Chapter 5
Color, Prototyping and Navigation, Principles and Guidelines Design, Evaluation and Testing, and Task Analysis

Abstract This chapter discusses the color, prototyping and navigation, principles and guidelines design, evaluation and testing, and task analysis pertaining to the new smart technology design. These are vital aspects of design that must be taken into account by the designers and HCI experts, by integrating these aspects in the new smart technology design, the new device, user interface, and website that will meet the needs of users, the community, and society in general. Therefore, if all these design considerations are taken into account, users will have full control of their devices without any frustration and irritation as users have the opportunity to evaluate and test them in order to meet their needs. Moreover, designers and HCI experts should consider these aspects in their new smart technology design to ensure their new design is in accordance with sustainability principles.

5.1 Introduction

To ensure that new smart technology design is widely accepted and used effectively both globally and locally, designers should consider the following: color, prototyping and navigation, principles and guidelines design, evaluation and testing, and task analysis. These aspects are essential in any new smart technology design for devices, user interfaces, or websites. Users are becoming more sophisticated, and their expectations and behaviors concerning new smart technology design are changing as they have the autonomy to select a new smart technology design, which matches their needs. Therefore, HCI experts should consider the needs of users, the community, and society in order to ensure that the new smart technology design is designed based on sound design principles, which include the notion of sustainability. This chapter is organized as follows: color, prototyping and navigation, principles and guidelines design, evaluation and testing, and task analysis.

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5.2 Color

The consideration of color in a new smart technology design is vital as it can determine the success of failure of a device, interface, or website. Up until now, designers and HCI experts have used color based on their own individual, personal preferences rather than on scientific evidence (Holtze 2006, p. 34).

This approach will affect users' attitudes to these technologies in terms of style, layout, structure, navigation, usability and ad speed, and their acceptance or rejection of this new smart technology. Shneiderman and Plaisant (2010) posited that designers should limit the number of colors used in their designs and should select the colors which are the most appropriate for the contents and audience. Furthermore, Te'eni et al. (2007) verified that color usage in new smart technology design will help the user to understand and absorb information when reading, decision making, and differentiating between important and unimportant information.

Color theory in new smart technology design is considered in consumer-oriented websites that match the social and emotional perceptions of users and are expected to "increase trust and be more engaging, also increase user enjoyment or loyalty" (Cyr et al. 2010, p. 2). Color has played an important part in communication, psychology, and even physical health. Arguably, color has power, which is utilized for interior design, graphic design (Web or Interface), and art.

Generally speaking, color comprises three variables: hue, saturation (or chroma), and brightness (or intensity or luminance) (Holtze 2006; Pelet et al. 2013).

- **Hue**:
  - Corresponds to the normal meaning of color—changes in wavelength (these are spectral colors).
- **Saturation (or Chroma)**
  - Is the relative amount of pure light that must be mixed with the white light to produce the perceived color.
- **Brightness (or intensity or luminance)**
  - Refers to the shades of gray decreasing from white through gray to black.

There are three-color wheels, namely primary, secondary, and tertiary hues (Morton 2015)—primary hues: blue, red, yellow (in the printing world, these colors are cyan, magenta, yellow); secondary hues: violet, green, orange; and tertiary hues: red-violet, yellow-orange, blue-green, red-orange, blue-violet, yellow-green.

The judicious use of color in a new smart technology device has several advantages including: attracting attention, being appealing, facilitating recognition, and assisting memory and comprehension. Moreover, the choice of colors can help users to understand and recall information when undertaking reading and decision-making tasks, and supports effective processes, i.e., attract attention, help users to memorize, and add reminders.

There are two general design guidelines for color: Firstly, allow for redundancy so that differentiation by color is also accompanied by differentiation by shape or size. Secondly, whenever possible, authorize the users to adapt colors to suit their preferences and their culture.

Let us explain the effects and moods of color usage in new smart technology design. There are various types of colors from cold, cool, hot, warmth, darkness, light, pastel, "intensity" (power and passion) (Elliot and Maier 2012; Labrecque and Milne 2012; QSX Software Group 2015; Sibagraphics 2015).

