Chapter 6
Models and Methodologies

Abstract This chapter examines the various types of models and methodologies for developing systems (including websites), which may incorporate such HCI processes, usability, and Internet marketing issues. It assesses the advantages and disadvantages of each methodology and analyzes the differences between them in order to develop the framework for a new participative methodology. To produce a successful new smart technology, devices "system" (or website), both designers and users should be working collaboratively. Such user participation has to be facilitated by a system development methodology consisting of a clear sequence of stages and steps to be followed by the designer and participating users. The approach of breaking a methodology into stages and steps will be adopted in this research to facilitate the design process by breaking down the activities into several major stages and smallest parts into steps (within each stage).

6.1 Introduction

In order for new smart technology, devices, systems, (or websites) to be widely accepted and used effectively, they need to be well designed. To achieve this, designers and users need to use a specific methodology to produce the "system" (or website). A sound methodology is a very important component of the system development process, in order to produce a new system, which meets the user's requirements. A methodology "should tell us what steps to take, in what order and how to perform those steps but, most importantly, the reasons, 'why' those steps should be taken, in that particular order" (Jayaratna 1994).

The term "methodology" is used significantly in information systems development, as each methodology should have a set of stages and steps, which need to be followed in sequence if the work is to be done successfully. 'Stage' is a "convenient breakdown of the totality of the information systems life cycle activity" (Olle et al. 1988, p. 21), while 'step' is "the smallest part of a design process" (Olle et al. 1988, p. 21).

The sequence of the stages may not always be fixed, but it "does suggest that there is a strict time scale applicable to all situations" (Olle et al. 1988, p. 30). In some projects, iteration between stages will occur and this may have a range of impacts on the methodology, as an iteration may "take different forms and thus impact differently on what one can do with a methodology" (Olle et al. 1988, p. 30).

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The main demand is for methodologies that can lead to improvements in the following three aspects according to Avison and Fitzgerald (1993, p. 264): A better end product; A better development process; A standardized process.

For that reason, a designer needs to understand users' requirements for the project before choosing the methodology, in turn to successfully complete the work and to accomplish profitable results.

In this chapter, Issa (2008) will discuss various types of models and methodologies, including: lifecycle models; IS development methodologies; methodologies with explicit human factors aspects; websites methodologies; marketing methodologies; and additional techniques, such as task analysis[1] and detailed website design and implementation. There are numerous similarities in respect to the stages between methodologies for developing information systems, websites, or marketing strategies. Integrating stages from information systems methodologies into website and marketing methodologies is very beneficial in order to develop websites that are more effective and efficient. Human factors experts should be involved in these methodologies to make sure that transaction processes, tracking, maintenance and updating of the website meet the users' requirements.

Firstly, Issa (2008) will discuss the methodologies in this sequence to identify two aspects: (1) the stages needed for the system development process; and (2) the four key principles (user participation, usability, iteration, real interaction), in order to check the availability of these four key principles in IS development, website and marketing methodologies. The system's development cycle will be discussed in order to identify the stages.

Secondly, the stages of information systems development methodologies will be checked to assess how effectively they match the four key principles at each stage and to identify the strongest stage in each methodology. Thirdly, for the website and marketing methodologies, the researcher will: check the availability of techniques covering the four key principles in these methodologies; list the extra stages which will be added to the new methodology; and identify the strongest stage in each methodology.

Finally, additional techniques (i.e. task analysis[2] and detailed website design and implementation) will be discussed. The chapter will also identify any extra stages, which will be added to the new methodology, such as navigation, promotion and staff training. Such additional detailed techniques will play a key role in the new methodology, as most of the existing methodologies have neglected these.

