of the subscription manager performs key verification prior to recording a subscription. It contains hard wired information enabling it to make a direct TCP/IP connection to a hard wired IP address of a key authentication server. Such a server verifies that a given organizations public key is as it is said to be. Because the contact address of the server is hard wired into the program,  
10       access to the key server cannot be DNS spoofed.
  
- 15       • Counter-advice. If a certain site is successfully spoofed, it may submit to Better Advice Bureau.org an advisory which goes out to all advice readers because Better Advice Bureau.org is a built-in subscription. The advisory  
15       asserts the value of the correct public key associated with the site. Those users with incorrect public keys are notified with the relevant advisory, which explains the risks involved. If the issue is particularly urgent, the site UrgentAdviceNet is employed.
  
- 20       In summary, if the advice reader and its subscriptions are appropriately configured, the advice consumer is protected from spoofing when the advice provider digitally signs his advisories.

#### Reduction of Spoofing Threats

25       DNS Spoofing, while a significant threat to Internet security, is not more of a threat to the invention than to other components of the Internet, especially e-commerce. The Better Advice Bureau.org and UrgentAdviceNet are important devices to help suppress spoofing of advice.

30

Better Advice Bureau.org and UrgentAdviceNet are important devices to help suppress spoofing of all Internet activities. By the use of this combination, the Internet's susceptibility to spoofing may be reduced, and the attractiveness of spoofing in other settings, outside of invention are reduced.

5

#### Advice Reader Moles

Another potential hole in the invention's security system is the possibility that a copy of the executable binary of a legitimate advice reader is acquired by an attacker, and then is systematically altered to introduce various new behaviors. The resultant illegitimate reader is then redistributed on the Internet, where it masquerades as a legitimate copy of the advice reader, and is downloaded and used by unsuspecting consumers. Nothing can stop the creation of such illegitimate readers. Nothing can stop illegitimate versions of a software tool from displaying very damaging behavior. This is well understood by the community of Internet users worldwide. Anyone who downloads software over the Internet from sites which are not authentic providers of trusted software exposes himself to the same risk, whether the software is a word processor, a spreadsheet, a Web browser, or the advice reader.

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However, of concern is the possibility of illegitimate mole readers whose goal is not to cause damage but to compromise the security and privacy of the user. Such mole readers contain subtle features escaping detection by casual observation but allowing for subtle effects on the user's environment or for the gathering and forwarding of important information about the user. Again, the invention is no more vulnerable to this kind of modification than any other piece of software. However, the typical implementation of the invention contains two mechanisms which can identify the existence of mole software and help correct the situation.

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- 5 \* Server-Challenge. This is implemented as part of the invention server-reader interaction protocol. A typical implementation of the server begins its transaction with an advice reader through a handshaking session, in which the server challenges the reader to prove that it is a valid version of an advice  
10 reader. In a typical implementation, the advice reader is written to create certain data blocks with known properties dynamically in memory at known location offsets from the beginning of the program. The method by which the data was created and the purpose of the creation are guarded secrets. The server selects random blocks of this data and asks the reader for the correct digital digest associated with such a block. If the program is altered, it is difficult for the executable code to answer the challenge correctly. If the server receives an unsatisfactory answer, the server then transmits advice to the reader which is automatically relevant, stating that the user's advice reader appears illegitimate. The advice reader may also refuse to interact  
15 with servers that do not pass a digital authentication test.
  
- \* Advice-Challenge. The invention, at Better Advice Bureau.org, offers advice whose intent is to verify that a valid configuration of the invention is installed. The advice, which may change daily, asserts that certain blocks of the data in  
20 the CPU memory while the advice reader is running have certain digital digests. The blocks are chosen randomly by the Better Advice Bureau.org authority, or according to design, when a certain well known mole is to be diagnosed from a specific motif in the binary data at a specific location.
  
- 25 In summary, invention diagnoses moles and notifies users about them.

Reduction of Mole Threats

Moles, while a potential threat to Internet security and privacy, are not more of a threat to the invention than to other components of the Internet, especially e-commerce. Better Advice Bureau.org and UrgentAdviceNet are important devices to help suppress spoofing. The same remark applies to moles. Better Advice Bureau.org and UrgentAdviceNet are important devices to help suppress mole applications uniformly. By the use of these devices, the Internet's susceptibility to mole activities may be reduced, and the attractiveness of mole activities in other settings, outside of invention is reduced.

Irreducible Core Risks

A threat is caused by defective advice offered in good faith by usually trustworthy authors. Advice authors have reputation incentives which tend to make them want to provide good advice. Advice providers in one core application, e.g. technical support, are part of sophisticated organizations which have the ability to do things in a disciplined way. They understand that advice should be tested for safety and effectiveness and be released in a deliberate, staged manner. Because of this, it is likely that very few pieces of advice in the technical support applications area are defective. Nevertheless, there are occasional problems with advice authored by typically trustworthy providers.

The risks posed by advice are of two kinds:

25

First, there are the risks posed by advice gathering and evaluation.

Second, there are risks posed by the solution process, i.e. by the users response to a relevant advisory which offers the user a solution to a problem. This second type of risk is by far the more serious one. When the user agrees to a solution,

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he is allowing powerful actions with potentially permanent consequences. The advice reader is not able to provide any kind of protection against the effects of applying flawed or malicious solutions. Instead, the burden of security must fall on the user, who should always limit subscriptions to well known, trusted sites, and should always carefully check the explanation and the authenticity of authorship before accepting a solution proposed by an advisory. In its typical configuration, invention does not automatically apply solution operators, precisely because of the need for user supervision.

10 As for the first kind of risk, that from gathering and evaluation, the invention is specially designed to limit risk.

It is true that the invention is typically used in a mode of automatic unattended operation. In this mode, advisories are gathered from external advice sites without user intervention and are automatically evaluated for relevance without user intervention. As mentioned earlier, the consensus of Internet experts is that automatic unattended operation over the Internet poses serious risks.

20 However, the invention does not download arbitrary resources, nor does it evaluate arbitrary executable code. Its design imposes constraints on what information can flow into the computer automatically, and on what effects automatic evaluation can have. These constraints are specifically imposed to avoid the known risks of unattended operation.

25 In its typical configuration, the invention does not automatically apply solution operators, even when performing automatic unattended operation. In that typical configuration, the effects of automatic unattended operation on the system are not direct effects, *i.e.* the advice reader does not enable modify access to a specific piece of the system environment. The effects are instead indirect, *i.e.*

side effects of consuming too many resources during the downloading and evaluation of advice. The side effects to be concerned with are of three types:

(a) Advice gathering might monopolize all network bandwidth.

5

(b) Advice gathering might fill up the local storage device.

(c) Relevance evaluation might consume all CPU cycles.

10 Problems (a) and (b) are solved by resource rationing. The information that can flow into the computer consists of ASCII text files. By imposing resource quotas at download time, the system protects against the possibility that overly many network resources are used and protects against the possibility that overly big files are downloaded into the machine, exhausting the capacity of the processor  
15 or storage device. Problem (c) is also partly solved by resource rationing. By metering CPU usage and imposing resource quotas, the invention can address the problem.

#### Security Support in the Invention

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The invention is designed to support security habits in several ways.

#### Language Structure

25 The relevance language is an example of mobile code. Such code is written by an author on one computer for interpretation on another computer. Recently, there has been considerable interest in the development of safe languages for mobile coding (see S. Oaks, *Java Security*, Oreilly(1998); and N. Borenstein, *Email with a mind of its own: The Safe-TCL Language for Enabled mail*,  
30 <http://minsky.med.Virginia.edu:80/sdm7g/Projects/Python/safe-tcl/>). Java and

Safe-TCL are examples of so called safe languages, *i.e.* they are considered to provide a degree of safety that traditional languages such as C and C++ cannot offer.