- ***'Cold' colors***:
  - Colors like blue, green, and blue-green are associated with coldness and calm.
  - Use these colors to promote a feeling of seriousness, significance, honesty, determination, cleanliness, refreshing freshness, coldness.
- ***'Cool' colors***:
  - Blue is the base for these colors but added are reds and yellows to bring out a wide range of color from minty green to a soft violet.
  - These colors help promote a feeling of calm, serenity, trust, and relaxation.
- ***'Hot' colors***:
  - Red is the highest chroma color, and is the most powerful hue.
  - A hot color may evoke strong emotional responses and has been known to stimulate physical activity and sexual desire.
  - Use hot colors if you want an aggressive feel or want something stand out among others.
  - Red is the strongest of hues, placing a high chroma yellow in any designed, or work of art will draw the eye first.
- ***'Warm' colors***:
  - Based in red but softened and suffused with orange and yellows. Warm colors are often used to suggest comfort and warm, and heartfelt emotions.
- ***'Darkness' colors***:
  - Black is a mysterious color associated with fear and the unknown.
  - They are often used to reduce space.
  - These colors are also used so that lighter colors can stand out greater and be more effective.
  - These colors are serious and can suggest depressed and hardness.
- ***'Light' colors***:
  - These colors are barely colors at all; they exist merely as suggestions and hints of colors.

  - They are the opposite of darkness, and they are often used to open up a space or evoke a feeling of openness.

- ***'Pastel' colors***:

  - These pale colors are hues tinted with large amounts of white and are very soft in nature.
  - This type of color suggests innocence, fond memories, and romance.

- ***'Intensity (power and passion)' colors***:

  - The colors of intensity are high chroma colors and pure and seem to scream their message. Great for attention grabbing.

In conclusion, several studies (Cornforth 1994; Morton 2010; Wang et al. 2008) indicate color is essential in new smart technology design as it can enhance marketing, especially in the brand recognition. Compared with black and white, the use of color will increase users' participation and engagement, especially in traditional (i.e., newspapers) and online facilities.

In general, using color in new smart technology design will attract attention, help users to memorize, and add reminders. Moreover, another powerful effect is that it facilitates recognition and comprehension by both the designers and the users.

5.3 Navigation

Navigation is concerned with finding out about, moving through, and the environment. It includes three different but related activities: object identification, which is concerned with understanding and classifying the objects in an environment, exploration, which is concerned with finding out about a local environment and how that environment relates to other environments, and wayfinding, which is concerned with navigation toward a known destination (Adler and Blue 1998; Elfes 1987; Taylor and Sennott 1984).

Furthermore, several studies (Blackmon et al. 2002; Fons et al. 2003; Kakumani et al. 2004) indicate that a part of navigation is labeling, as labels are used for internal and external links, headings, subheading, titles, and related areas. For example, there is nothing more confusing for people than a website changing its own vocabulary by referring, for example, to "products" one minute and "items" the next. The same labels should be used consistently on searching mechanisms and on the main pages, in the names of the pages and in the link names.

This type of job will assist the navigation support in any new smart technology design, as many of the signs and labels are deliberately placed in order to support navigation, and it is common to have a navigation bar across the top of a design (i.e., site) which points to the main, top-level categories. This is often called the "global navigation bar."

Within each of these, there will be sub-categories; these might be placed down the left-hand side of the site or may drop down when the main category is selected. This is known as "local navigation."

It is a good design principle to have the same global, top-level navigation bar on every page so that people can easily jump back to the home page, to a "frequently asked questions" page or to one of the other main categories.

An essential aspect of the navigation features of any new smart technology design is to provide a "YOU are here" sign. This is often presented by a description showing where people are in the hierarchy of the site. Other devices such as indexes and glossaries are helpful in assisting people find exactly what they are searching for. The site map should be made available so that it can be called up when needed.

One of the significant features of the new smart technology design as an information space is that many sites support the searching process. Search engines can be bought; the better ones are quite expensive but are also effective. Two main problems with searching a website are: The first is knowing exactly what sort of documents the search engine is searching for; the second is how to express a combination of search criteria.

- ***Inclusion and Exclusion***
  - With many search engines, you can improve search performance by specifying an ***"inclusion operator,"*** which is generally a plus (+) sign. This operator states that you do not want a page retrieved unless it contains the specified word. By listing several key terms with this search operator, you can exclude many pages that do not contain one or more of the essential terms. The following, for example, will retrieve only those pages that contain all three of the words mentioned
    i.e., kittens + care + Siamese
- ***Wildcards***
  - An asterisk* is a wild card.
  - That is, searching for hunt* will return sites with hunter, hunters, hunting, huntsman, etc.
- ***Boolean Searches***
  - Use keywords (AND, OR, and NOT) to link the words you are searching for.
- By using Boolean operators, you can gain a more precise control over your searches.
  That is, AND operator tells the search service to return only those documents that contain both words

- That is, kittens AND care
  That is, OR operator is used to search for documents containing either word
- That is, Kittens OR care
  That is, NOT operator tells the search engine to omit any documents containing the word preceded by NOT (just as the minus sign does). For example, the search phrase "kittens NOT cats" retrieves pages that mention kittens but not those that mention cats.

