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(54) A device and a method for assisting in improving the productivity in a workplace

(57) A device for assisting in improving the productivity in a workplace, comprising user interfaces (1), a graphical user interface means (5) for forming a graphical user interface comprising a plurality of questions concerning the working environment, and for receiving user inputs as answers to said questions, which answers take the form of quantitative values, and for displaying said graphical user interface on said user interfaces, a data storage (6) for storing said inputted answers, and a processing unit (7) processing said inputted answers to the questions, comprising means for computing a value representing the degree of accomplishment for each of a plurality of predefined factors affecting the productivity of a workplace, based on said inputted answers to the questions. The graphical user interface means (5) comprises means for forming a graphical image displaying the degree of accomplishment for the factors on said user interface.

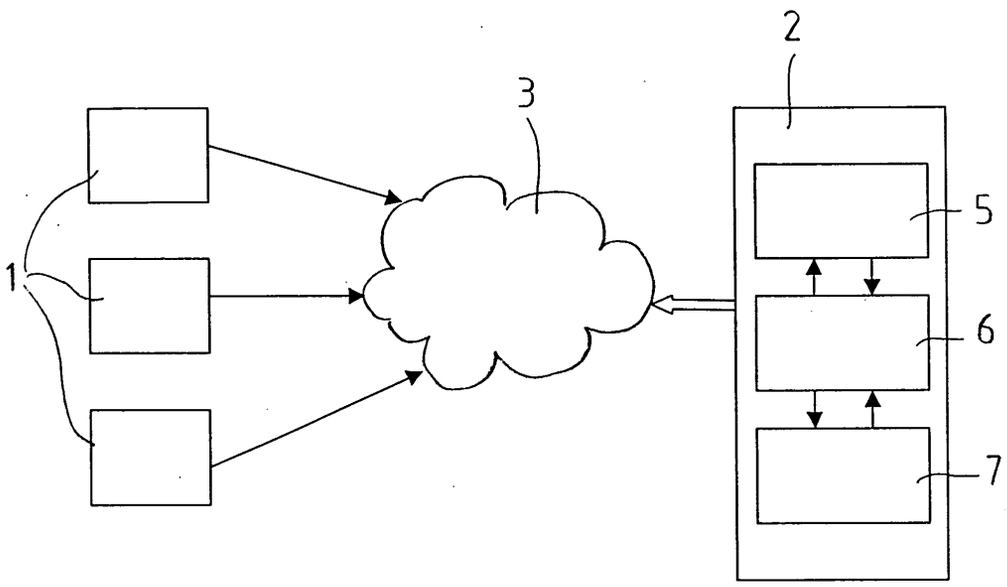

Figure 2

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a device and a method for assisting in improving the productivity in a workplace. In particular, it is a computerised method and device to collect data on factors affecting productivity, which data may be stored and analysed to provide a rational basis for maintaining and improving productivity in a workplace.

TECHNICAL BACKGROUND

[0002] Measurement of productivity has long been carried out in industrial workplaces and commercial environments in the pursuit of reduced costs and thereby increased profits. To a lesser extent similar methods have been applied to non-commercial organisations and government organisations to improve efficiency and reduce costs.

[0003] The traditional industrial workplace was characterised by a determined drive to standardise work and separate any various tasks making up a job of work. This was epitomised by the production line assembly techniques such as those used in the automobile manufacturing industry. This approach was, and in some companies, still is carried out so that the productivity within that work process could, once so defined, be measured in terms of work output per unit time. The behavioural models used to design and or explain behaviour rested primarily on explanations or models of motivation of the worker. The observation and measurement of repeated performance of the same standardised tasks measured against time in one form or another was the basis for the majority of such methods, and for workstudy techniques generally.

[0004] The traditional standardisation of work approach was further facilitated by the general adoption of computers in industry, typically computers of the mainframe type, in centralised data processing systems. This meant that processing and analysis of large amounts of data could be carried out by specialised departments to provide information on levels of productivity achieved. In recent years many workplaces have adopted personal computers connected to networks such as LAN networks, using Internet technology.

[0005] A significant development for industrial companies and other organisations in general in recent years is that an increased pace of change in industry and commerce generally has resulted in that traditional job standardization and job specialisation approaches to productivity are too rigid, and moreover uneconomic to change to suit the tasks and parameters of work as rapidly as today's fast changing markets demand. The work of many production workers and service workers is no longer suitable for the same type of standardisation-oriented analysis.

[0006] Industrial companies and other organisations have experienced that inflexible work routines have prevented successful response to fast changing markets. Shorter product lives for example dictate shorter development cycles. Rapid response to rapidly changing demands mean that traditional approaches based on job analysis with a view to work output based on standardised tasks and jobs are at least very uneconomic to apply.

[0007] Productivity is generally regarded to have increased in recent years due to extensive computerisation and the wide adoption of information technology. However at the same time, many organisations are also experiencing a great number of problems ascribed to unacceptably high stress levels. A wide range of many serious work-related conditions including such widely seen conditions as "burnout", or "hitting the wall" have been attributed to excess stress. A large number of medical conditions have also been attributed to an excess of stress. High general rates of sickness, absence from work, absenteeism, and some cases of accidents at work, are also commonly considered to be due at least in part to excess stress. Excess stress is in turn widely considered to be a result of an accelerated rate of change of demands in working life.

[0008] Such problems conventionally believed to be a result of excess stress have, of course, resulted in a reduction in productivity. Such sickness, accidents and absenteeism have also imposed extremely expensive costs on the companies, organisations and the tax-paying communities involved for items such as long-term treatment and rehabilitation of stress afflicted person as well as for replacement workers. However when indications of excess stress are observed, it is often difficult to identify a specific workplace condition as a cause; and/or a course of action in the workplace that would remedy an excessive stress on an identified person or group.

[0009] An article published in Motivations Kraft, Quid Novi 1996, with a title translated into English of "Modern organisations demand empowered individuals", hereby included in this description with this reference in its entirety, describes a model for empowerment. Certain details are summarised here to facilitate an understanding of the psycho-social technical background of the invention.

[0010] The article explains that, according to the writers model, in order for a person to be empowered, and/or act as a self-starter, the person requires that certain psychological pre-requisites should be present in or about the work place as experienced by the person. The writers explain that when a person considers that he/she is empowered, he or she performs well, and that when they do not feel empowered, they do not perform as well. This has an effect on at least two levels, the general aggregate level of the whole organisation and the local level of the immediate working group.

[0011] In particular the empowerment model de-

scribed maintains that to carry out a task in a workplace at least satisfactorily the following psychological pre-requisites must be found; that in relation to the workplace, the person knows what he or she:

- should do,
- may do,
- can do (e.g. understands how to perform a task),
- know (e.g. knows information needed to carry out the task), and
- will (is motivated to do).

[0012] The model maintains that the above psychological pre-requisites are further related to certain objective correlates, otherwise described in this specification as factors affecting productivity, here presented in a table form. Figure 1 (Prior Art) shows these factors together with relationships drawn between the cited psychological pre-requisites and their objective correlates. According to the empowerment model, when a person experiences or otherwise knows that one or more of the cited pre-requisites is absent or significantly lacking, the person cannot perform well. The article also describes tests of the model in two factories and discusses results from those tests.

SUMMARY OF THE INVENTION

[0013] The object of the present invention is to provide a tool for assisting in improving the productivity in a workplace, which is easy to use and does not require any special training of the user.

[0014] According to an aspect of the invention this object is achieved by a device as defined in claim 1.

[0015] According to a further aspect of the invention this object is achieved by a computerized method as defined in claim 11.

[0016] The device comprises means for collecting numerical information about a plurality of factors affecting the productivity in a workplace from persons working in the workplace, means for processing the collected information, and means for presenting the processed information. The factors affecting productivity of a workplace may comprise any of responsibility, authority, task competence, job information, and incentive. Those factors have been scientifically proved to affect the performance of individuals, and thus the productivity and profitability of the workplace.

[0017] The information to be processed is provided by the persons working in the workplace, as answers to a plurality of questions concerning how they experience the working environment. The each answer is provided as, or transferred to, a quantitative value. In an advantageous embodiment, numerical information is collected related to the above described empowerment model to measure factors affecting productivity in a workplace.

[0018] The information is collected from more than one person of the workplace, preferably from all persons working at the workplace. For at least some of the factors, a value representing the degree of accomplishment for the factor is computed. This value can be computed for each person who has answered the questions, and/or for a predefined group of the persons having answered the questions. For example, a value is computed for each person working in the workplace, a value is computed for each department, and a value is computed for the whole company.

[0019] A central advantage of the invention is that it makes it easy to collect and analyze information about factors affecting productivity, thereby making it possible to repeatedly update the information and the analyze. Thus, the result of the work with improving the productivity can easily be followed up. In particular the invention provides an efficient method to compare changes over time in the degree of accomplishment for the factors affecting productivity, as well as difference in degrees of accomplishment for those factors between different parts of the same company or other organisation. For example, it is suitable to follow up the work with improving the productivity of a workplace about four times a year. Having a device according to the invention in the workplace, the persons working on the workplace only have to answer the questions presented to them and the device automatically provides an assessment of the workplace.

[0020] In an embodiment of the invention the device proposes suitable actions to be taken to improve the productivity of the workplace. Preferable, the device provides a list of possible actions to be taken to improve the productivity of the workplace when the assessment shows that any factor or factors has a low accomplishment. However, the device may also provide possible actions to be taken to maintain and further improve the productivity of the workplace when the accomplishment for all the factors is high. Which actions the device proposes depends on the received answers to the questions.

[0021] The numerical information collected related to factors affecting productivity may be compared to other information and further analysed so that the presence or absence of certain pre-requisites, such as any of that the person:

- know what they should do,
- know what they are permitted to do,
- has the knowledge needed to carry out the tasks of the job,
- has the information needed to carry out the present task,
- has the will to do the task;

is measurable in a quantitative way that may be related to:
the same person and/or group over time; related to other persons/groups in the same company; and related to other groups in the same company over time.