- 5 The relevance language is a language for mobile coding. The language offers a level of security protection in excess of the current norm of the Internet business community. Relevance Language interpretation is inherently safer than safe languages for mobile code, such as Java and TCL. Java, TCL, and related languages are procedural languages. They contain control features such as
- 10 loops, recursion, and branching statements which, if abused, can consume large fractions of system CPU resources. They offer authors storage allocation facilities which, if abused, can potentially consume large fractions of system memory resources. Remote unattended operation of code from these languages obtained over the Internet can in fact be dangerous, despite the labeling as safe.
- 15 In fact, these mobile code languages are typically only used in attended operation. For example, mobile Java code is typically used in Web browsers, with a human watching the screen as the code runs. It is implicitly understood that the human is supervising the execution of the process.
- 20 The relevance language is a descriptive language rather than a procedural language. It describes a state of the computer and its environment. Relevance evaluation is a process of determining whether this state holds or not. This description of the state uses a language that does not exhibit traditional control structures, such as loops, nor does it have traditional storage allocation facilities.
- 25 In fact, the relevance language is so tightly constrained that it is not Turing-complete. It does not suffer from the famous Turing halting problem, which is a typical property of procedural languages. The Turing halting problem is to decide whether a given computer program ever halts or not. Most procedural languages
- 30 are undecidable. They contain programs, perhaps even simple ones, for which it

can never be known in advance whether the program must always halt. Java and TCL programs can be undecidable. In stark contrast, statements expressible in the relevance language are decidable, i.e. they halt. This is an additional level of security that goes well beyond the security guarantees of mobile code languages, such as Java and TCL.

#### Human Intelligibility

An additional security feature of the invention is the human intelligibility of the relevance language. The relevance language has an appearance which is reminiscent of ordinary English. A consumer who reads English can form an approximate sense of what a given piece of advice is doing by inspecting the plain text of the advisory. In this way, consumers are brought into the process of understanding the advisories sent to them. While it is true that untrustworthy advice providers, by writing opaque relevance clauses, may still be able to disguise their intentions, the more important point is that trustworthy advice providers are able to make their intentions clear to consumers, and thereby gain and cultivate trust.

#### 20 Disclosure and Labeling

The invention offers, in one implementation, a mechanism to encourage advice providers to label their advisories clearly for intended effects and thereby provide the public an accurate understanding of the risks associated with a given solution operators.

In this implementation, the Better Advice Bureau defines and maintains a list of special labels which indicate the effects of a certain solution operator, for example, the subsystems affected, the extent to which effects are reversible, and the availability of further documentation explaining the proposed change. The

advice provider uses this labeling system to describe the effects of the advisories published by the provider. The advice reader uses this labeling mechanism as part of its user interface during the solution proposal process. When a consumer is contemplating applying a solution operator, part of the user interface indicates for the consumer the types of side effects which may result, according to the labeling which the provider has supplied.

Both consumers and providers, under the guidance of a central classification, come to have a common way to understand and discuss the potential effects of a system modification. The Better Advice Bureau issues counter advisories against advisories which inaccurately label the effects of their advisories. The advice reader uses distinctive visual identifiers to call attention to advice with extreme effects and to call attention to advice with no labeled effects. The consumer may refuse to approve proposed solution operators which are unlabelled, or to subscribe to sites which author unlabelled operators.

#### Security Summary

There are several illegal activities that threaten the security of the consumer. However, in every instance, the system has been designed with an effective means of defense. The invention does not expose the user to levels of risk in excess of those risks already experienced through the use of e-mail and Web browsing. In fact, the risks from invention are far lower than the risks of those standard activities.

There is also the possibility that otherwise trustworthy advice authors release damaging advice. The system is designed to contain and correct such situations. The extent of damage due to honest mistakes is contained because advice has access to only a limited complement of system resources, e.g. disk storage and CPU time, and the use of these resources is metered and rationed in a typical

implementation. The structure of advice files and the associated relevance language is relatively transparent to consumers, which helps them play a role in fostering their own security. Finally, through the advisory process, through Better Advice Bureau and UrgentAdviceNet, the invention contains mechanisms to  
5 correct security problems automatically as they arise.

#### Privacy Issues

The advice reader accesses a great deal of information about the consumer's  
10 computer, about the contents of the files on the consumer's computer, and about the interactions of that computer with devices in the immediate environment. To the extent that the consumer stores information about his financial, personal, or medical affairs on the computer, typical implementations of the advice reader are able to access that information, for example bank balances and prescription drug  
15 information. To the extent that the consumer computer has access to network devices which form part of the consumer's home or work environment, the advice reader is able to access information about that environment, for example whether certain devices are present in the environment, whether they are operating, and what their conditions of operation are. Enabling the invention to access this  
20 information is beneficial to the consumer, allowing helpful advice to be written which can identify problematic situations and call them to the attention of the consumer.

Much of the information that invention has access to is potentially sensitive, and  
25 most consumers would not knowingly permit such data to be divulged to strangers. Any system which can access such sensitive information must also protect the information. As explained below, the advice reader acts to preserve the privacy of the consumer.

Existing Internet Privacy Standards

The invention is designed to protect user privacy, offering a level of protection far in excess of the current norm of the Internet business community.

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Internet mediated activities, such as Web browsing and on-line commerce, can result in the disclosure to Web servers of information about the browsing consumer's identity, computer configuration, and also certain items about consumer shopping or browsing interests. There is no single accepted standard of privacy, and industry groups have formed for the purpose of gathering information about consumers from their Web interactions and sharing among themselves information about the consumers. Consumer oriented groups such as EPIC (Electronic Privacy information Center) have formed in response, and there are currently political battles over the consumer's right to electronic privacy.

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The invention offers a method which meets or exceeds the level of information privacy desired by consumer groups, while providing the fine grained targeting of messages to recipients desired by industry groups.

20 The standard that the invention offers is understood by considering a classification of privacy respecting/threatening behaviors. The ethical standards of advice providers are classified into four categories, definitions of which are provided below.

25 (Ea) Completely Ethical

(Eb) Merely Ethical

(Ec) Merely Legal

30

(Ed) Criminal

Completely ethical behavior of an information provider is defined as full respect of consumer privacy and of the intended purpose of the invention communications protocol. A completely ethical provider would ...

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  - 10
  - 15
  - 20
  - 25
- \* never seek to perform covert identification or surveillance of a consumer community. In particular, it would:
    - make no efforts to infer from server activity the identity or attributes of any consumer,
    - make no efforts to infer from network activity the attributes of any consumer, and
  - \* make no efforts to use the Internet as a pure broadcast advertising medium, creating messages which make unsolicited contact with all or a very large number of consumers passively receiving messages.
  - \* fully disclose to consumers the existence and purpose of data gathering efforts;
  - \* make no efforts to use information so received in ways unrelated to the disclosed purpose of the information gathering effort;
  - \* make no efforts to use information gathered from such a questionnaire to correlate with future server or network activity.



Completely ethical behavior is a standard much higher than that obeyed by many actors in the current Internet business community. The internet business community at the moment contains a wide range of attitudes and behaviors towards consumer privacy. There are many instances of behavior that can be  
5 classified as merely ethical, or merely legal.

Merely ethical means that the behavior of inferring user identity or attributes from Internet activity, while providing some sort of notice that privacy compromises are taking place, respects the provider-consumer relationship by not using the  
10 information to initiate unwanted contacts with consumers and not sharing the information with other businesses. In effect, merely ethical behavior restricts the use of information gathering to internal research and planning purposes, in much the same way that ethical companies currently use information gathered from product registration cards.

15 Merely legal means that the behavior of inferring user identity or attributes from Internet activity, provides only minimal notice that some sort of privacy compromise is taking place, and then subsequently makes maximum exploitation of the gathered information under current laws, which includes systematically  
20 sharing the information with other businesses and initiating unwanted contacts with consumers. The standard of many Internet based information gathering efforts is at precisely the level of merely legal. Companies which are collecting information about the consumer rely on the Web browser to notify the user that an insecure process is taking place. They do not make any separate notice of  
25 their own, explaining what information is being gathered or how it is used.