6.2 Lifecycle Models

The term 'lifecycle model' is used to represent a model that captures a set of system development activities and how they are related (Preece et al. 2002). The more sophisticated lifecycle models inform the designer about when and how to move

[1] Task Analysis – Please check Chap. 5

[2] Task Analysis: Please check Chap. 5

from one activity to the next and provide a description of the deliverables for each activity. These lifecycle models are popular since they allow developers, and particularly managers, to get an overall view of the development effort so that processes can be tracked, deliverables specified, resources allocated, targets set and so on. As indicated, some lifecycle models include iteration – this "model incorporates iteration and encourages a user focus" (Preece et al. 2002, p. 186).

The stages in a typical development lifecycle model for interaction design are:

- Define the requirements;
- Prepare some alterative designs, which meet the needs, and requirements that have been identified previously;
- Select a preferred solution;
- Test and evaluate the design;
- Iterate, if necessary. This option can be used either before or after the evaluation stage.

This section discusses and compares a historical sequence of increasingly complex models (i.e. Waterfall Lifecycle Model, Spiral Lifecycle Model, and Rapid Applications Development) which focus on interaction design and adopt the general approach of the development Life Cycle Model.

Furthermore, two models will be discussed in this section from the Human Computer Interaction perspective, the Star Lifecycle Model and Usability Engineering. The former focuses on how the designer addresses Human Computer Interaction design problems, while the latter "shows a more structured approach and hails from the usability engineering tradition" (Preece et al. 2002, p. 192).

6.2.1 The Waterfall Lifecycle Model

This model is basically a linear model where each stage must be completed before the next stage can be started. For example, requirements analysis has to be completed before design can begin. However, iteration can occur at each stage. This lifecycle model is divided into five sequential stages, which may be described as follows:

- **Requirements Analysis:** this stage begins when an organization seeks to add, improve, or correct a system, which is not meeting the requirements of the users. The requirements specification should be captured by the designer in consultation with users to know "what the eventual system will be expected to provide, and how the system will provide the expected services" (Dix et al. 1998, p. 181).
- **Design:** this stage will allow the designers to define the system specifications for the components, such as hardware and software, screen layouts, and documentation.
- **Code:** this stage involves converting design and system specifications into "executable programming language" (Dix et al. 1998, p. 182).
- **Test:** this stage will allow the users to test the new system to ensure that "the system meets their requirements" (Dix et al. 1998, p. 183).

- **Maintenance:** this stage involves the "correction of errors in the system which are discovered after release and the revision of the system services to satisfy requirements that were not realized during previous development" (Dix et al. 1998, p. 183).

One of the main flaws with this model is "that requirements change over time, as businesses and the environment in which they operate change rapidly"; hence, it "does not make sense to freeze requirements for months or years, while the design and implementation are completed" (Preece et al. 2002, p. 188). In addition, although a limited (between stages) iteration option is available in this model, the opportunity to constantly review and evaluate a proposed system with users is not included.

In practice, developing a website by using the waterfall model is complex since most of the users are not "clear how they would want the site to look" (Darlington 2005, p. 34). To solve this problem, prototyping should be introduced since it can help to identify the website 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, p. 34).

6.2.2 The Spiral Lifecycle Model

For many years, the Waterfall Lifecycle Model was considered the most popular model for the system development process. However, in 1988 Dr. Barry Boehm introduced the Spiral Lifecycle Model. This model combines the waterfall model with an element called "risk analysis." It is divided into three major stages: (1) planning – to define the objectives, alternatives and constraints; (2) Risk Analysis – for each of the alternatives solutions risks are identified and analyzed; and if this information is not enough, then the prototyping approach will be adopted, before finally, (3) Engineering the solution.

This structured model is very useful as the customer can decide whether any one phase has been completed to his/her satisfaction before the next phase can commence. S/he may elect, if the risks are unacceptably high, to terminate the project. In addition, client evaluation can also be incorporated to check whether or not the system is developing according to their needs.

This model is very useful for large and complex development processes. The regular feedback from the customer allows for any necessary changes to be acted upon immediately. It incorporates steps to identify and controls risks. This model "explicitly encourages alternatives to be considered, and steps in which problems or potential problems are encountered to be re-addressed" (Preece et al. 2002, p. 188). However, if not all aspects of risks are discovered in time, problems will surely occur, thereby leading to the need to repeat the procedures from the beginning, and failure to meet the deadline for accomplishing the project. User involvement is not clearly defined in this model.