[0022] The method may also be used in a workplace, or by an organisation without any special training required before a working person may understand the relationship between the factors measured and his or her own productivity. The application of the method using the empowerment model to measure factors associated with productivity is easily regarded as a reliable indicator because the factors are described in terms that ordinary people can understand. Dimensions called "Should do", "Can do", "Know how-to" and "Want to" are understandable and relatively unambiguous. These dimensions obviously depend on the individual as he perceives his situation and the connection between measurements of these dimensions as factors affecting workplace productivity is immediate without training. The invention seems intuitively relevant and a workforce will have no difficulty buying in to the method and device.

[0023] Another advantage to the invention is that it may be used together with a strategic productivity plan for a whole organisation. The information so collected may be examined by a user depending on the job or position that the user holds, for example the managing director may examine data or comparisons for every part of the company, a regional manager only for that region, a departmental supervisor only for that department and so on.

[0024] Another and very beneficial advantage of the invention is that the measured absence of any such prerequisite can be addressed, leading not only to better conditions for productivity, but also to a reduced level of excess stress. For example, without knowing the responsibility she or he has, the person is stressed. Without adequate knowledge of how to do the task the person is stressed. Without knowing information needed to carry out the job, perhaps as elementary delivery schedules for necessary material, quality of incoming material, the person is stressed, and so on. The stress reduction aspect of the invention is particularly useful in fast changing and new industries, but may also be applied in hospitals or other institutions under great or extreme pressure to "perform". As well as commercial organisations, health care and educational organisations would benefit greatly from a reduction in stress-related sickness and absenteeism.

[0025] The economic benefits of the method include reduced production costs and thereby higher profits. The economic benefits can also include reduced costs of illness, and the effect of reduced capacity of workers to work effectively and correspondingly reduced health insurance costs. Higher productivity and a reduction in today's stress-related problems also contribute to a positive image for an organisation. This makes it easier to hold on to existing workers and to more easily attract qualified job applicants, a problem in many organisations.

[0026] According to an embodiment of the invention, the method comprises computing a statistical value representing the total productivity in at least a part of the workplace, based on said computed values representing the degree of accomplishment for the factors, and displaying a graphical user image comprising said statistical value representing the total productivity. For example, a total value is calculated by adding said computed values representing the degree of accomplishment for the factors, and said statistical value representing the total productivity is calculated by dividing the total value with a theoretical maximum value of the productivity. Thereby it is possible to follow changes in the productivity in real time.

[0027] According to a further aspect of the invention, the object is achieved by a computer program directly loadable into the internal memory of a computer or a processor, comprising software code portions for performing the steps of the method according to the invention, when said program is run on a computer. The computer program is provided either on a computer readable medium or through a network, such as the Internet.

[0028] According to another aspect of the invention, the object is achieved by a computer readable medium having a program recorded thereon, when the program is to make a computer perform the steps of the method according to the invention, and said program is run on the computer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The invention will now be explained more closely by the description of different embodiments of the invention and with reference to the appended figures.

Fig. 1 (Prior Art) is a schematic diagram of a model for factors affecting productivity according to the Prior Art.

Fig. 2 shows a block diagram over a device for assisting in improving productivity in a workplace according to an embodiment of the invention.

Fig. 3 is a simplified flow chart for a method for collecting and storing quantitative information about factors affecting the productivity in a workplace according to an embodiment of the invention.

Fig. 4 is an example of a graphical user interface comprising questions concerning the working environment and for receiving user inputs as answers to said questions.

Fig. 5 shows a first example of a schema for storing quantitative user identification data collected about factors affecting productivity in a workplace.

Fig. 6 shows a second example of a schema for storing data collected in respect of questions in which the question type of each question is stored.

Fig. 7 shows a third example of a schema for storing data collected as numerical values concerned with factors affecting productivity in a workplace according to an embodiment of the invention.

Fig. 8 is a simplified flow chart for a method for examining numerical information about factors affecting productivity collected and stored according to an embodiment of the invention.

Figs. 9, 10, 11, show images of comparisons of numerical information about factors affecting productivity graphically in forms such as time series

Fig. 12 shows an example of a question-by-question review, for examining quantitative information collected and stored for a part of an organization compared to the rest of the organization, according to another embodiment.

Fig. 13 shows a theoretical model for relationships between factors affecting productivity at an individual, local, and strategic company level.

Fig. 14 shows a practical model for using data collected about factors affecting productivity at an individual level to monitor productivity at a local, and strategic company level.

Fig. 15 shows an example of an image displaying the degree of accomplishment for a number of factors affecting the productivity of a workplace.

Fig. 16 shows an example of an image presenting action items for improving the productivity of the workplace.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

[0030] Fig. 2 shows a block diagram over a device for assisting in improving the productivity in a workplace according to an embodiment of the invention. The device comprises a client side system comprising one or more user interfaces 1, a server side system comprising at least one computer 2, and data communication means 3 achieving communication between the server and client side systems. The user interfaces is for example a personal computer, a handheld computer, such as a Personal Digital Assistant (PDA), a laptop or a mobile telephone. The data communication means is for example a web browser communicating with said server system via a data communications network such as the Internet. The data communication means can also be a local network.

[0031] The server side system comprises graphical user interface means 5 forming a graphical user interface for interactions with the users via the user interfaces 1. The graphical user interface for example is adapted for displaying a plurality of questions concerning the working environment, receiving user inputs as answers to said questions, and for displaying said graphical user interface on the user interfaces 1. The server side system also comprises data storage 6 comprising a database for storing information such as inputted answers and suitable action items for improving the productivity of the workplace. Proposed actions to be taken to improve the accomplishment for the factor, and thus to improve the productivity, are stored in the database.

[0032] The server side system further comprises processing means 7 for processing the inputted answers to the questions. The processing means 7 comprises hardware, such as a processor, and software for performing the processing, which software is to be run on the processor. The processing means 7 comprises means for computing a value representing the degree of accomplishment for a plurality of predefined factors affecting the productivity of a workplace, based on said inputted answers to the questions. In this embodiment the factors affecting the productivity of a workplace comprises responsibility, authority, competence, information and incentive, as shown in figure 1. The processing means 7 further comprises means for comparing each of said computed values representing the degree of accomplishment for the factor, with a limit value for the degree of accomplishment, and means for selecting one or more suitable action items from the stored set of action items based on the result of said comparison. The graphical user interface means 5 also comprises means for forming one or more graphical images displaying the degree of accomplishment for the factors, and action items for improving the productivity of the workplace on said user interfaces 1.

[0033] The client side system may further comprise one or more of the following features:

- the means to receive a numerical input is arranged to receive a text input from any of the list of window, keyboard, keypad, touch screen.
- the interface is provided by a client side executable application written in a platform independent language including any of the list of: Java, J2ME, SmallTalk.
- the interface is provided by information presented at according to a format or protocol including any of the list of: HTML, XML, WDML, I-mode.

[0034] The server side system may further comprise one or more of the following features:

- it comprises server side application means to store the answer in buffer memory, and means to store the numerical value input in said one or more databases.
- the database comprises at least one schema for storing numerical values comprising a record of a

numerical value each question and a record of the question type to which each question belongs.

- the one or more databases comprise a record of company ID, ID of a part of the company, and ID of the person logged in to the system.
- the server side application provides a log-in means for access to the system over a network including the Internet.
- the server side application provides a login to access the system such that a user may log-in as according to an employed organisational level comprising any of top management, management, supervision, worker.
- the server side application provides means to access and display stored numerical values for each question for at least a part of the company in real time.
- the means to access and display stored numerical values for each question for at least a part of the company in real time is provided dependent on the organizational position of the user.

[0035] Figure 3 is a flow chart for a method for collecting and storing quantitative information, which shows that at step 20 a user logs in and the log-in is authenticated at step 21. The user level and company department (or other sub-group) is identified 22. An interface is retrieved 23 and is displayed to the identified User. The user inputs information into the interface 5 in the general case that the user is completing a form or questionnaire by answering questions at 24. The user enters a numerical value, as an answer to a question in step 26, and submits answers to questions. By the completion of the process when the user has answered all of the questions, all of the information submitted at 26, the answers to the questions have been stored 28 in one or more data schema in one or more of a series of actions. The data thus collected is stored in the database.

[0036] Figure 4 shows an exemplary interface 30 for a general user to input numerical data about factors affecting productivity in the method diagrammed by Figure 3 above. The figure shows schematically two questions 32, 34, and two indicated answer values 36, 38, and two explanatory labels 35, 35'. In the figure the questions 32, 34 are displayed as text only although a question may also be indicated by the use of graphics or symbols. Explanatory labels indicate that values may be indicated on a scale, in this example a scale of 1-5 starting at 1 for seldom/never up to 5 for often/always. In the simple example shown, for question 32 the indicated value 36 for the user's answer is represented as a 4 and for question 34 the value 38 is represented as a 5.

[0037] The illustrated type of display, sometimes referred to as radio buttons, is a type where by means of a mouse click one of the row of buttons may be selected by a user. In particular, radio buttons only allow one of the possible values at a time to remain selected and marked. Any other display suitable for providing a means to select a numerical value may alternatively be used. Alternatively a number may be input as text from an input means such as a keyboard.

[0038] As a user answers questions the numerical values input as answers are collected by a client side application, and communicated to a server side application, where the numerical inputs are stored in one or more data structures in a digital file. Figure 5 shows a first schema 40 for storing data according to an embodiment of the invention. In a header section the questionnaire or questionnaire type 41 is identified for every questionnaire that is answered. The company 42 that the user belongs to is also identified. Demographic details related to the user such as age, sex 44, length of time employed, are stored, as is department user level 46 illustrated here as department responsible (DeptRespons) N for No. The identity of the user 43 is also stored in some direct, indirect or encrypted form.

[0039] In Figure 6 a second schema 50 for storing data is shown, wherein each question number 54 in the given survey questionnaire type is listed in turn and identified as to which question type 52 it belongs to. The meaning and use of Question type is described in detail below.

[0040] For example, a user might read a question asking if the user has sufficient training to carry out his/her task most of the time. This exemplary question is aimed at the user's own subjective assessment of, say, task-related information to carry out his/her task(s) in the workplace. The user response should be an input of a number between 1 and 5. The question type associated with that question, according to the prior art model previously described and shown in Figure 1, specifies that the answer shall in this example be grouped under the objective correlate of Competence. Each question type is related to one of the factors affecting productivity. All answers for the same Question type may be processed together, including, for example, by calculating the sum of all answers for each question type that represents an objective correlate. The summed totals and other calculations are processed and the totals are stored with the completed information.