#### Privacy Protection

The invention does not allow unsolicited interactions with the outside world. In  
30 routine operation, the invention has interactions only with the advice servers to

the user has subscribed. Assuming that security problems, such as spoofing and moles are not an issue, the risk of compromising privacy is therefore focused on the interaction between consumer and trusted advice provider. As described below, the invention's communications protocol divides the advisory  
5 communications process into the following stages:

(ACP-a) Subscription. The consumer anonymously initiates a subscription.

(ACP-b) Gathering. The consumer's advice reader anonymously gathers advice  
10 from the site.

(ACP-c) Evaluation. The consumer's advice reader evaluates advice for relevance.

(ACP-d) Explanation. The consumer's advice reader displays a document  
15 authored by the advice provider, explaining why a certain advisory is relevant, and proposing a solution/response.

(ACP-e) Solution/Response. The consumer evaluates the document and,  
20 potentially, accepts the proposed solution/response, potentially interacting with the world as a result.

The invention, operating with the AEUP communications protocol, makes steps  
25 (ACP-a)-(ACP-d) completely private and localizes the information sharing potential to step (ACP-e).

Operationally, a completely ethical advice provider never seeks to violate the  
30 privacy protection of steps (ACP-a)-(ACP-d) of the protocol. In particular, a completely ethical provider never seeks to perform covert identification or surveillance of a consumer community using the invention. There are no efforts

to infer from server activity the identity or attributes of any user. There are no efforts to develop tools to infer from network activity the attributes of any user. There are no efforts to use the invention as a pure broadcast advertising medium, creating advisories which make unsolicited contact with all or a very large number of consumers. Any efforts to use the invention to gather information from consumers are based on a questionnaire process at solution time (ACP-e) and come with full prior disclosure to the consumer at explanation time (ACP-d), in easily understandable terms, of the types of information being gathered, of the purposes for which they are being gathered. There are no efforts to use information so received in ways unrelated to the disclosed purpose of the information gathering effort. There are no efforts to use information gathered from such a questionnaire to correlate with future server activity.

In one typical implementation, the invention encourages providers to behave in a completely ethical way. The invention may provide mechanisms to encourage consumer knowledge of the standards of completely ethical behavior and knowledge of the standards kept by individual providers. The invention contains mechanisms to defeat and discourage criminal attacks on privacy and to defeat and discourage unethical behavior.

In a typical implementation, the invention has several mechanisms to promote and enforce completely ethical behavior.

First, by encouraging subscription to trusted advice sites, the system encourages users to be aware of the quality of a site. One important component of quality is ethical quality.

Second, the Better Advice Bureau provides a mechanism to issue advisories warning against unethical sites. The Better Advice Bureau maintains an openly accessible list of objective causes for counter advisories. This list makes it clear

to consumers and providers the types of behavior which result in counter advisories. In this way, providers receive guidance about what constitutes unethical behavior. Those providers wishing to preserve public trust act ethically.

5 Third, the invention may frustrate attempts to violate the privacy intent of the protocol. As described below, all legal threats to the protocol have effective responses from the invention, and a provider must engage in criminal activity to violate the communications protocol.

10 Privacy and AEUP

The invention uses a protocol (AEUP) for information exchange over open public networks which imposes a much higher standard of information ethics than the current industry standard. In addition, the protocol protects against certain  
15 outright criminal behavior.

The goal of AEUP is that:

Information on the machine stays on the machine.

20 That is, information about the consumer's computer or its environment which has been accessed by invention is not distributed to outside parties without explicit consent. In physical terms, AEUP provides a one way membrane between the consumer computer and the outside world. During unattended operation:

25 Information flows in, but no information flows out of the consumer computer.

This design constraint is expressed in four principles:

30

(PRIV-a) The act of subscription does not divulge the user's identity or attributes.

(PRIV-b) The act of gathering advice does not divulge the user's identity or attributes.

5

(PRIV-c) The act of evaluating relevance does not divulge the user's identity or attributes.

(PRIV-d) The act of passively viewing a relevant advisory does not divulge  
10 the user's identity or attributes.

When operated under AEUP, all automatic unattended operation preserves the  
privacy of the user's identity and attributes. The following discussion describes  
the ways in which AEUP and the overall invention process enable (PRIV-a)-  
15 (PRIV-d).

(PRIV-a) Privacy in the act of subscription.

Under AEUP, the information that a certain user is subscribing to a certain advice  
20 site is known only to the user and to his advice reader. This requires clarification.  
In common usage, the word subscription implies a sort of registration process by  
which a user identifies himself to a provider as a subscriber. Under AEUP, there  
is no such registration process. There is no need for it. Advice is made freely  
and anonymously available in the same way that Web sites make Web pages  
25 available freely and anonymously. The subscription process is an interaction  
between the user and the user's own advice reader, not between user and some  
external advice provider. The advice reader operating on the user's computer  
obtains from the user the selection of advice sites of interest and stores those on  
the user's computer only as part of a database maintained locally by the  
30 subscription manager component of the advice reader. That database controls

the evaluation of advice, causing the advice gatherer to gather advice periodically from some sites and not from others. Subscription is a private matter.

5 (PRIV-b) Privacy in the act of gathering.

Under AEUP, the act of gathering advice does not reveal information that a certain consumer is interested in certain things, or that he has a certain computer configuration.

10

It may be objected that an advice site can learn about the identity of a subscriber from the fact that the subscriber's advice reader frequently gathers information from the site. However, in typical implementations, the only thing that can be learned from the act of gathering is that a connection to an advice site has been  
15 made from a certain IP address. Under current network protocols most consumers have dynamic IP addresses, and so the correlation between IP address and identity is weak, lasting typically a few minutes. Hence, the information in an IP address is generally of little value.

20 Moreover, consumers with static IP addresses who do not wish to divulge their true IP address may use a proxy server. Proxy servers are a well known tool by which certain IP client-server transactions are replaced by a three-party client-proxy-server interaction, with the proxy requesting data of the server and routing it anonymously to the client. To the server, it appears that the proxy is the client.  
25 To the client, it appears that the proxy is the server. There is never any direct contact between the server and client. The server never obtains the identity of the client, *i.e.* its IP number.

The invention, in one implementation, is configured to offer universal proxy  
30 service to all users, and the advice reader offers to the user, as one optional

means of connection, the use of such a server. In such an implementation, Better Advice Bureau.org or another central authority offers an anonymous advice gathering server which accepts advice gathering requests from users, strips them of return addresses, routes them to advice sites, and forwards the returned information to the user. This mechanism conceals the IP address of the user.

The act of gathering may be thought to divulge information because the gatherer selects only certain documents from among those available at the advice site. This objection is based on a misunderstanding of AEUP. In a typical implementation, the advice gatherer always accesses all documents available at a certain site, which are not already present on the consumer machine. No selection of any kind is performed at gathering time. Relevance is determined only after all the advice has been gathered and stored on the consumer computer. The only correct inference that can be made from the behavior of the advice gatherer is that the consumer has an ongoing subscription to that site.

This approach is very different from currently popular approaches to obtaining relevant information using Internet. In the currently popular approach, the user fills out a form expressing, for example, preferences, characteristics, and system configurations. This form is sent to the server. The server then responds to the consumer in a focused way, based on the information that was contained in the form. This standard process reveals information about the consumer to the server.

In the invention's approach, the consumer's preferences and configurations are kept confidential on the consumer's machine. All of the advice offered by the site is brought to the consumer machine and is then evaluated for relevance privately.

30

(PRIV-c) Privacy in the act of evaluating relevance.