6.2.3 Rapid Application Development (RAD)

This model attempts to take a user-centered view and to minimize the risk caused by requirements changing during the course of the project by completing the stages as rapidly as possible. This model has five stages (namely Project set-up; JAD workshops; Iterative design and Build; Engineer and test final prototype; and Implementation Review) and each must be completed before the next stage can be started. However, an iterative approach is incorporated, requiring the developer to go "back to the original data to gather and check the requirements" to determine whether or not it is supporting the user's tasks (Preece et al. 2002, p. 64). RAD added two new key features to the previous development models: Time Boxing and Joint Application Development workshops.

- **Time Boxing** breaks down a large project into many smaller projects. This will allow the designers to deliver the products incrementally and enhances flexibility in terms of the development techniques used and the maintainability of the final system.
- **JAD (Joint Application Development)** workshops between the users and developers are used to gain more information about any difficult issues that are faced and for decisions about system design to be made.

This model also specifically incorporates user testing of prototypes; however, it lacks maintenance of the implemented system. The prototyping in this model should be used to evaluate the system design and to identify the potential problems without any haste. Rapid development and manipulation of a prototype should not "be mistaken for rushed evaluation which might lead to erroneous results and invalidate the only advantage of using a prototype in the first place" (Dix et al. 1998, p. 207).

6.2.4 Systems Development Life Cycle

Kendall proposed the Systems Development Life Cycle in 1992. This lifecycle is a "project management technique that divides complex projects into smaller, more easily managed segments or phases" (FFIEC IT Examination Handbook 2005). The segmentation of projects is a very useful method as it allows the designers and analyst to check if the previous stages have been successfully completed before moving to the next stage. This life cycle is very constructive and useful as it prevents any tribulations to the designer, analysts and users towards the end of the project.

This development life cycle is divided into eight sequential stages (phases), with each needing to be completed before the next stage can be started. The stages are:

- **Initiation Phase:** this stage (phase) begins when an organization decides to add, improve, or correct a system, which is currently not meeting the requirements and needs for the organization and user simultaneously. Consequently, the management needs to define the following requirements before moving to later system development phases:

- Business Considerations (i.e. goals, objectives, budget and legal issues);
- Functional Requirements (i.e. user requirements, hardware and software requirements and backup);
- Project Factors (i.e. project and risk management methodology, and estimated completion dates and costs);
- Cost/Benefits Analysis (including both tangible and intangible benefits and costs).

(FFIEC IT Examination Handbook 2005).

All these requirements need to be considered and support documentation prepared before moving to the planning phase.

- **Planning Phase:** this stage (phase) is very significant as both designers and analysts need to study the requirements very carefully. Throughout this stage, the management needs to address the following items before shifting to the next phase: "communication, defined deliverables, control requirements, risk management, change management, standards, documentation, scheduling, budget, and testing and staff development" (FFIEC IT Examination Handbook 2005).
- **Design Phase:** this stage (phase) allows both the designers and analysts to carry out the design of the new system utilizing the requirements identified by the previous two phases. In this phase, initial prototyping is used to build mock-up designs of items such as applications screens, database layouts, and system architectures. This initial design needs to be reviewed by the users, designers, analysts, network administrators and database managers to make sure it meets the requirements. The initial prototyping design is an iterative process, which means the system will remain in the stage and be reviewed by the participants "until they agree on an acceptable design" (FFIEC IT Examination Handbook 2005).
- **Development Phase:** this stage (phase) involves converting design specifications into an executable program (FFIEC IT Examination Handbook 2005).
- **Testing Phase:** this stage (phase) will allow the users to test the new system to ensure the accuracy of "programmed code, the inclusion of expected functionality and the interoperability of application and other network components" (FFIEC IT Examination Handbook 2005).
- **Implementation Phase:** this stage (phase) will involve installing the new system into the real world environment. In addition, the users' training session for the new system will be carried out.
- **Project Evaluation:** this stage (phase) will allow the management to evaluate and review the "completion of the project objectives and assess project management activities" (FFIEC IT Examination Handbook 2005).
- **Maintenance Phase:** this stage (phase) involves changes and the correction of errors in the hardware, software, and documentation, which are discovered after the implementation stage.