[0041] The table in Figure 6 illustrates as an example that the first four questions Q1-Q4 were of two different question types 2, 1. A question type relates to the objective correlates according to the prior art model of Figure 1 such as Responsibility, Competence or Incentive. Question type of each question presented is stored in the data schema to indicate the objective correlate that the question, when answered, would provide a quantitative assessment for.

[0042] Figure 7 shows how in a third schema 60 for storing collected data, in particular the numerical values 64, 68, 69 returned for each question number 62, 66 etc. are stored. For a question to which more than one answer is allowed, there is more than one row allocated for answers to that question, eg in Figure 7 question number 3, reference number 66, shows that two answer

values may be collected 68, 69.

[0043] When the data has been collected it is processed by the processing means. For each of the factors affecting the productivity a value representing the degree of accomplishment for the factor is calculated based on the collected data. This value is for example calculated as the arithmetical mean value for a selected group of persons. The selected group of persons is for example the whole company, a department or another defined sub-group. The value representing the degree of accomplishment for a factor is for example calculated as a percentage of a theoretical maximum value for the factor. This value is for instance calculate by adding all the numerical values received as answers to the questions of the question type related to the factor to produce a total sum, and dividing the total sum with a theoretical maximum value for the total sum.

[0044] Further the processing means comprises means for computing a statistical value representing the total productivity of the workplace, or of a part of the workplace, as a percentage of a theoretical maximum value of the productivity. The statistical value of the productivity is computed by adding the computed values representing the degree of accomplishment for all of the factors affecting the productivity in the workplace. Alternatively, the statistical value can be calculated by adding all the numerical values received as answers to the questions for the persons working in the workplace, and then dividing the computed total value with a theoretical maximum value of the productivity. The theoretical maximum value of the productivity is for example the theoretical average of the line of business. Thus, it is possible to compare the productivity of different lines of business in real time. The user interface means is adapted for forming a graphical user image displaying said statistical value representing the total productivity.

[0045] Figure 8 shows an example of how collected quantitative data may be made available for use. A logged in user is identified at 22 as employed at a predetermined level of responsibility, as any of

- user level
- supervisory level, or
- department responsible, or
  at a very high level of responsibility;
- top level.

[0046] According to a preferred embodiment, a second interface is provided at 23 which is specific for each responsibility level other than ordinary user, "user level". The user employed at a supervisory top level chooses 74 at the second interface which company unit(s) or department(s) and/or time period(s) to examine. The accumulated data for the chosen department or departments for, for example, one or more time periods, is accessed and or retrieved at 78 and returned or displayed at 79, typically in a graphical display form. The user at the supervisory level is restricted to parts of a company within, for example, one division. The user at the top level has access to data from every part of the company.

[0047] Thus a user logs in to the computerised system and is identified as described before according to Figure 3. A senior user of the computerised system is a person who has been provided with an upper or top level authority in the computerised system. As indicated in Figure 8, when the senior user is identified a second interface for that level is returned. The senior user chooses at the second interface departmental, regional or national level and so on, the data of interest, examines and compares the data to other departments, other time period for same department, and so on. The collected data may be displayed for example as a time series, to examine changes in data collected about particular factors affecting productivity over time in one or more parts of the company or other organisation.

[0048] Figure 9 shows a bar chart, Figure 10 polar diagram, and Figure 11 a line chart. The bar chart 80 of Figure 9 shows 5 sets of bars, numbered 1-5. Each set of bars, such as 81a, 81b, represent values derived from the data collected per Question type. The values for each of the bars are indicated by a scale 83. Thus the value collected for an objective correlate such as Information may be displayed for two separate results for each Question type, ie objective correlate, in a time series. A direct comparison may be rapidly evaluated. The same format, bar chart, could as well be used to compare two (or more) different units of an organisation measured at the same time.

[0049] Figure 10 shows a polar diagram 90 with Question types numbered 1-5 and Question type or objective correlate scores 91, 92. Figure 11 shows a line chart 100, with two lines 102, 104 drawn joining values for Question types 1-5 for two time periods. Other graphical types such as the polar diagram are suitable for presenting possible changes in a different context, such as when more than one factor may be seen to be changing or drifting at the same time. Similarly, line charts such as Figure 11 may be used, as may any other suitable form including pie charts, 3-D charts, point plots and so on.

[0050] Figure 12 shows a type of analysis display 110 that a supervisory or top-level person can access according to a preferred embodiment of the invention. Figure 12 shows a question 112, a range of values from 1, labelled 116 as seldom/never to 5, labelled often/always 117. Values representing on unit such as My unit/dept 113 are shown, as are responses for another unit or units such as All units/depts 114. The processed values may be for example percentage of responses collected that give a numerical value of 1, or 2 etc as an answer. On this display 110, a representation of the numerical score for an organisational unit for every question, one after the other, may be reviewed. The organisational unit is selectable to be from the smallest unit, to a department, division and so on. The numerical values collected for by, for example, a supervisors department or oth-

er organisational unit are shown together with a corresponding total value for other parts of the organisation. Thus a supervisor or top level person can identify on which, if any, specific questions a department has a response that is the same or different and, different over time, if different, to what extent.

[0051] Examining the data so collected, on line in real time or subsequently, may be used to improve productivity by comparing collected values for the questions with values collected from other departments, or for the same department, over time. For example the objective correlate for each given question for which a difference, improvement or deterioration, has been found indicates the area of which factor affecting productivity to examine. As a simplified example, if the objective correlate Incentive shows a marked deterioration in one unit over time, then this suggests that the remuneration package for that unit should be among those conditions for the unit that should be reviewed. The precise question involved may also indicate that some particular aspect of the factor could be considered.

[0052] Figure 13 shows a theoretical model of how the data collected may be used to improve productivity. The diagram is arranged in three vertical columns 121, 122, 123. A relationship is shown moving right to left with arrows such as 125 and another relationship left to right with arrow 124. Vertical column 121 depicts the individual level, where, when the individual subjectively considers that the individual factors of will, know, can, may and should are present the model predicts that this will lead to individual performance, bottom of column 121. Performance at the individual level leads to efficiency at the operative management or local level 122, which leads to profitability at the top or strategic level 123, as indicated by the direction arrow 124. From the top level support actions must be present, when required, shown in the direction 125 supporting local or operational management, so that local or operational management can deliver the conditions necessary to match the expectations at a individual level.

[0053] Figure 14 shows a practical model or an implementation method for using the data collected to improve productivity. A time line T0 is shown beginning left and proceeding to right of diagram. Four central stages T0-T3 are indicated on the time line, as are a greater number of local stages L1-L8. Data is collected locally beginning at 133 shown as L0. The collected data, and comparisons, analyses of the collected data may be observed centrally in real time at T1, T2, T3 etc. Thus changes in the data collected concerning factors linked to productivity may be observed centrally, and at the operating level in real time, while data is collected periodically and potentially for a number of years. In this way actions to support productivity from the top, and actions to support expectations at the operational level, may be adjusted over time to achieve stable and/or improved productivity.

[0054] Figure 15 shows a bar chart 110, wherein each bar, such as 112a, 112b, represents the degree of accomplishment for one of the factors 1 - 5 affecting the productivity. Each bar represents values derived from the data collected per Question Type. Each Question Type corresponds to one of the factors affecting the productivity. The value of each bar is calculated as the arithmetical mean value of the degree of accomplishment for a selected group of persons. The group of persons is for example the whole company, a department or other defined sub-group. The level of a limit value 114 for the accomplishment of the factors is also shown in the bar chart. The limit value is for example a theoretical mean value for the accomplishment of the factors. Accordingly, it is possible to see from the bar chart 110 whether the accomplishment for a certain factor is above or below the limit value. If the accomplishment for a factor is below the limit value the influenced of the productivity is negative and something should be done about it.

[0055] In one embodiment of the invention, the processing means compares for each of the factors, the computed value representing the degree of accomplishment for the factor with the limit value for the factor, and if the degree of accomplishment for any factor is below the limit value, suitable action items are retrieved from the set of action items stored in the database. As shown in the bar chart 110, the accomplishment for two of the factors is below the limit value and accordingly action items for those factors are retrieved from the database. The retrieved action items for improving the productivity of the workplace are displayed in a view on the user interface as shown in figure 16. For example if the accomplishments for the factors responsibility and incentive are low, the proposed actions to be taken are: review the dialogue between the manager and the workers, and make the area of responsibility clearer.

[0056] In another embodiment action items are proposed in dependence of the answers to the questions, i.e. in dependence of the values received as answers to the question. Statistical values representing the answers to the questions are calculated, for example the mean values of the answers are calculated. The mean values of the answers form a vector and the vector is input to a matrix stored in the database, which matrix reflect the relationship between the vector and the action items to be proposed.

[0057] In another embodiment further factors for improving the productivity are defined for the purpose of improving the action items proposed. The accomplishments for those additional factors are not necessary computed and displayed. The factors are divided into three groups, denoted influence, prime mover and consequence. Each group comprises a plurality of factors. For example the group prime mover comprises the factors: responsibility, authority, competence, information and incentive. The group consequence for example comprises the following factors: organizational commitment, comfort, inclination and health. The group influ-

ence comprises factors related to external circumstantial, such as leadership and working climate.

[0058] To each of the factors belongs one or more questions, which answers reflect the accomplishment of the factor. The answers to the questions are stored in a matrix in the database. The matrix is linked to a statistical calculation module calculating the mean value and standard deviation of the answers to each question. The statistical calculation module also calculates the mean value and standard deviation of the accomplishment for each factor in the groups, based on the arithmetical mean value for the answers to the questions belonging to the factor. The factors having the highest and lowest mean value of the accomplishment in each group are sorted out. Thereby three "high" factors and three "low" factors are provided. Those factors form a pattern of high factors maintaining the productivity, and a pattern of low factors pointing out areas suitable for taking actions for improving the productivity. Which actions are proposed for improving the productivity, are selected based on the three lowest factors sorted out. An example of an area suitable for taking actions for improvement of the productivity is an absent manager, which leads to vague information and consequently to uncertainty of own performance.

[0059] To improve the reliability, the sorting out of the "highest" and "lowest" factors within the group is also based on the deviation or scattering the answers, for example based on the standard deviation of the answers. If the deviation of the answers for a factor is high, the reliability is considered to be high, otherwise the reliability is considered to be low. If the deviation of a factor is too high, the factor is disregarded.