The relevance or irrelevance of a given piece of advice can signal a great deal of information about an advice consumer's computer and its environment. A very  
5 narrowly focused condition, specifying contents of the user profile, and contents of specific files can, if true, convey a great deal of information about the user.

If the advice reader allows the fact of relevance or irrelevance of an advisory to leak out of the reader to the outside world, it compromises the consumer's  
10 privacy. If this happens during unattended operation, the outcome might be very serious because many thousands of advisories are being evaluated for relevance. If there is a mechanism for systematically discovering the relevance of an arbitrary collection of many pieces of advice, a complete profile about the consumer and his environment leaks out.

15 In a typical implementation, the advice reader's relevance evaluation process has as its only externally observable effect a resulting change in the state of the user interface. The user is notified when a certain piece of advice has become relevant, and that is all. In a typical implementation, the simple fact that  
20 something evaluated to relevant causes no activity outside of the user's computer which can be observed by others. There is a possible exception to this when remote inspectors are available. See below.

(PRIV-d) The act of passively viewing a relevant advisory does not divulge the  
25 users identity or attributes.

Reading a text file in the privacy of one's own interaction with one's own computer does not offer any breach of privacy. No one in the outside world need  
30 know that one has read the file. However, reading a Web page is a different matter. A hole in the one-way privacy membrane maintained by invention is



opened by the careless offering of HTML or other hyperlinked media as a valid type of advisory content in the explanatory component of the advisory. The discussion below describes the hole and its consequences, and describes why the invention, in a typical implementation, does not leave this hole open.

5

#### Constraints on Solution Operations

The final step in the advice processing chain is the application of a recommended solution operation. Because this operation can be an essentially arbitrary operation, it is not possible for the invention to control the effects of this operation. In particular, the recommended operation includes electronic correspondence with the advice author, divulging identity and attributes. For this reason, there is a design constraint:

10  
15 (PRIV-e) In typical implementations, the advice reader does not apply recommended solution operators automatically. They may only be applied after user approval.

20 Because of the wide-open nature of solution operators, the consumer plays an important role in protecting his own privacy. The act of applying a recommended solution operation may divulge the consumer's identity or attributes, whether the consumer knows this or not. An unethical advice author can create mole solution operators which, while claiming to do one sort of operation, could in fact be conducting electronic correspondence covertly, without informing the consumer.

25 The consumer should only agree to apply solution operations which come from authors he trusts to behave in an ethical fashion.

Remote inspectors: Plugging Leaks

In one implementation, there is a potential violation of the privacy of the relevance evaluation process, based on the assumption that advice reader  
5 allows conditional evaluation of and clauses, and the assumption that relevance clauses may refer to conditions which are verified by making queries to other computers and/or other devices remote from the computer on which the advice reader is running. A careless implementation of a remote inspector creates network activity that is observable to the outside world, and from which activity  
10 the value of certain relevance clauses is inferred. Inspectors which cause network activity are by no means central to the invention, and this particular privacy threat therefore affects only certain implementations of the invention. (Compare discussion of Covert Channels in Pfleeger, Security in Computing)

15 Consider an eavesdropper who would like to learn about the value of a relevance clause R when evaluated for relevance on a certain advice consumer's machine. Suppose that the eavesdropper operates an advice site which is trusted by the consumer and subscribed to by the advice reader, so the eavesdropper can introduce advice onto the machine. Suppose that the  
20 eavesdropper knows that the advice reader contains an inspector which, when invoked via clause I, generates network activity across a piece of the Internet under control of the eavesdropper. For example, suppose that the eavesdropper has system level access to a node of the Internet in a direct path between the consumer machine and a destination machine that is queried as a result of a  
25 certain inspector call. The eavesdropper is then in a position to program the IP transport logic at the node under his control to take note of the existence of IP traffic between the consumer and the destination.

In this hypothetical situation, the eavesdropper is in a position to author advice asserting R and I and to publish the advice at his advice site. After this advice is gathered by the consumer machine, it is evaluated automatically for relevance.

5 In one implementation of the advice reader, the evaluation of a clause A and B stops immediately as soon as A is determined to be false because it is not necessary to know the value of B to finish the evaluation of the phrase. As soon as A is determined to be false, the phrase A and B is known to have the value False. This scheme is referred to as conditional evaluation. There are  
10 implementations of the advice reader that do not perform conditional evaluation. These schemes always evaluate all subexpressions of an expression before inferring the value of the expression. The decision to use conditional evaluation in an implementation is based on performance considerations. Advice readers using conditional evaluation typically run faster.

15 Assuming that the advice reader implements conditional evaluation as described above, then the network activity prompted by the clause I only occurs if the clause R evaluates to True. The eavesdropper is in a position to observe this network activity, and hence to infer that clause R evaluates to True. Information  
20 about the consumer has leaked out of the consumer's computer due to the relevance evaluation.

In discussing this hypothetical situation, it should be noted that eavesdropping activity of the sort described constitutes a form of electronic stalking and may be  
25 illegal. Such situation requires either that the trusted advice author be himself an eavesdropper, engaging in conspiracy with the eavesdropper, or does not act to prevent unauthorized advice from being injected in his name, for example by signing his advice. The advice consumer may protect himself from this threat by subscribing to trustworthy sites only, *i.e.* sites meeting the standard of completely  
30 ethical behavior.

The advice consumer may also protect himself from this threat by configuring the advice reader to restrict the domain of allowed relevance checking to a domain where he has physical control. In extreme cases, this means limiting  
5 relevance to check conditions verifiable only on the machine where the advice reader is running.

There are presently four mechanisms whereby the advice reader can allow network activity and yet protect against this type of eavesdropping.

10

- Disallow conditional evaluation of clauses. The advice reader is configured to avoid conditional evaluation. In that event, no information about relevance evaluation is revealed by the existence of observable network activity between consumer and destination.

15

- Randomly reorder subexpressions for conditional evaluation. In evaluation of a clause A and B, the parser randomly reduces the clause to the equivalent of (& A B) with probability 1/2, and to perform (& B A) with probability 1/2. When this is done, the fact that remote network activity occurs in evaluation  
20 of the clause R and I implies that either a fair coin was tossed heads or that a clause R was true. This makes it impossible in a particular instance to determine whether R was actually true for the user in question.

- Always force evaluation of subexpressions involving network activity. The  
25 advice reader is configured so that each inspector has an attribute Remote-Activity which is set in case the inspector causes activity off the machine running the inspector. The advice reader, in parsing a relevance clause, identifies those subexpressions which have attribute Remote-Activity and forces evaluation of those subexpressions.

30

- Decouple network activity from relevance evaluation. Inspectors with the attribute Remote-Activity are constrained to work only on cached data, using queued requests, to a prespecified location or collection of locations. This means that an inspector, when receiving a request for an attribute determinable only remotely, can check a local cache. If the answer is found in the cache, it responds with the answer. If the answer is not found in the cache, the request is placed in the queue for future evaluation. Independently, a process runs according to a fixed schedule, e.g. once per day, which communicates with a fixed list of remote machines, and which at that time processes all requests that have been cached in the last day. In this way, relevance evaluation *per se* causes no network activity outside of regularly scheduled activity.

An appropriate combination of these mechanisms can safeguard the privacy of relevance evaluation, even in the indicated context of criminal eavesdropping.

#### HTML: Plugging Leaks

The final appearance of a typical modern HTML document is the product of several files rather than a single one. The HTML document itself gives a kind of logical skeleton of the display, and an inventory of the textual component, and a collection of links to various graphics and multimedia files, which provide the visual components. In traditional Web browsing practice, a Web browser constructs the rendered image in a series of stages. First the HTML file is gathered and the skeleton of the document is rendered. If the HTML document refers to remotely located multimedia files, then the Web browser begins to gather those files. After the files arrive, they are used to format and render the final display.