According to L. Peters (1988), this life cycle is a systematic breakdown of the software development process, "… A Software Life Cycle is both a management and a technical tool for organizing, planning, scheduling and controlling the activities

associated with a software development and maintenance effort" (cite in Jayaratna 1994, p. 33). However, this life cycle does not allow for significant review and iteration between the stages; this means that suppleness and flexibility for responding to the particular needs of a specific project are missing. It also lacks detailed arrangements for user involvement at all stages.

6.2.5 The Star Lifecycle Model

The Star Lifecycle Model was proposed by Hix and Hartson (1993) to address Human Computer Interaction issues in system development in a more flexible way. This model is six steps namely Implementation, Task/functional analysis, prototyping, requirements specification, conceptual/formal design and evaluation. This model incorporates two different modes of activity: the analytic mode and the synthetic mode. The former is described by concepts such as top-down, organizing, and working from the system view towards the user's view. While the latter is described by concepts such as bottom-up, free thinking, creative and working from the user's view towards the systems view (Preece et al. 2002; Hix and Hartson 1993). The Star Lifecycle Model is extremely flexible and popular, especially with managers, enabling them to get an overview of the "development effort so that process can be tracked, deliverables specified, resources allocated, targets sets and so on" (Preece et al. 2002, p. 193).

The star lifecycle model can be adopted in any system development process and the developer can move from any activity to any other without any specific order as the "activities are highly interconnected" (Preece et al. 2002, p. 193). The evaluation activity is at the center of this model, since, before moving to another activity, one need to pass through the evaluation activity to evaluate the result from the previous activity. This model can be used for defining requirements for a new system, or for evaluating an existing situation and analyzing existing tasks. However, this lifecycle is very general and does not explicitly incorporate procedures for user participation or for system design and maintenance.

6.2.6 The Usability Engineering Lifecycle

Deborah Mayhew proposed the Usability Engineering Lifecycle in 1999, and the purpose of this model is to focus more on how usability design and evaluation tasks may be performed alongside more traditional software engineering activities (Preece 2002).

This lifecycle model presents a "menu of choices that can be worked into the broader development context in order to increase usability" (Instone 2004). It has three main aspects: requirements analysis, design/testing development, and installation. The production of a set of usability goals is the main aspect of the first stage since

"these goals [are] captured in a style guide that is [then] used throughout the project to help ensure that the usability goals are adhered to" (Preece et al. 2002, p. 195). The middle stage in this model is the largest and most complex stage as many subtasks are involved to produce a detailed design. The final stage involves installation and user feedback.

The most important elements in the Usability Engineering Model are experiential user testing and prototyping, combined with iterative design. "Because it's nearly impossible to design a user interface right the first time, we need to test prototype and plan for modification by using iterative design" (Nielsen 1992, p. 13).

It is anticipated that, via this life cycle, the software engineering discipline "will embrace and incorporate usability engineering and it will become widely institutionalized in development organizations, similarly to how software engineering methodologies in general have become institutionalized" (Mayhew 1999, p. 33). However, this explicitly 'human factors' approach is not easily integrated into the more general technical aspects of other models. This needs to be accomplished by operationalizing the model by using a methodology.