- ***Using Parentheses***
  - This operator tells the search engine to search first for what is grouped or nested inside the parentheses.
  - That is, ("kittens" OR "care") AND Siamese

Finally, the basic goals relate to navigation questions such as "Where am I?" Or "Where can I go?" (Applen 2002, p. 305). Moreover, such design approaches should involve user participation. Effective "communication and positive relationships must be cultivated and planned as any other successful component of project management" (Jiang et al. 2002, p. 20).

According to Issa (2008), navigation aims to determine the specific navigation paths through the website (including the new smart technology design) between the entities and to establish communication between the interface and navigation in the hypermedia application. Finally, navigation paths are "very important issues to address in website design, for the user has to be able to find what they are looking for as quickly as possible" (Darlington 2005, p. 75). The essential design techniques are: site, layout, link, and navigational structure for the hypermedia application.

5.4 Prototyping

Prototyping is considered a part of the development process and is used to evaluate different proposals for the final website or new smart technology design. Prototyping should be introduced in the new smart technology design (including devices, user interface, and website) to identify the layout and the potential problems in the early stages; "functional requirements; navigational issues and visual aspects can also be clarified with the aid of a prototype" (Darlington 2005).

Prototyping can be classified as evolutionary or throwaway. "Evolutionary, means that the prototyping becomes part of the final project," while throwaway prototyping "serves only as a pattern for implementation, and you can throw away the prototyping once the interface is complete" (McCracken and Wolfe 2004, p. 8).

Prototyping brings many advantages to the development process that improve communication in the system, including devices, user interface, and website, and to remove misunderstanding from requirements in order to demonstrate the object, action, or property being discussed, and to provide a basis for an ongoing debate with users about their system requirements. Finally, the prototyping approach place(s)

greater emphasis on the interpersonal and communication skills of developers and users (Verner and Cerpa 1997).

There are two types of prototyping, namely: low fidelity and high fidelity. The latter will be similar to the final product of the website by using software such as Visual Basic, Smalltalk, and Macromedia, and it is recommended that more than one solution be produced (i.e., three solutions) in order to give the client more options about the "look" of the website. The advantages of high-fidelity prototyping are: It is very useful for detailed evaluation of the main design elements; it is useful for "selling ideas to people and for testing out technical issues" (Preece et al. 2002, p. 246), and it often constitutes a crucial stage in client acceptance—"as a kind of final design document which the client must agree to before the final implementation" (Benyon et al. 2005, p. 254).

Finally, low-fidelity prototyping does not look very much like the final product and uses materials that are very different from the intended final version; however, these prototypes are very useful since they tend to be simple, cheap, and quick to produce, i.e., storyboarding and sketching (Rudd et al. 1996).

Finally, Issa (2008) confirms that prototyping will allow users and management to interface with a prototype of the new website (including the new smart technology design) to gain some experience in using it. The aims of prototyping are to reduce cost and improve quality during the early stages in the development process.

5.5 Guidelines and Principles Design

To recognize the significance of HCI and usability features in the web development process as well as in the design process, it is worth scrutinizing the principles and guidelines of design suggested by Te'eni et al. (2007). The implementation of these principles and guidelines when designing and developing a new smart technology, device, user interface, including a website, will improve the presentation, performance, functionality, learnability, efficiency, effectiveness, usefulness, or utility; it will reduce errors and inaccuracies in the system, and this will lead to improved user satisfaction and achievement of the goals of both the designer and the user (Davis and Shipman 2011; Fernandez et al. 2011; Leung and Law 2012; Oztekin 2011).

To ensure that the design of a device, user interface, and website will match users' needs, design principles and guidelines are introduced and presented to designers. Principles are used to formalize the high-level and widely appropriate design goals while guidelines are essential to the designers to achieve the principles (Te'eni et al. 2007; Zhang et al. 2005). The design principles are divided into seven stages (see Fig. 5.1); each principle focuses mainly on a specific concept, which should be considered from the outset by the designers and users in order to develop a successful device or user interface including a website.