Suppose that an advice provider has authored an advisory containing an HTML file making references to files located on the advice providers server in its explanatory component. Suppose also that the advice reader behaves as a traditional Web browser in rendering HTML. At the moment that the consumer  
5 reads the advisory, the underlying graphics files is gathered from the advice server. In other words, there is noticeable activity at the advice server caused by the fact of reading an advisory. If the advisory is irrelevant, the HTML is not rendered and, because the unrendered HTML never leads to a gathering of the multimedia file, the server can infer from this activity that an advisory evaluated  
10 to relevant. This constitutes a leak of information through the one way membrane, back from consumer to provider.

A completely ethical advice provider must not take any notice of this activity. However, a merely ethical advice provider could, in principle, exploit this fact to  
15 learn something about the consumer population. Indeed, such an advice provider can author an advisory referred to a special multimedia file, pointed to only by this advisory. Counting the number of references to the multimedia file, and dividing by the number of gathers of the advisory itself, one can obtain an estimate of the fraction of the consumer population which exhibited a certain  
20 combination of circumstances.

However the invention, in a typical implementation, takes steps to frustrate this sort of activity. Inducing leaks of this kind is considered less than completely ethical because, combined with other unethical behavior, it can compromise  
25 individual privacy. It is true that such leaks have an innocent and useful application. As long as no correlation is made between the information leaking back and individual identity, one could argue that the leak can be made to serve a constructive purpose of informing the advice provider about the user population in general. However, the existence of such a leak creates a temptation to perform  
30 such a correlation, which leads to serious privacy abuses.

There is another mechanism available by which the invention offers similar feedback to advice providers while protecting individual privacy, *i.e.* randomized response. To discourage attempts to exploit leaks caused by HTML, a typical implementation of invention can employ one or all of three mechanisms:

5

- HTML-A Proxy server. By working exclusively through a proxy server, the advice reader can destroy all correlation which might otherwise be visible at the advice site between identity of gatherer and fact of gathering. In effect, the advice reader is requesting the multimedia file from the proxy server rather than the original site. In one implementation, the proxy server caches the multimedia file locally and so serves many requests for the multimedia file while only asking for the file once from the advice site. Advice sites may find this arrangement advantageous because it minimizes the load on their own server. In return, they lose the ability to make population attribute prevalence studies, or to make correlation between identity and attributes.

10

- HTML-B Immediately gather all multimedia. In one implementation of the invention, the gathering process includes the automatic downloading of all multimedia files referred to in the HTML of an advisory. This works as follows: A preliminary parsing of the advisory leads to a listing of all multimedia files referred to in the HTML source of the explanatory component of the advisory. The advice gatherer gathers those files immediately, ensuring that if the advisory ever becomes relevant, the file is available locally. For this implementation of invention, there is no connection between the fact that a file was gathered and the possibility that a certain advisory may be relevant.

15

Mechanisms (HTML-A) and (HTML-B) may be used simultaneously. That is, a proxy server may gather advice on behalf of a client, and also all multimedia files

20

25

30

referred to in any HTML source contained within that advice. The consumer advice reader initially gets only the advisory files, and not all the multimedia files. At the proper time, the multimedia files are gathered from the proxy server. In this way, there is again no connection between the fact that a file was gathered  
5 and the possibility that a certain advisory may be relevant.

- HTML-C Download multimedia at random. In one implementation of the invention, the gathering process includes the random downloading of some multimedia files referred to in the HTML of some advisories. This works as  
10 follows: A preliminary parsing of the advisory leads to a listing of all multimedia files referred to in the HTML source of the explanatory component of the advisory. The advice gatherer periodically gathers a few randomly selected files from that list. This ensures that, for any advisory that an advice author publishes, a large fraction of the multimedia files are accessed, not for  
15 reasons of relevance, but due to outcomes pure chance experiments. Partially, this ensures that among those customers where an advisory becomes relevant, for many of them the file is already available locally. Under this implementation of the invention, there is no logical connection between the fact that a file is gathered and the possibility that a certain  
20 advisory is relevant. Whatever connection there may be is probabilistic and could be made rather weak by appropriate choice of the frequency of random downloading.

#### Support for Privacy Ethics

25

There are three meta-principles in the invention which help to enforce information ethics.

- Ethical sites. Consumers should only subscribe to advice sites known to  
30 behave in an ethical fashion. Many consumers configure their advice reader



to subscribe mainly to advice from large concerns which manufacture goods and services of interest to the consumer. For example, a computer manufacturer, a software publisher, or the provider of Internet service. Subscription to substantial organizations of this type is a reasonably secure practice. Such organizations have an interest in providing trustworthy advice so that they maintain rapport with their consumers. Few risks are posed to advice consumers who subscribe to advice authored by such concerns.

- Clear definition of ethics. The Better Advice Bureau is a fundamental tool for encouraging ethical behavior of authors. All users subscribe to this site. This site compiles counter advice, informing users about unethical sites and about unethical advice which has been circulating. Better Advice Bureau defines a solution operator as unethical if it involves divulging information to the author without first informing the user that information is to be divulged or without informing the user accurately about the nature of the information that is to be divulged. If pieces of mole advice are circulating which behave unethically, and they come to the attention of Better Advice Bureau.org, it may release counter advisories against them. Hence, the Better Advice Bureau functions in some respects as an privacy protection system for the invention, allowing the correction of unethical situations.
- Clear labeling of side effects. To make the definition of ethical behavior clear, and deviation from ethical behavior clear, the Better Advice Bureau describes a set of labels to be attached to advisories, indicating the potential side effects of solution operators. These labels indicate:

The critical subsystems which may be affected by the advisory's proposed solution.

Whether information may be revealed by using the advisory's proposed solution.

What types of information may be so revealed.

5

If information may be revealed, whether it may be used for marketing/mailing.

10

If information may be revealed, whether it may be shared with other companies.

15

Completely ethical behavior demands that advice authors label their advice according to its effects on potential consumers. Better Advice Bureau considers it grounds for a counter advisory if an advisory is mislabeled. Persistent, concerted efforts to misinform are considered by Better Advice Bureau grounds for a site counter subscription advisory.

#### Alternate Client-Server Interactions

20

A key component of the invention is the synchronization between consumer and provider site images. This happens according to AEUP. However, there are other embodiments of the basic invention in which synchronization is effected by different means. These are described below.

25

#### Anonymous Selective Update Protocol

30

Under this protocol, the act of subscription and the act of synchronization are both anonymous as in the AEUP. However, the update process is selective rather than exhaustive.

ASUP Definition

- 5 Under ASUP, each advisory message is abstracted into a short form consisting of at least a message identifier referring to the original advisory, the relevance clause of the original advisory and, potentially, other information, such as a subject line. Under this protocol, the advice server, in addition to directory messages and whole advisory files, also serves to the advice reader the abstracts of one or many advisories.
- 10 Under ASUP, the gathering process changes. The advice reader, instead of ensuring that it has the entire body of each advisory of the advice site, ensures that it has at least the abstract for each message. It does this by issuing requests for all the abstracts of all the advisories that are new since the previous synchronization.
- 15 Under ASUP, the advice database changes. The database contains two kinds of entries: full advisories, and advisory abstracts.
- 20 Under ASUP, the advice reader schedules relevance evaluation for all the relevance clauses it has obtained, both those clauses contained in full advisories and those clauses contained in abstracts.
- 25 Under ASUP, a relevant advisory can trigger a new round of contact between advice reader and advice site. Depending on the configuration, the advice reader, either in anticipation of the user wanting the full advisory or after a direct user request, establishes a connection with the advice site, and requests the bodies of certain advisories.

The result of this protocol is that, whereas the consumer's advice reader accesses and evaluates all the published relevance clauses, it does not download all the published advisories.