6.2.7 Summary of Lifecycle Models

Several stages were discussed in the lifecycle models section. The stages that are essential for the development of an information system interface, or website, can be summarized as planning, analysis, design, testing, implementation, evaluation, and maintenance. These stages are vital if the designer is to develop an interface, new smart technology or website, which meets the user requirements and needs. However, the models need to be opertationalized as detailed methodologies. As discussed in Chaps. 2 and 3, a critical aspect of systems development is effective HCI; hence, methodologies must adequately address this aspect. Four key principles (user participation, usability, iteration, real interaction) are identified as fundamental aspects in order to develop systems in an effective manner by involving users from the beginning. The four key principles are considered the main foundation for this research to produce websites with high usability, thereby:

- Involving the users in the design from the beginning;
- Avoiding frustrations for the users
- Making the website more approachable, friendly and interesting;
- Winning the trust of the site visitors by meeting users' requirements.

The four key principles are:

- ***User participation:*** the main purpose is to allow user participation in the website development process to gain more information about the problems, elicit alterative solutions from the users, and familiarize them with the website before it is released;
- ***Usability:*** to confirm that the website design is efficient, effective, safe, has utility, is easy to learn and easy to remember, usable, practical, provides job satisfac-

tion, and incorporates performance measures that effectively assess the users requirements and requests;
- ***Iteration:*** to allow for effectiveness and self-correction, this approach will assist the designers to build up the new website and ensure that the project will be tested repeatedly until it meets users' requirements;
- ***Real Interaction:*** the designer will track users' behavior to present statistics and useful information to demonstrate what attracts or repel users. This can be achieved by adding two options to the web: (1) feedback form to outline users' needs; or (2) adding a counter to a webpage, which will provide detailed statistics (log file) to the designer. Information obtained will include which "Web pages are viewed most often, which domains request Web pages, and what paths users follow as they navigate through a site" (Lazar 2006, p. 44).

In the subsequent sections, the presence of these aspects will be reviewed for each methodology. The rating used for these four key principles will be from 0 to 3. The former presents zero availability while the latter is the maximum. Ratings of 1 and 2 indicate that these aspects are covered in a minimal or moderate way, respectively.

6.3 Information Systems Development Methodologies

System development lifecycle models may be operationalized using methodologies. Information systems development methodologies (ISDM) are an "organized collection of concepts, methods (or techniques), beliefs, values, and normative principles supported by materials resources" (Iivari et al. 2001, p. 186). The main purpose behind using an ISDM is to guide the designer in performing the work by following specific stages in sequence. When developing a system or website, the analyst needs to study the different types of methodologies in respect to their similarities and differences and select the methodology, which best meets the project requirements.

Avison et al. (1993) describe the status of information systems development methodologies as a "methodology jungle". This status of ISDM is "an unorganized collection of numerous methodologies which are more or less similar to each other" (Hirschheim et al. 1998). It was estimated that more than "1000 brand-named methodologies are in use all over the world" (Jayaratna 1994, p. xvii).

It is very difficult for the designer to review the vast array of existing ISDM and check which methodology will accomplish the work to be done. Therefore, the most important aspect of developing a new methodology is "to understand the existing stock and the collective methodology knowledge embedded in them" (Hirschheim et al. 1998). A new methodology should not merely duplicate an existing one but should offer some positive improvement. Consequently, this researcher will develop a new participative methodology for developing websites from the marketing perspective by embedding and grafting stages from various methodologies (Jayaratna 1994) such as those for developing information systems, websites and marketing plans.

Various types of methodologies will be discussed in this section from perspectives of the information systems, human computer interaction, and websites: Structured Systems Analysis and Design Methodology (SSADM); Soft Systems Methodology (SSM); User-Centered Development Methodology; and ETHICS. These methodologies have been chosen for assessment as they cover a range of perspectives, which are likely to address the four key principles identified above.

Such methodologies lay out specific stages to be undertaken and incorporate a range of principles from the lifecycle models discussed in the previous section. This will be presented in a table at the end of each methodology section to address two aspects: (1) checking the level of availability of techniques covering the four key principles in each stage of the methodology; (2) identifying the strongest stage for each methodology. This information will help the researcher in two aspects: (1) to recognize the importance of these four key principles in particular methodologies; and (2) to select stages that will promote the structure of the new participative methodology for developing websites.