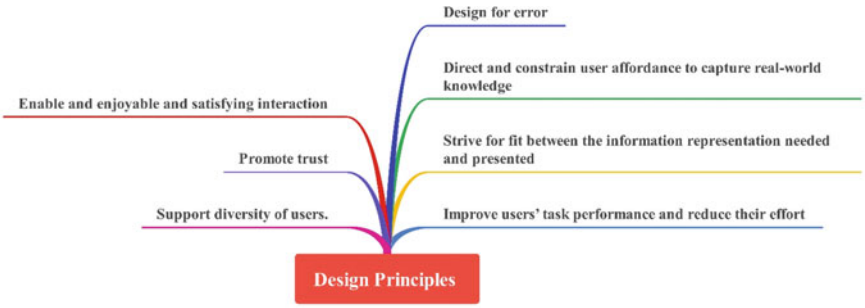

Fig. 5.1 Design principles (Adopted from Teeni et al. 2007—prepared by the Tomayess Issa)

The ***design principles*** are:

Improve users' task performance and reduce their effort: This principle aims to achieve high functionality along with high usability (i.e., efficiency, ease of use, and comfort in using the system, given that the functionality has been established).
Strive for fit between the information representation needed and presented.

a. Representation: a simplified description of a real-world phenomenon.
b. Functionality: the set of activities.
c. Usability: a measure of ease of use.
d. Cognitive fit: system's representation of the problem supports the user's strategies for performing the task.

Direct and constraint user affordance to capture real-world knowledge: The general idea here is that the knowledge required to act effectively resides both in the person's head and in the real world around him/her.
Design for error: A faulty action due to incorrect intention (mistake) or to incorrect or accidental implementation of the intention (slip).
Designing for an enjoyable and satisfying interaction: The design of the interface or website should make the interaction enjoyable for both the designer and the users.
Promote trust is a critical component in developing an interface or website, especially for the e-commerce systems where the interactions translate directly into revenue.
Support diversity of users: This principle should take into consideration the diversity of populations of users.

To confirm that the device, user interface, or website is widespread and meets users' requirements, designers, especially HCI experts, must include these design principles in their agenda to prevent user frustration and dissatisfaction with these tools.

Furthermore, to ensure that the device, user interface, or website is well accepted by users, the designers and HCI experts must consider the design guidelines, which

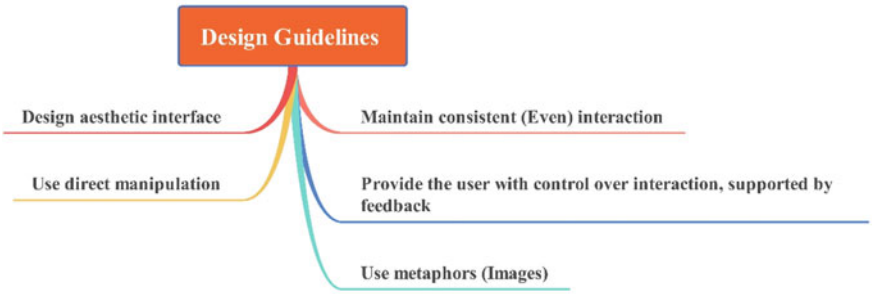

Fig. 5.2 Design guidelines (adopted from Te'eni et al. 2007)—prepared by Tomayess Issa

are crucial in the web development process. The design guidelines comprise five steps (see Fig. 5.2).

The ***design guidelines*** are:

- ***Consistency Guidelines***: If the interface is consistent (even if poorly designed), the end-user can adapt to it.
- ***Control and feedback go hand in hand***: Providing feedback is probably the most accepted guideline in the design of any interaction.
- ***Metaphor***: The use of familiar terms and associations to represent a new concept.
- ***Direct Manipulation***: An interaction style in which objects are represented and manipulated in a manner analogous to the real world.
- ***Design Aesthetic Interface***: Aesthetic appeal concerns the overall appearance of an application.

5.6 Evaluation and Testing

This section discusses the importance of the evaluation in the system development process for new smart technology, devices, interfaces, and websites. In general, evaluation is an essential step in the system development process, since experts and novices will evaluate the new smart technology, device, interface, or website and suggest solutions to problems (Jacobson et al. 1999; Nielsen and Molich 1990).