[0060] In another embodiment of the invention access to the computerised system is enabled using communication by telephone. The telephone is preferably equipped with a graphic display and WAP (Wireless Application Protocol) enabled, or similar, or adapted for operation with I-mode for input and display of text and/or graphic information. The method according to the invention may advantageously be carried out collecting numerical values input by a user via a keypad, touch screen or other input device of the telephone or mobile phone in response. The method may equally be carried out by collecting numerical input via graphic images selected by the user on a visual display of the phone, or by a combination of selecting and keypad entry. This may be carried out using any telephone system including Public Subscriber Switched Networks (PSTN), fixed lines, mobile telephone systems such as Global System for Mobile communications (GSM), GPRS (General Packet Radio Service), Univeral Mobile Telecommunications System (UMTS) etc.

[0061] The methods of the invention may be carried out using different types of computer program. In the preferred embodiment, the user interface is a display provided by a type of thin client in the form of a web browser, derivation thereof, or another means for providing a Graphical User Interfaces (GUI) on the users computer screen. Local functions running on the user's computer may advantageously be carried out using known techniques for HyperText Markup Language (HTML) and other meta-languages descended from Standard General Markup Language (SGML) such as extended markup Language (XML), or extended Hypertext Markup Language (XHTML) as well as derivatives or other adaptions for display and function suitable for use with handheld computing devices that include telephone and/or Internet communication functions. Local functions such as displaying and/or collecting data may even be carried out using Web Clipping Application (WCA) applications or proprietary applications such as Palm Query Application (PQA), (Palm is a Trade Mark) for portable computers such as handhelds or PDAs (Portable Digital Assistants). Such portable handheld computing devices and or PDAs may communicate via a data network and/or the Internet by means of a wireless connection according to a wireless standard such as Bluetooth, IEEE-802.11, IEEE-802.13, HomeRF or wireless Local Area Network (LAN) or equivalent.

[0062] Functions provided on the user display may be provided by applets or other programs or scripts executing locally, such as by means of the well known Java (TM) programming language. The data collected in the interfaces provided by a local client, or other local means running on a fixed, portable or handheld computer, may be transferred to a server, preferably a Hypertext Transfer Protocol (HTTP) server, where other computer programs store the collected data in data structures such as those described in relation to Figures 4, 5, 6. The three data structures described may be stored in the same file.

[0063] After a user has input a numerical value in an interface such as 30, Figure 3, the local client running on the user's computer may transfer that value by means preferably of a protocol such HTTP on top of Transmission Control Protocol/Internet Protocol (TCP/IP) to the server side application for temporary buffer storage and for non-volatile storage in one of the data storage means described in relation to Figures 4-6, whereupon the values may be made available in real time for examination and/or display as previously described in relation to Figures 7-11.

[0064] In another preferred embodiment, the method may be carried out using a suitably adapted telephone or mobile phone. Questions may be displayed on a phone display by means of standards such as Short Message Service (SMS), WAP (Wireless Application Protocol) or standards as such as WML, (Wireless Markup Language) WDML or standards such as cHTML (compact HTML) and others suitable for mobile phones operating to standards such as I-mode. Local functions may also be implemented by applets or other small executables implemented by languages such as Java, or as J2ME (Java 2 Micro Edition (TM)). The latter is a Java language specially adapted for the limited memory com-

mon in handheld devices, PDAs or similar.

[0065] The data collected in the local interfaces may be transferred to a server in an encrypted form using any suitable encryption means and/or method. For example encryption by SSL (Secure Socket Layers) and/or Message Integrity Check (MIC) for detecting transmission errors and preventing interception.

[0066] It is also noted that while the above describes exemplifying embodiments of the invention, there are several variations and modifications which may be made to the disclosed solution without departing from the scope of the present invention as defined in the appended claims.

[0067] The method may further comprise one or more of the following steps:

- storing the numerical value of the inputted answer in a database together with an identifier of the matched question type (52),
- matching information input via the computer interface to a question type identifying a known company or client organization. The question type comprises questions particular to at least one part of a local workplace that is a part of a larger organization.
- summing the numerical values for each answer to each question type, and providing a statistical analysis such as a mean value for at least a part of a company or organisation of the numerical values input as answers to each question type.
- calculating the statistical analysis for at least a part of a company and providing a comparison for the said company part as a time series.
- calculating the statistical analysis for values as a comparison with another part of the same company such as another team, department, division, region, national subsidiary. The comparison of the statistical analysis of at least a part of a company with another part of the same company comprises a time series.
- calculating the statistical analysis for the numerical values according to demographic variables such as any of gender, age, marital status.
- calculating the statistical analysis for the numerical values according to user dependent variable including any of the list of: length of time employed, education, organisational level employed at in the company.
- calculating the statistical analysis for the numerical values according to a factor particular to a part of the company including any of the list of: change in local employment conditions, change in local workplace routines, change in local workplace environment.
- providing a statistical function of at least one dimension for at least a part of a company in a diagrammatic form such as a pie chart, "web" diagram, bar chart, line chart, graph.
- collected data is reviewed by management centrally in real time, and compared to other data collected locally at periodic intervals. The central reviews of comparisons of collected data are used to determine an action to support productivity taken by strategic management to support an operational management. The central reviews of comparisons of collected data are used by a local management to determine which objective prerequisite requires support at the local workplace operating level from the list of: responsibility, authority, competence, information, incentive.
- providing the interface by means of a web browser communicating with one or more servers via a private data communications network.
- providing the interface by means of a web browser communicating with one or more servers via a data communications network including a public network such as the Internet.
- providing the interface by means of a web browser communicating with one or more servers via a data communications network including a telephone network including any of the list of: a PSTN, GSM, GPRS, UMTS.
- providing the interface by means of an application running on a portable computing device arranged with communication means and communicating with one or more servers via a data communications network including any of the list of: a PSTN, the Internet, GSM, GPRS, UMTS.

Claims

1. A device for assisting in improving the productivity in a workplace, comprising a client side system comprising one or more user interfaces (1), a server side system comprising at least one computer (2), and data communication means (3) achieving communication between the server and client side systems, **characterized in that** the device comprises

   - a graphical user interface means (5) for forming a graphical user interface comprising a plurality of questions concerning the working environment, and for receiving user inputs as answers to said questions, which answers take the form of quantitative values, and for displaying said graphical user interface on said user interfaces,
   - a data storage (6) for storing said inputted answers, and
   - a processing unit (7) processing said inputted answers to the questions, comprising means for computing a value representing the degree of accomplishment for each of a plurality of predefined factors affecting the productivity of a workplace, based on said inputted answers to the questions,

and that said graphical user interface means (5) comprises means for forming a graphical image displaying the degree of accomplishment for the factors on said user interface.

2. A device according claim 1, **characterized in that** said graphical user interface means (5) comprises means for forming a graphical image displaying for each factor the degree of accomplishment of the factor and a limit value for the degree of accomplishment for the factor.

3. A device according claim 1 or 2, **characterized in that** said data storage (6) is adapted for storing a set of suitable action items for improving the productivity of the workplace, each action item being associated with at least one of said predefined factors affecting the productivity of a workplace, and said processing unit comprises means for selecting one or more suitable action items from said stored set of action items based on the received answers to the questions, and said graphical user interface means (5) comprises means for forming one or more graphical images displaying said selected action items for improving the productivity of the workplace on said user interface.

4. A device according to claim 3, **characterized in that** said means for selecting one or more suitable action items is adapted to select suitable action items based on the degree of accomplishment of the factors.

5. A device according to any of the previous claims, **characterized in that** said processing means (6) comprises means for matching the inputted answer with a question type associated with one of said factors, and computing said value, representing the degree of accomplishment for the factor, based on the quantitative values of the answers of the question type associated with said factor.

6. A device according to any of the previous claims, **characterized in that** said processing means (6) is adapted to compute said values representing the degree of accomplishment for the factors, based on answers inputted by a plurality of persons working in the workplace.

7. A device according to any of the previous claims, **characterized in that** said processing means (6) comprises means for computing a statistical value representing the total productivity of at least a part of the workplace, based on said computed values, representing the degree of accomplishment for the factors, and that said user interface means is adapted for forming a graphical user image displaying said statistical value representing the total productivity.

8. A device according to claim 7, **characterized in that** said means for computing a statistical value representing the total productivity is adapted for calculating a total value by adding said computed values representing the degree of accomplishment for the factors.

9. A device according to any of the previous claims, **characterized in that** said graphical user interface (5) is provided by means of a web browser communicating with said server system via a data communications network.

10. A device according to any of the previous claims, **characterized in that** said user interfaces (1) is adapted to be handheld.

11. A computerized method for improving productivity in a workplace, **characterized in that** it comprises:

- displaying a graphical user interface comprising a plurality of questions concerning the working environment,
- receiving, via said graphical user interface, answers from at least one person working in said workplace in response to said questions, each answer takes the form of a quantitative value,
- computing for each of a plurality of predefined factors affecting the productivity of a workplace, a value representing the degree of accomplishment for the factor, based on said quantitative values for the answers to the questions, and
- displaying a graphical image comprising the degree of accomplishment for the factors.

12. A method according to claim 11, **characterized in that** said graphical image comprises a limit value for the degree of accomplishment for the factors.

13. A method according to claim 11 or 12, **characterized in that** it further comprises

- storing a set of suitable action items for improving the productivity of the workplace in a database, each action item being associated with at least one of said predefined factors affecting the productivity of a workplace,
- retrieving suitable action items from said stored set of action items based on the received answers to the questions, and
- displaying a graphical image comprising said retrieved action items for improving the productivity of the workplace on the user interface.

14. A method according claim 13, **characterized in that** suitable action items are retrieved from said

stored set of action items based on the degree of accomplishment of the factors.

15. A method according to claim 14, **characterized in that** it comprises comparing for each of said factors, said computed value representing the degree of accomplishment for the factor with a limit value for the factor, and if the degree of accomplishment for any factor is below the limit value, suitable action items are retrieved from said stored set of action items, based on the result of said comparison.

16. A method according to any of the claims 11 - 15, **characterized in that** is comprises matching each inputted answer with a question type associated with one of said factors, and computing said value representing the degree of accomplishment for each factor based on the quantitative values of the answers of the question type associated with said factor.