### Analysis of ASUP

This protocol can be advantageous if the published advisories consume considerably more storage than the abstracted advisories. It saves the consumer  
5 time in accessing a large body of advisories and saves the provider time in serving requests. A potential drawback of this protocol is the possibility of compromises of consumer privacy. Under the ASUP protocol, it is conceivable that an advice provider attempts to make inferences about the consumer based on observing the advisory files requested and not requested by the advice  
10 reader. If the protocol is implemented exactly as described above, the consumer never requests the entire advisory when the clause is not relevant and always request the entire advisory when the clause is relevant. An advice provider whose intent is to learn information about a specific consumer, in principle, correlates server requests for full advisories with IP addresses from which they  
15 came, inferring that requests signify the relevance of the corresponding advisory on the corresponding computer. If the IP address is permanently assigned to a certain consumer computer, the provider in principle correlates such requests with consumer identity. In this way, information about the consumer may leak back to the server.

20

### Privacy Protection Under ASUP

- Random gathering. The potential for information leaks is reduced by having the advice reader request full advisory bodies for some advisories whose  
25 relevance clauses are not relevant. This is done by a randomization mechanism. Each full advisory body is requested with a probability  $p$ , where  $p$  is a specified number.
  
- Proxy server. The potential for information leaks is reduced by having the  
30 advice reader request full advisory bodies via a proxy server, which

anonymously forwards advisory body requests to the advice site, and thereby masks to the advice site the identity of the requester. A centralized proxy server, for example located at the Better Advice Bureau or at advisories.com is made available for this purpose.

5

- Proprietary server. The potential for information leaks is reduced by restricting the supply of server software. If the only server software which works with the invention protocol does not make correlation between consumers and the advisories they request, and also does not log the requests, and if the users of the server software do not attempt to frustrate the intent of the proprietary protocol by eavesdropping on the server-reader transaction, then there is no disclosure of personal information to the server as a result of ASUP.

10

15 The supply of server software can be restricted by modifying the reader/server interaction so that a certain security handshake is mandatory. By using digital encryption technology as part of the security handshake and by restricting access to the appropriate security handshake keys, one restricts access to the ability to build server software.

20

Prohibitions against eavesdropping on client-server interactions can be enforced contractually. Valid server software may be made available only on condition that recipients do not eavesdrop.

25 Hence there are several avenues to safeguard privacy under ASUP.

#### NonAnonymous Exhaustive Update Protocol

30 In certain settings, the concept of anonymous subscription is not workable, for example because advisories are made available only on a for-pay basis, and the

reader/server interaction includes a handshake segment in which the reader must qualify himself as a paying customer. A variant on this scenario is in providing advice to members of a club, where members are not in any narrow sense paying for the advice subscription itself, but need to be members to qualify  
5 for the advice.

The non-anonymous exhaustive update protocol (NEUP) is applied in a non-anonymous setting where a subscriber exhaustively updates downloading all new advisories at each synchronization. Under NEUP, the consumer's privacy  
10 is protected in the following sense: While the fact of the consumer's subscription is known to the provider, the routine act of gathering advice and evaluating relevance does not reveal information about the consumer to the provider.

#### NonAnonymous Selective Update Protocol

15 In certain settings, the concept of anonymous subscription is not workable and the use of exhaustive updating is not workable, either because there is a very large body of potentially relevant advisories to consider or each advisory is rather large in size, and very few of the advisories are likely to be relevant, so  
20 consumers and providers are not willing to devote extensive resources to exhaustive updating.

The non-anonymous selection update protocol (NSUP) provides this non-anonymous setting where the advice reader selectively updates, obtaining first  
25 abstracted advisories, evaluating relevance, and later downloads relevant advisories.

The NSUP by itself gives the consumer no guarantees privacy from the provider. The fact of the consumer's subscription is known to the provider and the routine  
30 act of gathering advice and evaluating relevance reveals to the provider which

relevance clauses are True. Under NSUP, there are several mechanisms for helping to protect consumer privacy, e.g. randomization, proxy server, and proprietary server.

5 Alternate Advice Distribution

Centralized Advice Server

In one embodiment, a single centralized site stores the advice offered by many  
10 different advice providers, with the different advice sites actually serving as  
different subdirectories of a single file system. All advice readers operating on  
consumer computers synchronize their site images by contacting this centralized  
site and requesting resources, such as advisories, from this site. In practice, the  
15 single site actually consists of a collection of computers mirroring each other's  
functions and contents.

This arrangement has an impact in two areas:

- 20 \* Privacy. This arrangement prevents providers from learning about the identity  
or about any relevance attributes of any consumers by insulating consumers  
from providers. In particular, the ASUP protocol is safe in such a setting,  
provided the central advice site does not log or analyze reader-server  
transactions.
- 25 \* Security. This arrangement limits advice sites to those satisfying certain  
standards imposed by the central server management by restricting the  
supply of advice sites, and thereby ensures that advice sites are run by  
typically responsible organizations.



The centralized site allows advice providers to update the contents of their sites on the centralized server by use of standard methods, such as FTP or related file transfer methods.

5 Centralized Proxy Server

In one embodiment, a single centralized site is available to act as a Proxy server for all advice readers. There is a widely distributed base of advice sites. However, many users do not go to those sites individually. Instead, they  
10 configure their advice reader to get all advisories via the centralized proxy server. This is particularly true of users concerned about privacy violations.

The centralized proxy server caches the advice offered by many different advice providers. Advice readers on consumer computers request the proxy server to  
15 make available resources, such as advisories, from certain advice sites. If those resources are available on the proxy site, they are served immediately to the user. If they are not available, the original site is queried for the resources, which are both forwarded anonymously to the user, and also placed in the proxy site cache. The advice site includes a method to signal the centralized proxy site  
20 when the original site is changed, indicating that it is time to flush the cache (see Hallam-Baker, Phillip M. (1996) Notification for Proxy Caches, World-Wide-Web Consortium Technical Report, <http://www.w3.org/TR/WD-proxy>).

This arrangement addresses consumer privacy concerns. By insulating  
25 consumers from providers, this arrangement prevents providers from learning about the identity or about any relevance attributes of any consumers. In particular, even the ASUP protocol is safe in such a setting, provided the central advice site does not log or analyze reader-server transactions.

Centralized Anonymous Advice Remailer

In one embodiment, advice distribution operates by the use of Internet e-mail transport, routed through a centralized remailer by the use of anonymous mailing  
5 lists.

The advice site architecture discussed above is maintained. However, there is a widely distributed base of advice sites. Many readers do not contact those sites directly. Instead, they get advice by anonymous mail. In this implementation,  
10 advice sites e-mail their new advisories to the central remailer site, which in turn e-mails them to a mailing list which is kept confidential, consisting of individuals who have contacted the central site and established a subscription relationship. In this implementation, there is a new form of advisory specially designed for retraction. Advice sites handle retraction of advice by e-mailing retraction  
15 advisories to the central remailer site, which in turn e-mails them to the mailing list.

Under this arrangement, the advice reader cooperates with the e-mail reader on the consumer computer and with the consumer's e-mail reader configured to filter  
20 advice automatically into a mailbox designated for advice reader access. The advice reader performs site synchronization, not by contacting the original advice site, but instead by interpreting the contents of the mailbox that have arrived since the previous synchronization.

25 This approach is particularly suited for working with POP3 Internet mail servers. This arrangement is essentially an implementation of the AEUP protocol using e-mail. Neither the fact that a certain consumer has a subscription nor the fact of a certain advisory is relevant is generally available to the advice provider.

Under this arrangement, the one way membrane that AEUP provides is made particularly clear to consumers. Consumers understand that the advice site need not know that they subscribe to the site and that there is never direct IP traffic between the consumer machine and the advice site. They can see, by inspecting the plain text of the mail, that advisories are not coming to them directly from the advice site, but instead are transferred anonymously to them from the centralized advice remailer.

A potential weak spot in this arrangement is the existence of a secret mailing list whose secrecy is compromised. To inspire consumer confidence, it is best that the centralized remailer is operated by a trusted consumer minded authority.