5.6.1 What is Evaluation?

Evaluation is intended to collect comments and evaluation from the users to ensure that devices, interfaces, and websites are meeting the users' needs (Issa 2008). To ensure that the functions of devices, interfaces, and websites are effective from the technical perspective, experts and novices test them using specific scenarios. According to McCracken and Wolfe (2004, p. 41), "expert- based evaluation can

be achieved by using a group of usability experts to critique the prototype" while user-based evaluation can be performed by asking "users to perform representative tasks with the prototype."

Evaluation should occur in the initial stages of the system development process and prior to release to ensure that the device, interface, or website matches users' needs. Furthermore, evaluation takes place when the system is released and is used by target users in a real context, that is, during the use and impact stage.

In general, experts and users will evaluate new smart technology, devices, interfaces, and websites in terms of usability (i.e., efficient, effective, safe, utility, easy to learn, easy to remember, easy to use, easy to evaluate), HCI (usable, practical, visible, job satisfaction, additional features, text style, fonts, layout, graphics, and color), and navigation (site, layout, navigational structure for the hypermedia application) (Issa 2008).

5.6.2 Why Evaluate?

Additionally, designers, HCI experts, and users should understand the reasons for conducting evaluation. Preece et al. (1994) listed four main reasons as: (1) to understand the real world and how users employ the new smart technology in the workplace and social life, in order to provide further information to the designers to improve this new smart technology to better fit their needs and work and social environment; (2) to compare and contrast the new smart technology design in line to identify which is the best; (3) to determine whether the new smart technology design is matching the users, the projects goals, and the objectives; and finally 4) to check confirmation to a standard.

5.6.3 When to Evaluate?

In order to ensure that new smart technology design matches users' needs, the designers, HCI experts, and users should determine an appropriate time and means of conducting the evaluation. Currently, there are two approaches for formative and summative evaluation. Formative evaluation is conducted during the development of a product in order to form or influence design decisions. Summative evaluation is conducted after the product is finished to ensure that it possesses certain qualities, meets certain standards, or satisfies certain requirements set by the sponsors or other agencies (Hamilton and Chervany 1981; Nunamaker and Chen 1990; Shackel 1991).

5.6.4 Methods and Means of Evaluation

Real users in real-world contexts can conduct evaluation during the actual use of the produce, and this type is called "use and impact evaluation." However, the longitudinal evaluation aims to observe or examine a set of subjects over time with respect to one or more evaluation variables.

To have a successful evaluation, a plan should be formed to identify the stages of design (early, middle, late); the novelty of product (well-defined versus exploratory); number of expected users; criticality of the interface (e.g., life-critical medical system versus museum-exhibit support); costs of product and finances allocated for testing; and time available and the experience of the design and evaluation team (Gauthier 2015; Te'eni et al. 2007; Wakefield et al. 2015).

Examples of evaluation strategies include analytical methods (conducted by experts or designers to inspect potential new smart technology design problems) and heuristic evaluation (conducted by experts guided by a set of higher-level design principles or heuristics, evaluate to ensure if the new smart technology design is matching the principles and guidelines design). Furthermore, a guidelines review is conducted during the design stage with objective users (i.e., experts or designers outside the design team) to confirm whether the new smart technology design matches the project aims and objectives. Nielsen and Molich's ten (10) rules of thumb and Ben Shneiderman's eight (8) goals are considered the first step to establish the heuristics evaluation (Fard N.D.; Wong 2020) (see Fig. 5.3).

Additionally, cognitive walk-through evaluation is one of the evaluation strategies intended to identify the problems and glitches in the new smart technology design by asking the experts only to evaluate specific tasks in the design; on the other hand, the pluralistic walk-through evaluation will ask experts, designers, and users to examine the new smart technology design by considering specific scenarios. This type of evaluation is focused mainly on users' participation and how they would proceed with doing tasks.

In addition, in order to collect from users' further information about the new smart technology design, empirical methods are very useful used, i.e., survey/questionnaire, interviews, focus groups, laboratory experiments, and observing and monitoring usage through field studies. These methods are useful to obtain the necessary feedback from users to improve the new smart technology design and to match users' needs (Nielsen and Mack 1994; Shneiderman and Plaisant 2010).

Finally, according to Issa (2008), expert-based and user-based evaluations will test the website to ensure that the website functions effectively from the technical perspective. Functionality testing and evaluation are mainly about formative usability evaluation by experts and users.