17. A method according to any of the claims 11 - 16, **characterized in that** said values representing the degree of accomplishment for the factors are computed based on answers inputted by a plurality of persons working in the workplace.

18. A method according to any of the claims 11 - 17, **characterized in that** it comprises computing a statistical value representing the total productivity in at least a part of the workplace, based on said computed values representing the degree of accomplishment for the factors, and displaying a graphical user image comprising said statistical value representing the total productivity.

19. A method according to claim 18, **characterized in that** it comprises calculating a total value by adding said computed values representing the degree of accomplishment for the factors, and calculating said statistical value representing the total productivity by dividing the calculated total value with a theoretical maximum value of the productivity.

20. A method according to any the claims 11 - 19, **characterized in that** said factors affecting productivity of a workplace comprises responsibility, authority, competence, information, and incentive.

21. A computer program directly loadable into the internal memory of a computer, comprising software for performing the steps of any of the claims 13 - 19.

22. A computer readable medium, having a program recorded thereon, where the program is to make a computer perform the steps of any of the claims 13 - 19, when said program is run on the computer.

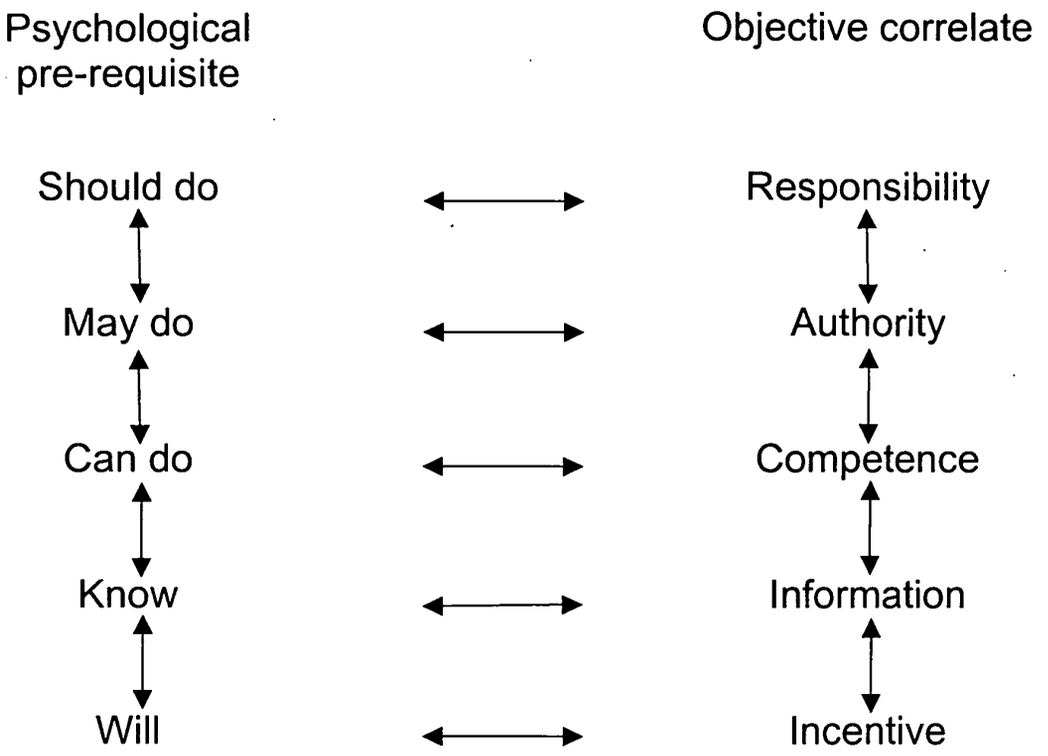

Figure 1 (Prior Art)

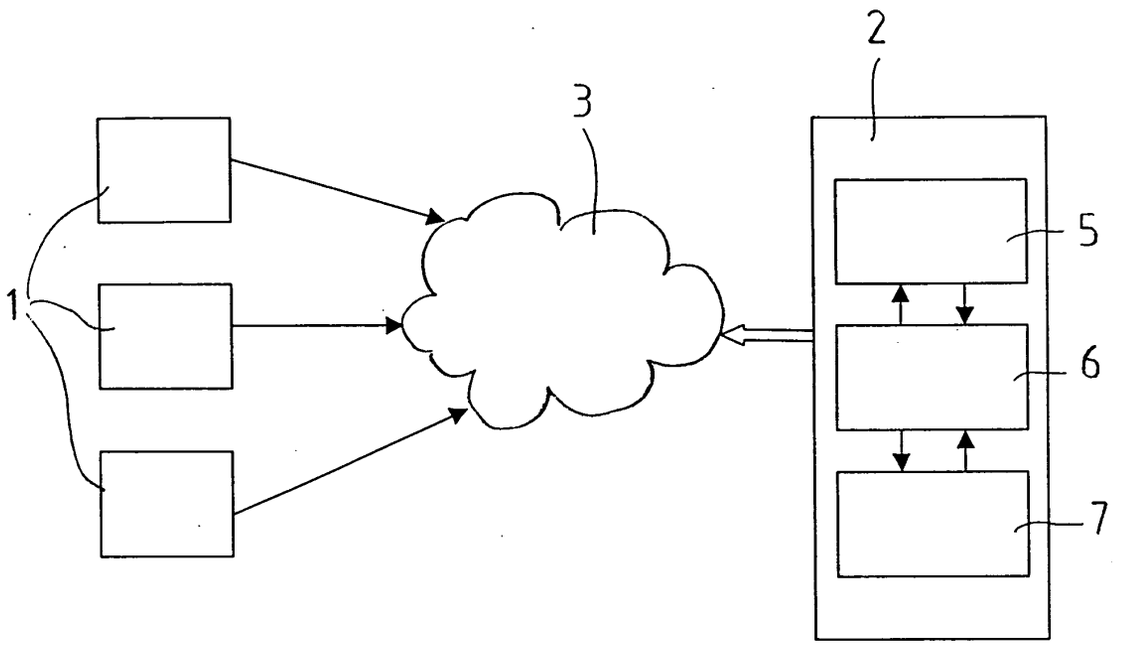

Figure 2

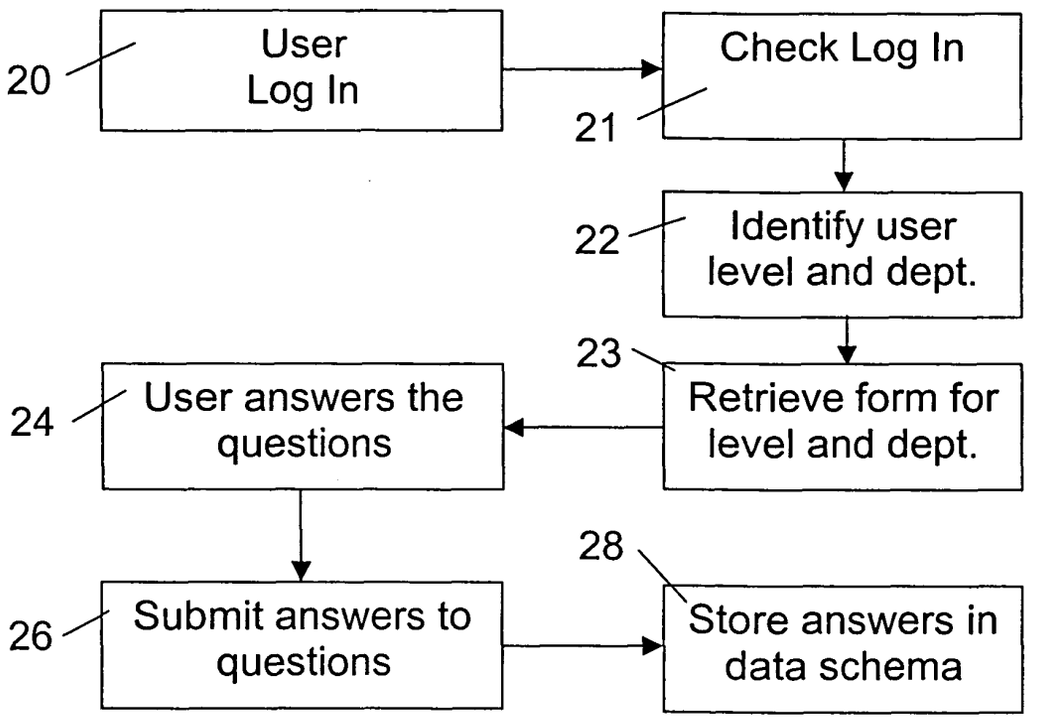
20
User
Log In
Check Log In
21
22
Identify user
level and dept.
23
24
User answers the
questions
Retrieve form for
level and dept.
28
26
Submit answers to
questions
Store answers in
data schema

Figure 3

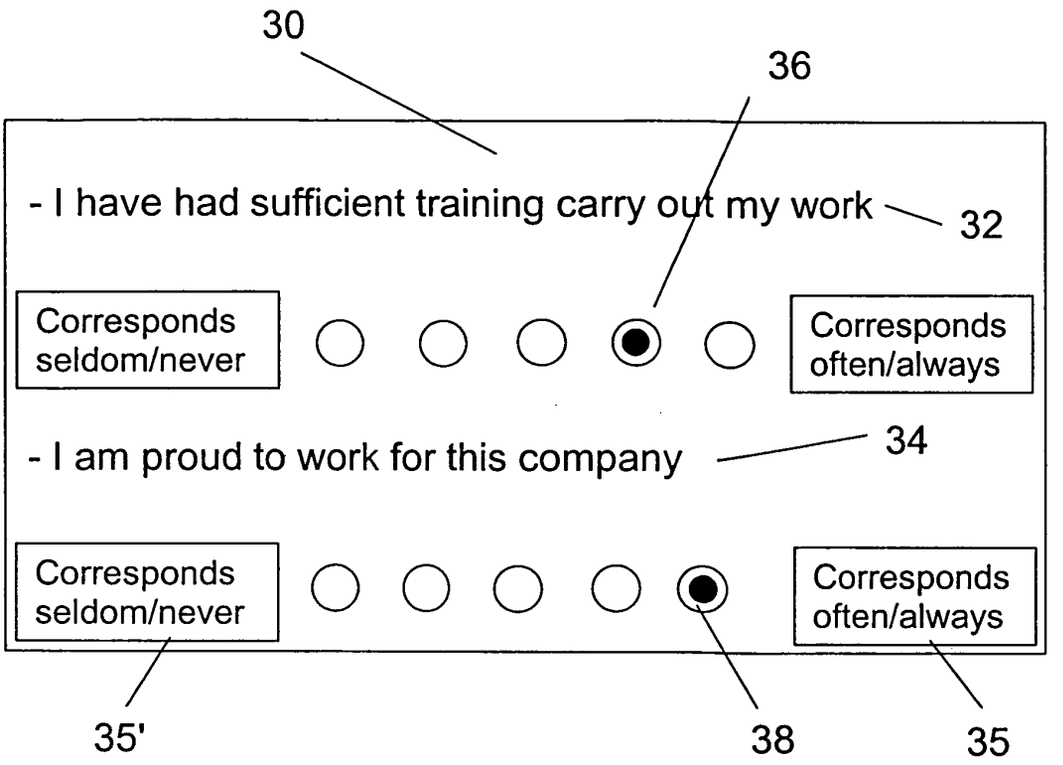
30
36
- I have had sufficient training carry out my work
32
Corresponds seldom/never
Corresponds often/always
- I am proud to work for this company
34
Corresponds seldom/never
Corresponds often/always
35'
38
35