By insulating consumers from providers, this arrangement prevents providers from learning about the identity or about any relevance attributes of any consumer who participates in this arrangement and who do not choose to disclose anything to the providers voluntarily.

#### USENET Advice Diffuser

In one embodiment, advice distribution operates via USENET news transport.

The advice site architecture described above is maintained. There is a widely distributed base of advice sites. However, many readers do not contact those sites directly. Instead, they get advice by USENET. In this implementation, a whole collection of USENET newsgroups is created, e.g. one per advice site. The advice site, from time to time, posts new advisories to USENET, which, in turn, cause the new postings to be distributed worldwide to all machines that operate as newsgroup servers.

Under this arrangement, the advice reader then performs site synchronization, not by contacting the original advice site, but instead using USENET protocols to contact a newsgroup server and access new postings in certain newsgroups.

- 5 This arrangement is essentially an implementation of the AEUP protocol using USENET. Neither the fact that a certain consumer has a subscription nor the fact of a certain advisory's being relevant is generally available to the advice provider.
- 10 Under this arrangement, the one way membrane that AEUP provides is made particularly clear to consumers. Consumers understand that the advice site need not know that they subscribe to the site and that there is never direct IP traffic between the consumer machine and the advice site. In fact, because the act of receiving news via USENET is anonymous, there is not even a mailing list
- 15 anywhere and so there is no centralized information base linking them to the advice site.

#### Software Channels

- 20 In possible embodiment, advice distribution operates by the use of what are commonly referred to as channels by push providers, such as Backweb, Marimba, and Pointcast (see Ellerman, Castedo (1997) Channel Definition Format, World-Wide-Web Consortium Technical Report, <http://www.w3.org/TR/NOTE-CDFsubmit.html>). In another embodiment, advice
- 25 distribution operates by the use of e-mail mailing lists. In either case, the distribution method is referred to as a channel. The logical relationships are the same. Nothing of importance changes below if every occurrence of the word channel is changed to mailing list.

The advice site architecture discussed above is maintained. There is a widely distributed base of advice sites. However, some readers do not contact those sites directly. Instead, they receive advisories through channels. In this implementation, a whole collection of channels is created, perhaps one per  
5 advice site. The advice site from time to time pushes new advisories to its channel which, in turn, causes the new offerings to be distributed worldwide to all machines that subscribe to that channel.

Under this arrangement, the advice reader perform site synchronization by  
10 listening for incoming data on the channel, and processing the incoming advisories as they arrive.

This arrangement is essentially an implementation of the NEUP protocol. Under some implementations of channels, the fact that a user has a subscription is  
15 known to the content provider. Typically, the fact a certain advisory is relevant is generally unavailable to the advice provider.

Under this arrangement, the one way membrane that AEUP provides is made particularly clear to consumers, if channel providers offer truly one-way channels  
20 and explain this to consumers. For example, mailing lists are well understood by consumers to offer what is typically a one-way communication. Consumers understand that communication only becomes two-way when the consumer wishes to initiate contacts in the other direction.

#### 25 Alternate Mechanisms to Promote Consumer Trust

So far it has been assumed that the primary concerns that a consumer might have about privacy must be solved technologically. The viewpoint has been that it is only possible to protect consumer privacy by developing a system which  
30 renders it literally impossible for advice providers to make valid inferences about

the relevance of certain advisories to specific consumers. It is an important achievement to be able to insulate consumers in this way. However, this insulation comes at the cost of certain constraints. In addition, some consumers may not be able to accept that there exists a purely technological solution to the privacy problem, and those consumers may suspect that any technological solution inevitably has failings, i.e. leaks from time to time. Such consumers worry about what happens if a leak occurs, and are not persuaded by technologist's assurances that no leaks can occur. Such consumers might be more reassured by explicit pledges on the part of advice providers that leaks would not be exploited by the providers.

A way to address consumer concerns about advice provider intentions is to restrict the population of advice providers to just those providers who have signed and who are fulfilling a contract to behave in ways which offer consumers guarantees. This has three components:

- Ethical Standards. A fundamental document is made available providing a well known definition of ethical behavior. Certain advice providers have signed this document and deposited it with a central authority, such as Better Advice Bureau, which publishes the identities of signers.
- User Interface. Users are given an option to restrict interactions just to providers who are known to follow the ethical standards.
- Restriction of Server Privileges. The reader/server interaction is protected by a proprietary handshake mechanism, and access to the appropriate reader/server handshaking secret codes is licensed only to those who have signed the agreement on ethics. There are two natural ways this is done:

5 By a centralized server strategy, in which advice readers have their functioning restricted by a handshaking mechanism so that they can only interact with a centralized advice server, serving advice only from those sites known to be obligated to follow ethical standards and known to be in compliance.

10 Following a proprietary server strategy, in which advice readers can only interact with advice servers having the appropriate handshake, and the handshake is known only to servers at ethically bound advice sites.

15 In summary, there are some providers who have signed an agreement making a contractual guarantee of privacy to customers. There are some consumers who want to deal only with such providers, and there is a technological mechanism to restrict advice reader access to those providers.

20 Alternate Relevance Evaluation Models

#### The General Picture: State Comparison

25 In effect, a relevance clause is an assertion about the state of a computer or of its environment or of the state and environment of computational devices reachable from the computer. The relevance language provides a way for an author to describe components of the state of a computer. However, there are other ways that components of the state could be described.

The advice reader and the associated inspector libraries give a way to compare a description of the state with the actual state. However, there are other ways that components of the state could be compared with a description.

Community of Watchers

An alternate method of state description might rely on a community of watchers, *i.e.* specialized applications, each potentially with its own unique concerns and architecture, which can analyze specific assertions about the computer or its  
5 environment. Such an application is referred to as a watcher.

Consider a file watcher application that watches to see if certain files had appropriate attributes. This application maintains a database of assertions. Each  
10 entry names a file or directory, a list of the specified attributes of the object, a specified watching frequency, and a pointer to a message and action associated with failure of the assertion. Examples of specifiable attributes include existence, name, version, size, and checksum. The file system watcher, running continually, at scheduled times, or under user control, goes through its database of  
15 assertions and checks that each entry has the asserted status, *e.g.* each file has the specified attributes. If it finds an entry that does not have the required status, then it passes information about the failure of the assertion, along with the message and actions associated with the assertion, to a user interface module. The user interface module, a part of the watcher application, and an application  
20 used in common across the whole system, presents to the user information about failure of the asserted condition and relays the associated message and recommended response.

A file watcher application also interprets messages making new assertions about  
25 the state, or revokes old assertions. The receipt of such a message causes the file watcher to update its database of assertions to include entries making the new assertions or to delete entries making the revoked assertions. The file watcher itself receives these messages from a messaging module, which is part of the watcher application or an application used in common across the whole  
30 system.



A remote author who wants to assert conditions about the consumer computer authors messages intended for the file watcher application according to a published file watcher assertion specifier. This is a database entry homologous  
5 to the entries in the database kept by the file watcher, or a textual description of an entry, using a keyword language or other humanly interpretable descriptive device. Such a specifier is packaged for transport across networks or by other digital transfer mechanism. Such a package is distributed to consumer machines by any of the methods enumerated so far, *i.e.* AEUP, ASUP, NEUP, NSUP, e-  
10 mail, or channels.

Some potential advantages of this approach include:

- 15 \* Specialization yielding efficiency. A watcher, because it is specialized, is written to optimize the speed at completing a specialized set of tasks. For example, if a file system watcher has to watch several files in the same directory, it is to do so while making only one directory structure access rather than several, thereby saving disk operations. It is possible to avoid certain operations if it is known what the outcome is based on certain earlier  
20 operations. If several different assertions must be tested about the same file, it is possible to make a single file access to get the information about all of them simultaneously. In addition, if the watcher accepts instructions in a predefined format that avoids the need for parsing, it can evaluate assertions more quickly.  
25
- \* Specialization yielding expressiveness. A watcher, because it is specialized, is written to use a very convenient mode of describing a specialized set of tasks. For example, if a file system watcher accepted expressions in a language, that language is designed to incorporate well proven useful idioms  
30 from other systems. Thus, in UNIX, wild cards \*, [a-z], ? and related

constructs are useful in efficiently describing properties of file systems, for example, in referring to a large collection of files with similar but not identical names. A file system watcher makes use of such a specialized idiom without impacting the design of the interfaces of other watchers in the community of  
5 watchers.