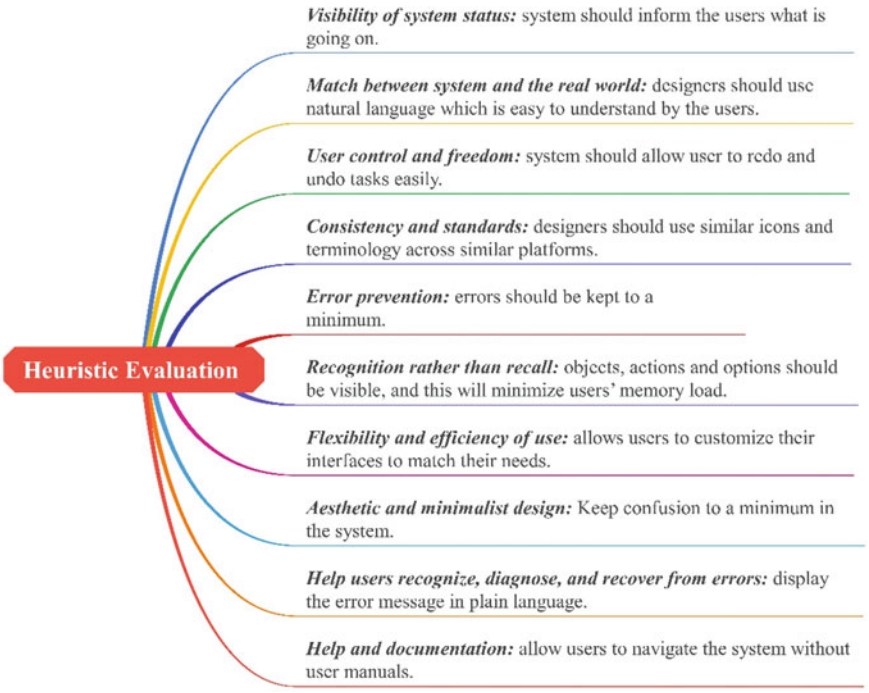

Fig. 5.3 Heuristic evaluation, prepared by Tomayess Issa

5.7 Task Analysis

To develop a new smart technology which will help to make the devices very successful, the researchers need to incorporate additional detailed techniques. These will address specific deficiencies identified in the methodologies reviewed in the preceding sections. They relate to:

- Detailed task analysis (to facilitate a comprehensive set of links between the front end and back end of an e-commerce websites).
- Detailed procedures for website design and implementation.

It is very important to know one's users when an information system or a website is being developed. At the same time, the designer is required to acquire more information about what users will actually do. To answer this question, the designer needs to adopt a specific technique which is termed "task analysis." Task analysis is the "process of building a complete description of the [users'] (their) duties" (McCracken and Wolfe 2004, p. 44). This technique involves seeking the following information about the users:

- What tasks they perform.
- Why they perform them.

- How they perform them.

The information will assist designers to determine the basis and foundation for making decisions that will produce successful designs.

5.7.1 Goals, Tasks, and Actions

Participation by users is the basis for developing and creating a simple, easy-to-use user interface or website. Task analysis will help the designer to learn more about the goals and tasks of the users, and in turn to produce an interface that operates effectively and productively.

According to McCracken and Wolfe (2004), goals, tasks, and actions should be defined at the beginning of the project. Goals are work-related objectives that include searching for information, sending e-cards, registering a hotel guest, sending e-mail, or doing Internet marketing or non-work-related goals such as playing games, chatting, or making a plan. Therefore, goals "are technology independent, and they remain the same even when the technology changes" (McCracken and Wolfe 2004, p. 44).

On the other hand, tasks may or may not be consistent between users. Therefore, tasks need to be changed according to the users' requirements and needs, and these tasks are used to accomplish the goals (e.g., buying a book (about HCI) from Amazon.com).

Finally, the last step is action. Actions are "subcomponents of tasks" (McCracken et al. 2004, p. 44). In other words, actions are a series of steps which need to be followed in sequence in order to complete the tasks and, hence, achieve the users' goals. In addition, these steps may involve one or more sub-steps.

5.7.2 Techniques for Identifying Types and Granularity of Tasks

In this section, six techniques will be introduced which can be used to collect more information about the tasks, which are needed to achieve the users' goals. Sometimes, analysts may need to use more than one technique to collect information with respect to the tasks that are needed in order to accomplish the goals.