6.3.1 Structured Systems Analysis and Design Methodology (SSADM)

This methodology gives the designer "very detailed rules and guidelines to work to" (Avison et al. 1993, p. 191), and "techniques, documentation and training procedures for developing information systems" (Avison and Wood-Harper 1990, p. 181). This methodology is classified into two major parts: three stages of systems analysis and three stages of systems design. The purpose behind this classification is to "make it easier to judge the proportion of time to spend on analysis" (Avison et al. 1993, p. 192). Thus, this methodology is divided into six sequential stages, each of which needs to be completed before the next can be started. The stages are as follows:

- **Analysis of the current system:** investigate and define the problems of the current system.
- **Specification of the required system:** define the aims and services of the new system.
- **User selection of service levels, including technical options:** this stage focuses on users' participation and a feasibility study.
- **Detailed data design:** to define data and the relationships between them, to ensure that the data model meets the requirements of the individual users and the client organization.
- **Detailed procedure design:** this stage is the trial design for the system. The prototype can be paper-based. The user will check if the trial design is working according to their requirements.
- **Physical design control:** develop the system from the paper prototype to an implemented system. The users can use it and test the final system.

Table 6.1 Structured systems analysis and design methodology (Prepared by Tomayess Issa)

Stages	Planning	Analysis	Design	Testing	Implementation	Evaluation	Maintenance
Principles							
User Participation	0	2	1	2	0	0	0
Usability	0	0	0	0	0	0	0
Iteration	0	0	1	0	0	0	0
Real interaction	0	0	0	0	0	0	0
Strongest stage in SSADM	–	–	☑	–	–	–	–

One of the main flaws of this methodology is that it cannot adequately "address the problem of project control and estimating costs directly through the incorporation of project management tools" (Avison et al. 1993, pp. 202–203). In addition, there is limited provision for iteration between stages and maintenance is missing. Table 6.1 indicates that user participation is moderate in the analysis stage.

There is only a minimum rating for user participation and iteration aspects in the design stage to ensure that the data outcomes meet user requirements. Usability and real interaction aspects are rated as zero for each stage of this methodology. The strongest stage in the SSADM methodology is the design stage. This stage will help to identity the data and the relationships between them and produce the trial design for the system. The trial design will be checked by the users to assess if it is working according to users' requirements and requests.

6.3.2 Soft Systems Methodology (SSM)

Checkland proposed the Soft Systems Methodology (SSM) in 1981. SSM provides a "way of tackling messy situations in the real world" (Checkland and Scholes 2003, p. 1). A powerful argument in favor of SSM is that it "has been found to be transferable to people beyond those who developed it, and has been used in several hundred projects around the world" (Rosenhead and Mingers 2002, p. 112). According to Checkland, the SSM methodology involves three roles: client, problem solver, and problem owner. The 'client' "is the person or persons who caused the study to take place" (Checkland and Scholes 1990, p. 47), while, the 'problem solver' "wishes to do something about the situation in question, and the intervention had better be defined in terms of their perceptions, knowledge and readiness to make resources available" (Checkland and Scholes 1990, p. 47). The 'problem solver' is responsible for turning the proposals for change "into real-world action in doing the study" (Checkland and Scholes. 1990, p. 48). The 'problem owner' is the person/group for whom the system has consequences. This methodology is divided into seven sequential stages where each stage must be completed before the next stage can be started.