Figure 4

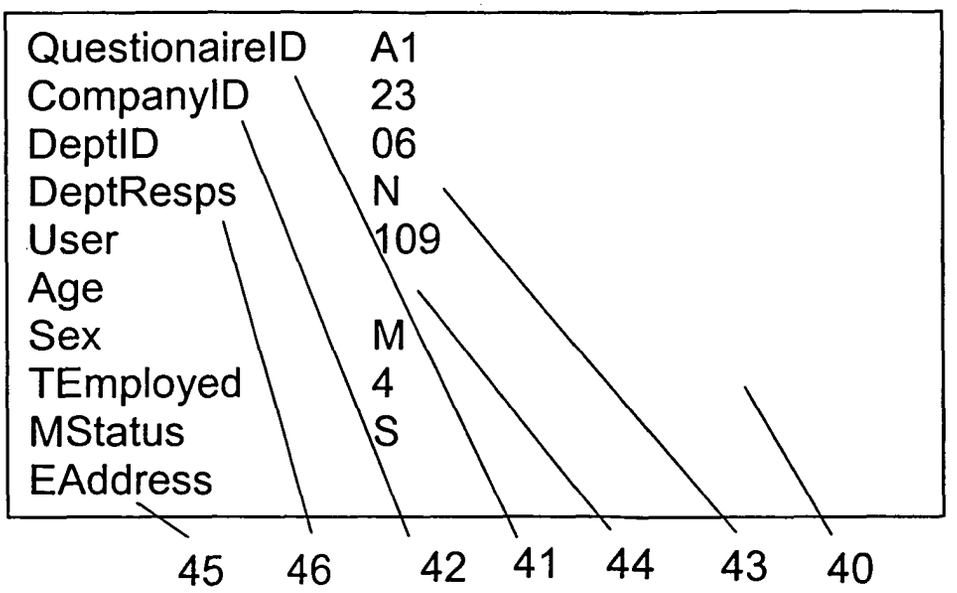

Figure 5

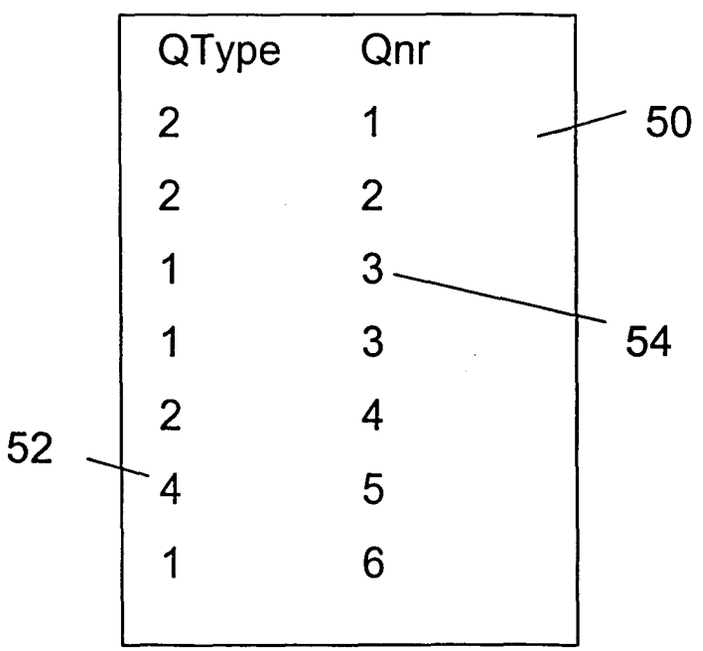

Figure 6

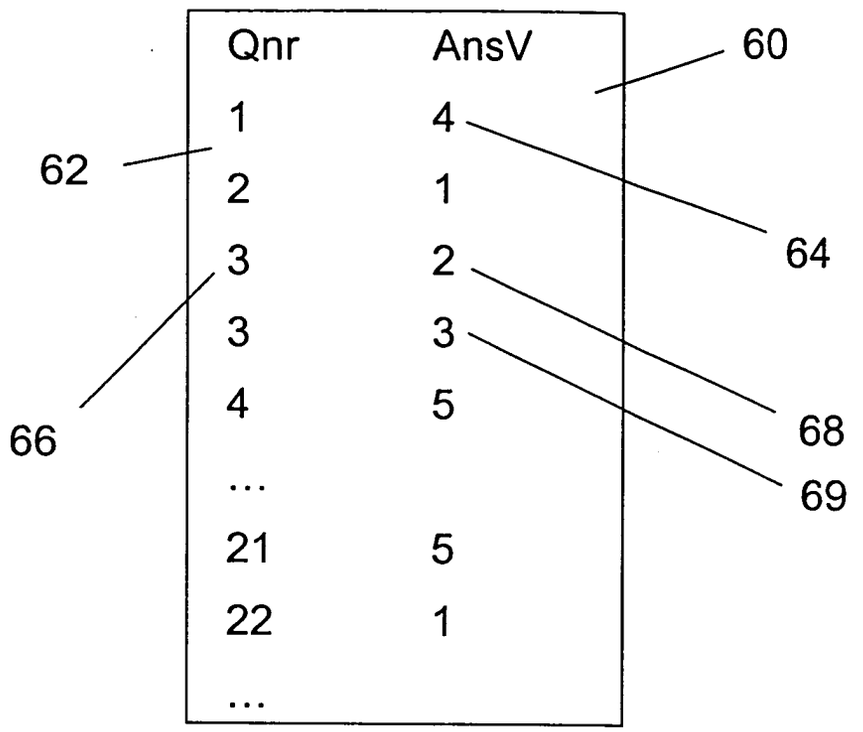

Figure 7

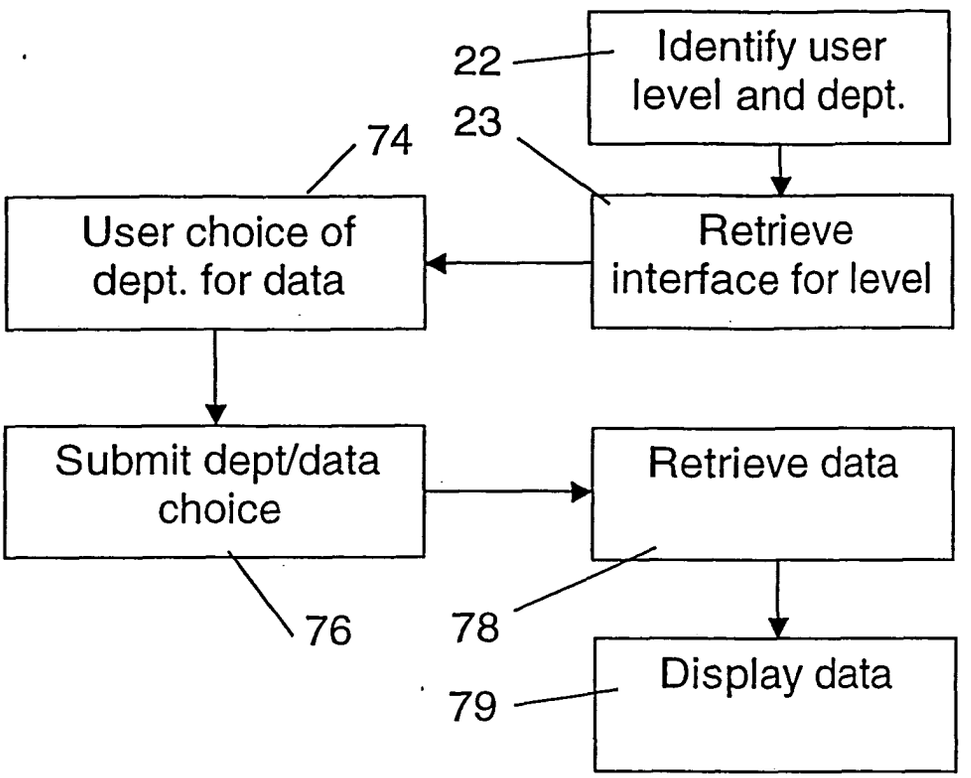
22
Identify user level and dept.
23
74
User choice of dept. for data
Retrieve interface for level
Submit dept/data choice
Retrieve data
76
78
Display data
79