A key issue is "granularity." This refers to "the level of detail in a description" (McCracken and Wolfe 2004, p. 45). For example, users need to look at their tasks from a short distance to understand its detail as well as from a long distance, to know the purpose behind it. Therefore, in task analysis the granularity that is chosen will depend on "the nature and scope of your website development effort" (McCracken and Wolfe 2004, p. 45).

Workflow Analysis: The purpose behind this technique is to illustrate how the work will be done if more than one user is involved in the task. This means that this technique focuses "on work as it passes from person to person" (McCracken and Wolfe 2004, p. 46). As a result, this information may be vast and very helpful for the designer and user simultaneously as it provides a full picture of the project.

Job Analysis: This technique is the opposite of the former, as the designer needs to "focus on what a single person does in a day, a week, or a month" (McCracken and Wolfe 2004, p. 46). The designer can collect this information from the users by using the interview method or observing them in their work environment.

Task List: This technique takes "the granularity of job analysis to a more detailed level" (McCracken and Wolfe 2004, p. 46). In other words, the designer needs to think very carefully about how many tasks are to be studied in detail before these are broken down into more tasks. In addition, the designer should define and describe the components of a user's job, as some users are responsible for more than one job.

Task Sequences: This technique will establish "the order in which the tasks take place" (McCracken and Wolfe 2004, p. 47). The designer can learn the order of these tasks by observing the users at work. However, the important issue which needs to be taken into consideration is to try not to change the users' way of doing the tasks unless there is an important reason for doing so. It is better to give users full control to finalize their job in whatever sequence they like. However, "if you discover that a majority of users do things in a certain sequence, it makes sense to set up the interface to simplify things for the majority" (McCracken and Wolfe 2004, p. 47).

Task Hierarchies: The purpose of this technique is to document the components of a task, which are called sub-tasks. The level of detail depends on the type and the purpose of the website.

Procedural Analysis: This last technique "contains the most detail of any of the techniques" (McCracken and Wolfe 2004, p. 48). This step will give the designer information about how many steps need to be taken by the user in order to achieve his/her tasks.

Figure 5.4 shows that involving the users in this aspect of the system development process is essential in order to provide the necessary detailed information and to familiarize the users with the new system structure. However, the designer needs to take into consideration the level of user participation in the system development process, which means involving the users in one or more tasks during the process. The user participation level needs to be discussed by the designer and users so that an agreed process can be identified.

Finally, task analysis is essential in the new smart technology development process and involves determining the user types, their work goals, and activities, and applies to the device, user interface, and website.

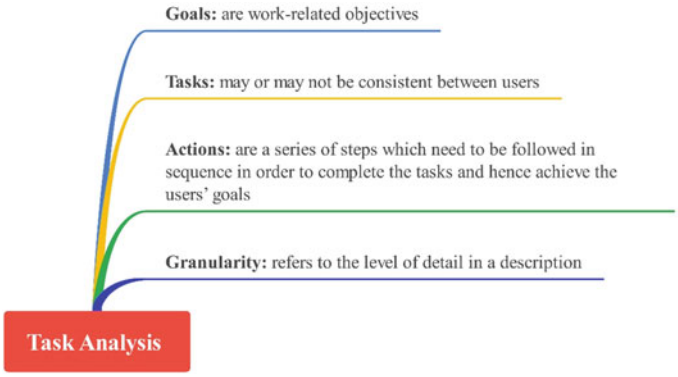

Fig. 5.4 Task analysis—prepared by Tomayess Issa

5.8 Conclusion

This chapter has discussed the issues of color, navigation, prototyping, principles and guidelines design, evaluation and testing, and task analysis in terms of new smart technology design. These design concepts are essential especially in new smart technology design, i.e., devices, user interface, and website. In general, color is widely used in the development process to attract users' attention and as reminders of specific information on a display. However, navigation enables the user to control the intersystem and intra-system flow of activities and the user's navigation of the system, while prototyping brings designs to life for both designers and users who will use the new design.

Furthermore, this chapter discussed the importance of the evaluation and testing of the new smart technology design as these aspects will assist users and designers to identify the problems and identify some solutions to prevent them in the future. On the other hand, to ensure that user interface or website is well accepted by designers and HCI experts must consider the design guidelines, which are crucial in the web development process. Finally, this chapter examined the task analysis focuses on goals, tasks, and actions of new smart technology design, and is concerned with logic, cognition, or purpose of tasks.

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