- Specialized scheduling algorithms. A watcher, because it is specialized, is written to schedule execution of the specialized task set that it addresses appropriately. For example, a file system watcher operating in continuous  
10 watch mode follows a specialized scheduling algorithm which is different from the algorithm used for a system settings watcher. In certain operating systems, for example, the file system itself maintains information about whether files or directories changed, which is used to defer evaluation of assertions because it is known that the state of the assertions has not  
15 changed since the previous evaluation.

- Specialization yielding security and privacy. A watcher, because it is specialized, is written to block certain dangerous or revealing assertions. For example, a file system watcher has various user configurable security and  
20 privacy settings, enabling the user to control the access to certain files or elements within files.

The collection of watchers is large. In addition to file system watchers and system settings watchers, files such as serial device watchers, printer watchers,  
25 and network watchers are provided.

#### Community of watchers is the same invention

The community of watchers approach is a variation on the invention. There are  
30 two ways to understand this point.

5

- As an implementation layer. Notice that in the invention, the inspector libraries have their actual implementations carried out by variations of such specific watchers. For example, a file system watcher is built to watch various characteristics of various files. This is then exploited by the advice reader, as follows: File related method dispatches in the advice reader are implemented as queries to the file system watcher. The file system watcher answers each query and records the query in its database of assertions. The next time the same dispatch occurs, the file system watcher uses its specialized caching, scheduling, and optimizations to get the answer more cheaply, where feasible. In this way, the community of watchers is an implementation layer for inspectors and the user interface/messaging software of the community of watchers is the advice reader software.

10

15

- As a variant implementation. Another way to see that the community of watchers is a related invention is to notice that the features which seem most attractive about the watcher approach, such as enabling specialized idioms for specialized tasks, are provided under both approaches. The UNIX patterning idioms are implemented by creating a named property of World referred to as located files which accepts UNIX-style patterns as the name-specifier string. The fragment:

20

not exists Located files "\*.mat" whose(creator of it is creator "MATLAB")

25

which asks for a file in UNIX notation is provided within the invention's language through an inspector for the plural property located files UNIX-pattern.

Forest of Concerns as an Optimization Strategy

The community of watchers approach to state description articulates the concept of forest of concerns. Each interested author formulates a concern about the state of the consumer computer, these concerns are relayed to the computer, and the state of the computer is continually reviewed and compared with those concerns.

From an efficiency and scheduling viewpoint, it is good to organize the process of state description around the concept of a forest of elementary concerns rather than around the concept of relevance clauses. Many pieces of advice may have as subclauses the exact same phrase, and it is inefficient to evaluate those subclauses independently. For example, consider a pool of five pieces of advice with relevance clauses making assertions about the directory Adobe Photoshop. The first is:

exists Folder "Brushes and Patterns" of  
Folder containing Application "Adobe Photoshop 2.5"

The second is:

exists Folder "Calibration" of  
Folder containing Application "Adobe Photoshop 2.5"

The third is:

exists Folder "Color Palettes" of  
Folder containing Application "Adobe Photoshop 2.5"

The fourth is:

exists Folder "Plug-Ins" of

Folder containing Application "Adobe Photoshop 2.5"

5

The fifth is:

exists Folder "Third-Party Filters" of

Folder containing Application "Adobe Photoshop 2.5"

10

In each case, evaluation of the relevance clause requires the evaluation of the phrase folder containing Application "Adobe Photoshop 2.5". In short, these five clauses do the same work five times.

15 It is possible to organize things differently, with the surface expressions being analyzed into a minimal collection of subexpressions. The collection of these subclauses are then watched in nonredundant fashion. More concretely, a pool of relevance clauses scheduled for joint evaluation is parsed into its forest of associated expression trees. This collection of trees is analyzed into its maximal  
20 subtrees. Two subtrees are equivalent if they are literally the same, i.e. the same method dispatches are applied to the same arguments, or are rearranged under valid applications of commutativity and associativity to be the same. An expression subtree is the child of another subtree if the associated expression occurs as a first level subexpression of the other associated expression.

25

A subtree is maximal if either:

(a) it has no parents, or

30 (b) if it has at least two parents and the parents are inequivalent expressions.

The following illustrates the concept with the pool of five relevance clauses illustrated above. The first parses into:

5 (exists (Folder "Brushes and Patterns"  
(Folder-Containing  
(Application "Adobe Photoshop 2.5")  
)  
)  
10 )

The second into:

(exists (Folder "Calibration"  
15 (Folder-Containing  
(Application "Adobe Photoshop 2.5")  
)  
)  
20 )

The third into:

(exists (Folder "Color Palettes"  
25 (Folder-Containing  
(Application "Adobe Photoshop 2.5")  
)  
)  
30 )

The fourth into:

```

(exists (Folder "Plug-Ins"
        (Folder-Containing
5         (Application "Adobe Photoshop 2.5")
          )
        )
      )

```

10 The fifth into:

```

(exists (Folder "Third-Party Filters"
        (Folder-Containing
15         (Application "Adobe Photoshop 2.5")
          )
        )
      )

```

20 Here, the five different relevance clauses are inequivalent because they name different properties. The collection of maximal expressions consists of these five expressions, plus one proper subexpression:

```

(Folder-Containing
25 (Application "Adobe Photoshop 2.5")
  )

```

A watcher organized around the maximal expressions operate in a nonredundant fashion as follows:

- Parse all expressions in a collection of relevance clauses into expression trees.
  - Identify with unique labels those maximal subexpressions which have  
5 parents.
  - Transform each expression tree into a new tree built from references to its labeled maximal subexpressions.
- 10 When evaluating relevance, maintain extra storage, referred to as maximal-subexpression value storage, which records the value of maximal subexpressions for later use. When encountering a reference to a labeled maximal subexpression, first check this storage to see if a value is already recorded. If so, use the stored value. If not, evaluate the subexpression,  
15 recording the resulting value in the storage.

in more detail, this works as follows: For the pool of five relevance clauses above, the maximal subexpression:

20 (Folder-Containing  
(Application "Adobe Photoshop 2.5")  
)

is associated with position one in maximal-subexpression storage. Transform a  
25 typical relevance clause by making appropriate references to this storage. In the case of the first of the relevance clauses this works as follows:



```

(exists (Folder "Brushes and Patterns"
(Maximal-Subexpression 1
  (quote (Folder-Containing
    (Application "Adobe Photoshop 2.5")
5      )
      )
      )
      )
      )
10

```

In summary, a wrapper referred to as Maximal-Subexpression is inserted around the identified maximal subexpression. This wrapper method has a first argument which associates the subexpression to storage index one, and a second argument which is a quoted-expression. This quoted expression is not evaluated

15 prior to the invocation of the wrapper method. Instead it is parsed into an appropriate representation as an unevaluated data structure representing an expression for conditional evaluation which is to be passed to the wrapper method as data. The wrapper method looks at location one to see if a value is stored there. If so, the wrapper method returns that value. If not, the wrapper

20 method asks to evaluate the subexpression which it has been passed. Upon completion of the evaluation, it stores the value in location one of the maximal-subexpression storage.

Suppose that this relevance clause is the first evaluated subexpression in a given

25 advice pool, evaluation of which results in evaluation of the subexpression and recording of the value of the subexpression in position one of the maximal-subexpression storage.

Now consider the second item in the pool, in its transformed form:

30