Figure 8

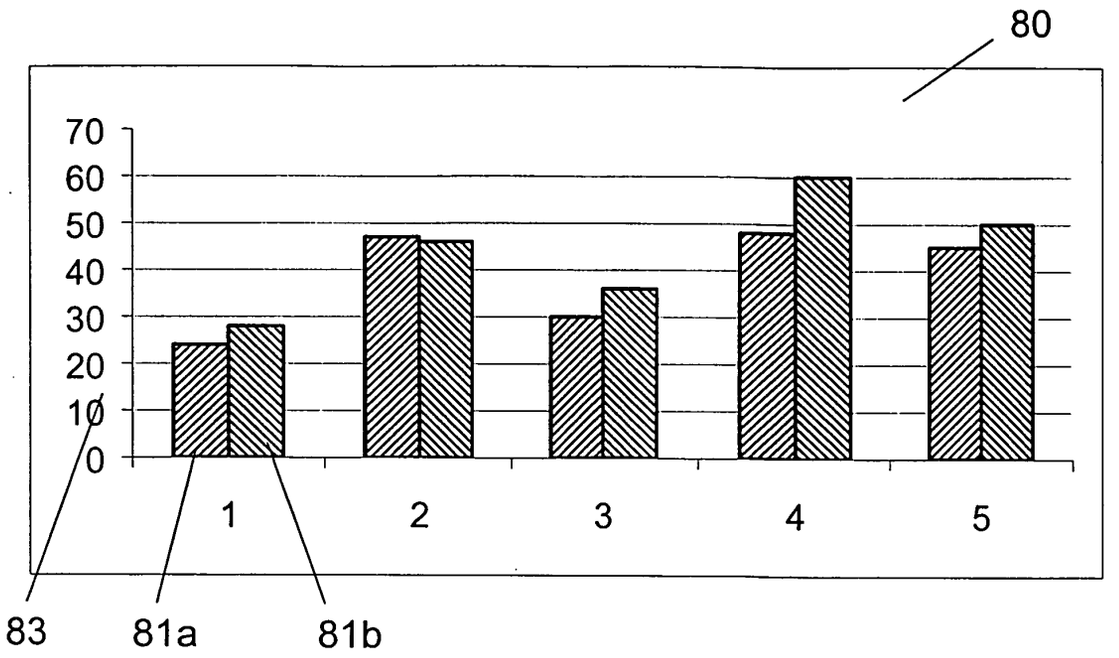

Figure 9

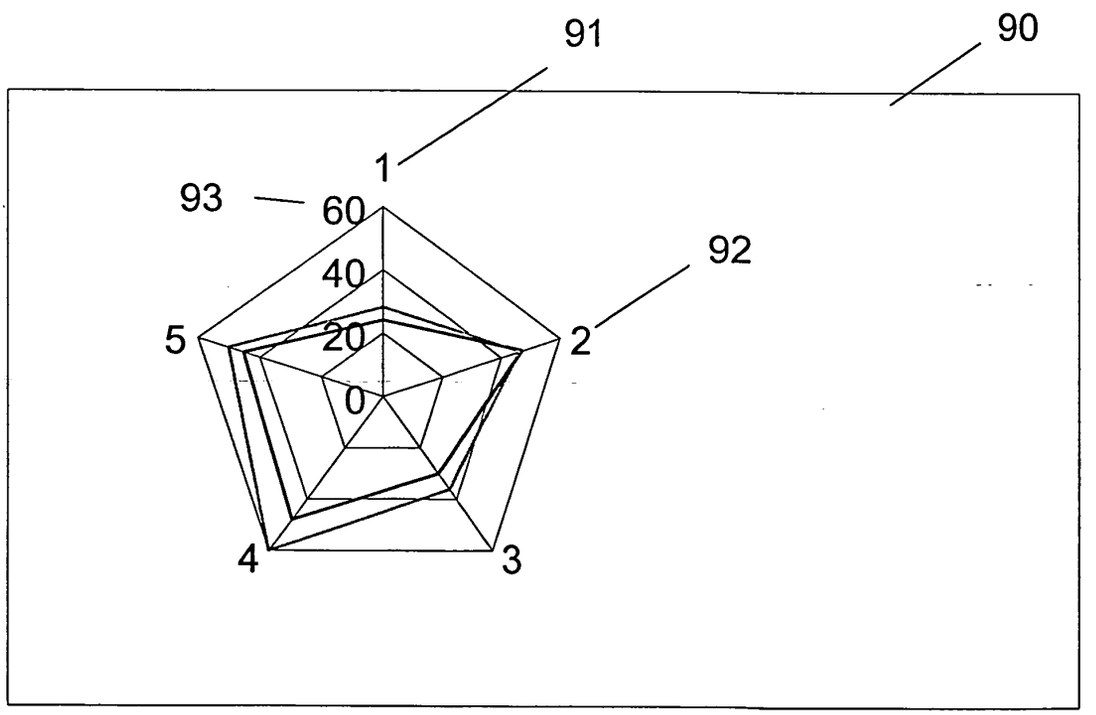

Figure 10

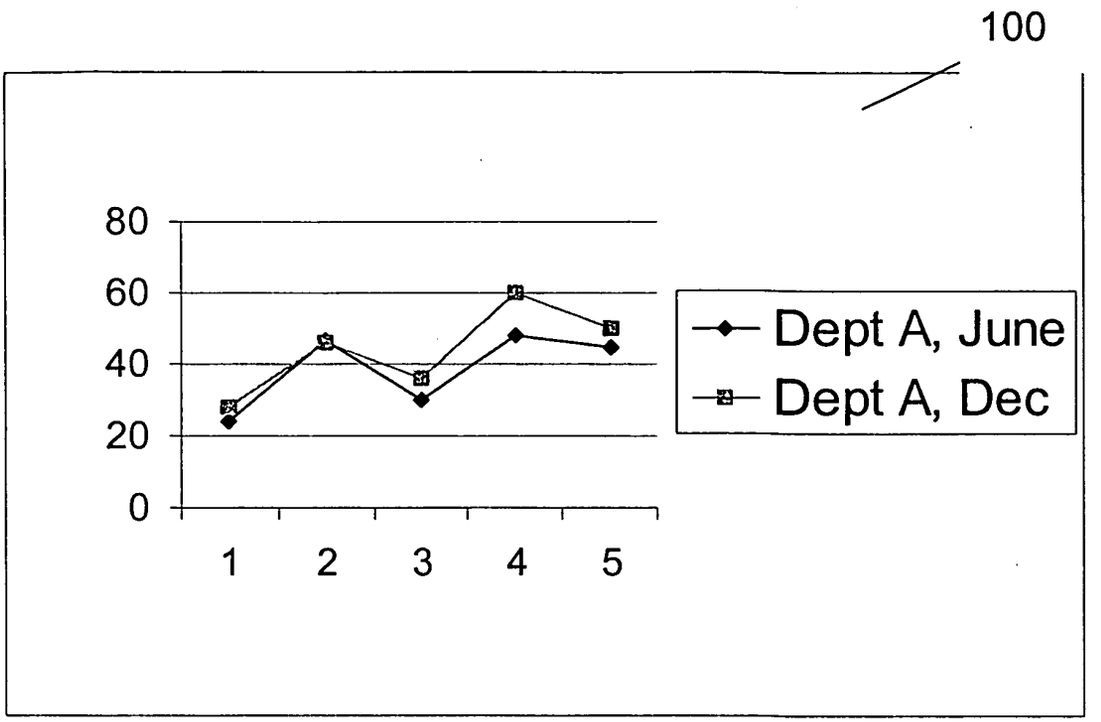

Figure 11

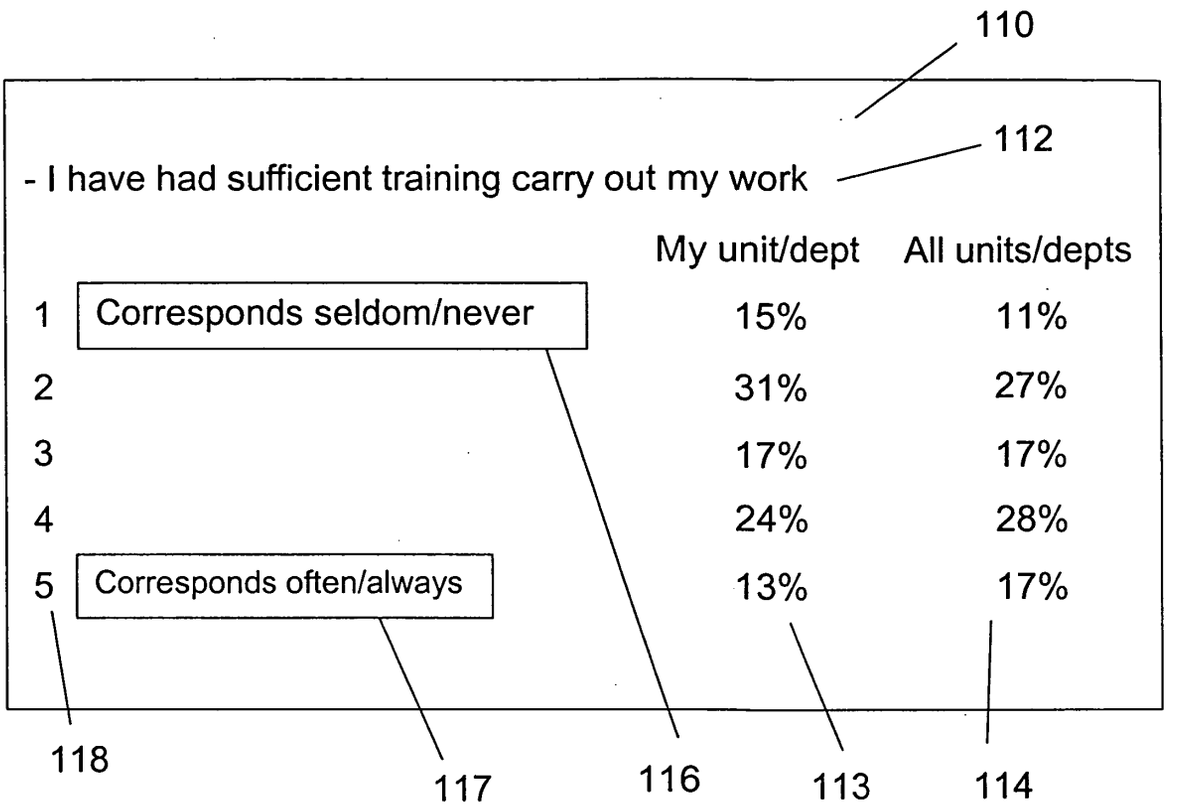
110
112
- I have had sufficient training carry out my work
My unit/dept
All units/depts
1
Corresponds seldom/never
15%
11%
2
31%
27%
3
17%
17%
4
24%
28%
5
Corresponds often/always
13%
17%
118
117
116
113
114

Figure 12

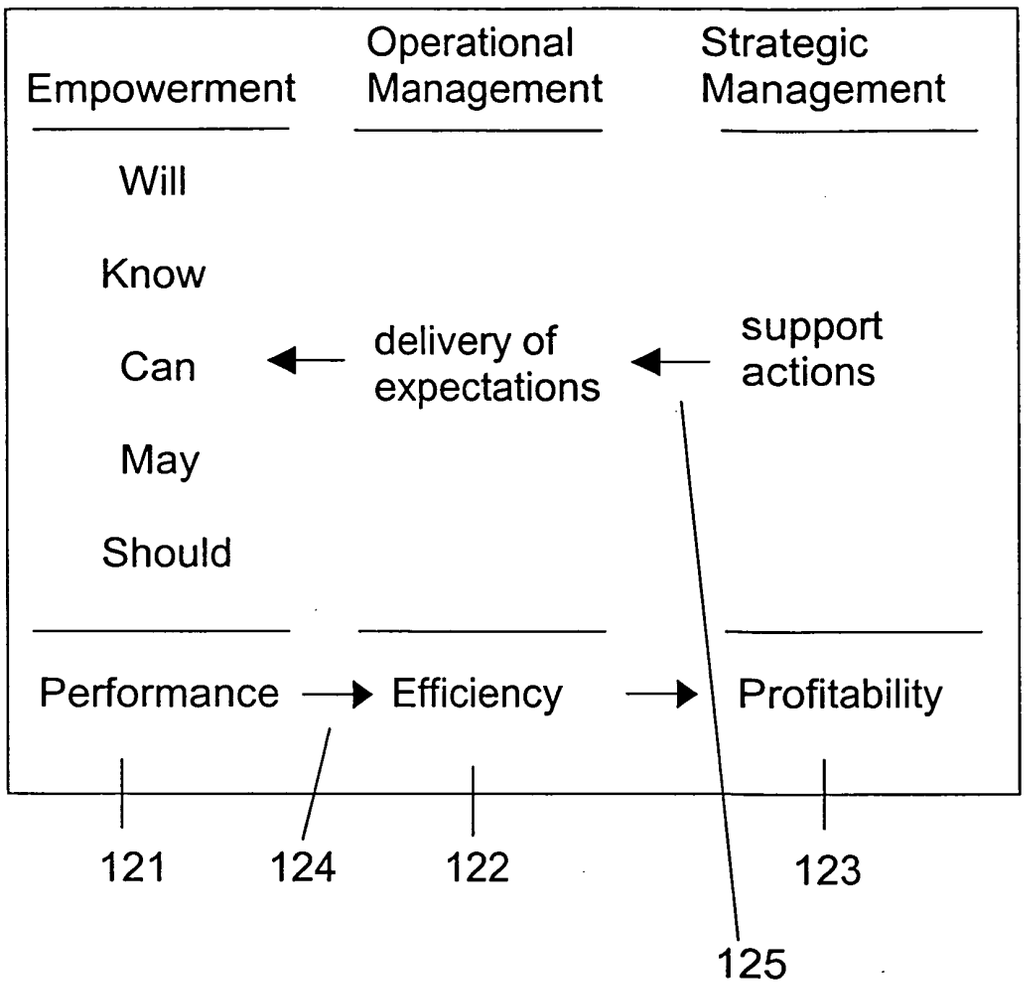
Empowerment
Operational Management
Strategic Management
Will
Know
Can
May
Should
delivery of expectations
support actions
Performance
Efficiency
Profitability
121
124
122
123
125

Figure 13

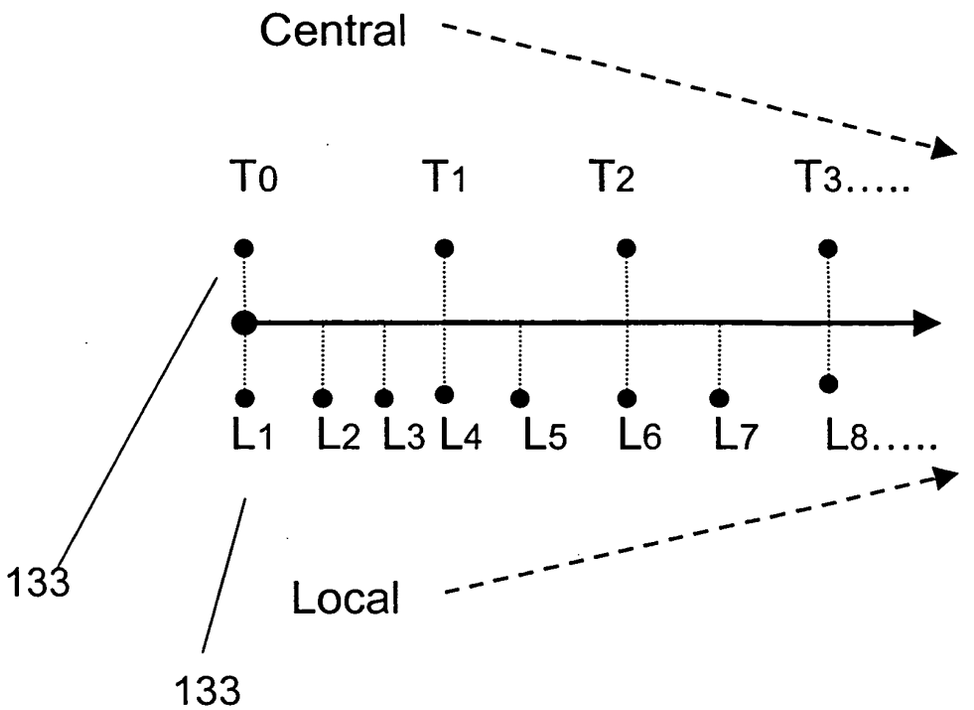

Figure 14

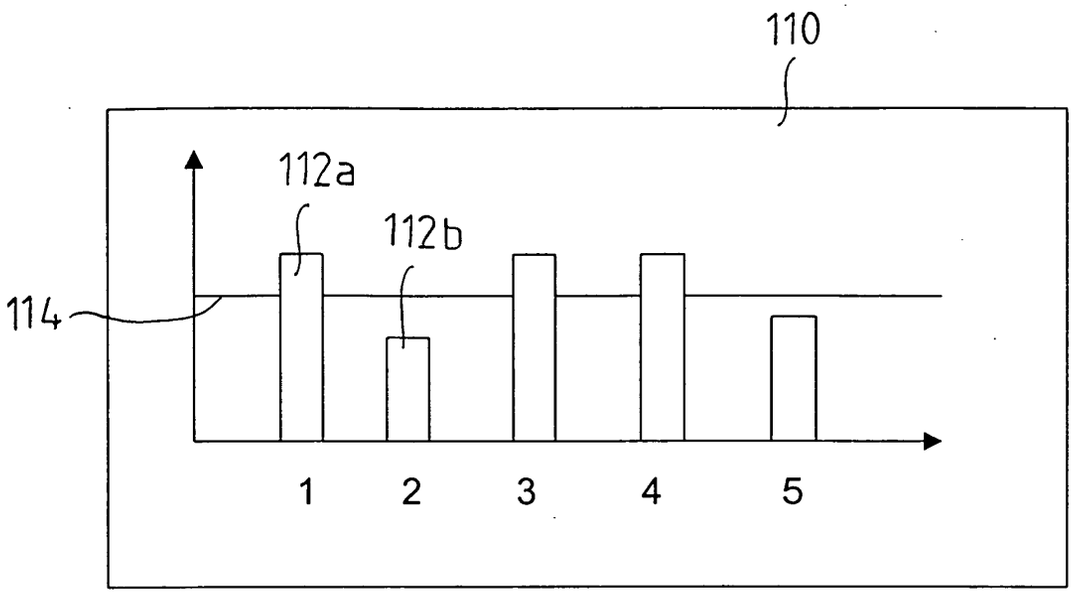

Figure 15

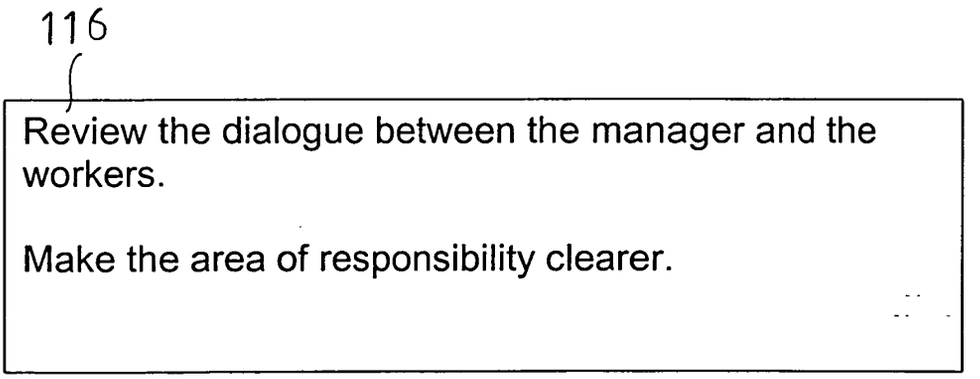

Figure 16

European Patent Office

DECLARATION

which under Rule 45 of the European Patent Convention shall be considered, for the purposes of subsequent proceedings, as the European search report

Application Number EP 04 01 4160

The Search Division considers that the present application, does not comply with the provisions of the EPC to such an extent that it is not possible to carry out a meaningful search into the state of the art on the basis of all claims

Reason:

The claims relate to subject matter excluded from patentability under Art. 52(2) and (3) EPC. Given that the claims are formulated in terms of such subject matter or merely specify commonplace features relating to its technological implementation, the search examiner could not establish any technical problem which might potentially have required an inventive step to overcome. Hence it was not possible to carry out a meaningful search into the state of the art (Rule 45 EPC). See also Guidelines Part B Chapter VIII, 1-3.

The applicant's attention is drawn to the fact that a search may be carried out during examination following a declaration of no search under Rule 45 EPC, should the problems which led to the declaration being issued be overcome (see EPC Guideline C-VI, 8.5).

CLASSIFICATION OF THE APPLICATION (Int.Cl.7)

G06F17/60

1

EPO FORM 1504 (P04C37)

Place of search	Date	Examiner
Munich	2 September 2004	Beatty, J