The stages are as follows:

- **Problem Situation Unstructured (1):** the purpose of this stage is to define the problem and to gain more information and understanding of the problem in general; for example, the SSM should recognize the organization's culture and policies. This can be achieved by meeting the members of the organization and gaining as much information as possible about the organizational structure and culture.
- **Problem Situation Structured (2):** at this stage, the analyst evaluates the problem situation from various approaches and different stakeholders; this means to examine and assess the situation from different worldviews. The stage has several steps: intervention analysis, social and cultural analysis, political analysis, rich picture and utilizes formal and informal methods. The stage has several steps: intervention analysis, social and cultural analysis, political analysis, rich picture and utilizes formal and informal methods.
  - **Intervention Analysis:** this step will help the analyst to define the three roles through which they will learn more about problem situation in general:

    Client: "is the person or persons who caused the study to take place" (Checkland and Scholes 2003, p. 47).
    Problem solver: defines the problem solver, resources and the constraints
    Problem owner: no one is intrinsically a problem owner. The problem solver must decide who is to take [the role of] possible "problem owner" (Checkland and Scholes 2003, p. 47). In addition, the problem owner is the entity "who has a feeling of un ease about a situation, either a sense of mismatch between 'what is' and 'what might be' or a vague feeling that things could be better and who wishes something were done about it" (Checkland 1981, p. 294).

  - **Social and Cultural Analysis:** this step will help the analyst to know more about the internal policies of the organization and to learn more about the motivation and features that effect an individual at the organization. Under this stage, the analyst needs to think about relevant Roles, Norms and Values, as these behaviors nor are fixed, they changed "steadily through time, sometimes slowly sometimes remarkably quickly" (Checkland 1981, p. 231) according to the situation:
  - **Roles:** "a social position recognized as significant by people in the problem situation" (Checkland and Scholes 2003, p. 49)

    Norms: is a "specific prescriptions and proscriptions of standardized practice" (Checkland 1981, p. 231).
    Values: is an "express preferences, priorities or desirable states of affairs" (Checkland 1981, p. 231).

  - **Rich Picture:** is a graphical representation and communication model between the analysts and users to understand system problems and how they can be solved.

  - **Formal and Informal Methods:** this step will help the analyst to collect more information about the system by using various methods, informal and formal, such as work observation, interviews and workshops and discussions.

- **Naming of Relevant Systems (3):** this stage aims to involve system-thinking activities. In other words, this stage will involve "formulating of root definitions to a number of relevant systems" (Checkland and Scholes 2003, p. 33). This stage has several steps, such as root definition and CATWOE analysis, which are very important steps as they focus on the human activity systems.

  - **Root Definition:** Checkland and Scholes (2003, p. 33) define root definition as a way to "expresses the core purpose of purposeful activity system". In other words, the core purpose is the transformation process in which some entity 'the input' changes into a new form of entity 'the output'. There are two kinds of Root Definition supported in SSM: 'Primary Task Root Definition' and 'Issue based Root Definition'. The latter is concerned with one-off occurrences (such as a management restructuring), while the former is part of regular activities in the organization.
  - **CATWOE Analysis:** is a way to provide the analyst about with the structure of the real world situation by answering "six element who is doing what for whom, and to whom are they answerable, what assumptions are being made, and in what environment is it happening?" (Avison et al. 1993, p. 247). In other words, "a root definition meeting CATWOE requirements would have driven us more quickly towards aspects which with hindsight we know were finally crucial; we got there in the end, but with CATWOE we should have been quicker" (Checkland 1981, p. 226). According to Checkland et al. (2003, p. 35), CATWOE stands for:

    C: "Customers": the victims or beneficiaries of system activities;
    A: "Actors": people who do the activities;
    T: "Transformation": the conversion of input to output;
    W: "Weltanschauung": the world view which makes this definition meaningful;
    O: "Owners": those who can close the system or stop the event from happening;
    E: "Environment": elements outside the system, which it takes as given

Two of the major things, which need to be considered, are the T (Transformation) and W (Weltanschauung). The analyst needs to take care with respect to the T (Transformation) as it is "frequently misunderstood, and the systems literature is full of inadequate representations of system inputs and outputs" (Rosenhead and Mingers 2002, p. 74). Moreover, the W (Weltanschauung) might be extreme, such as a "terrorist system" or "freedom-fighting system" (Checkland 1988, p. 244). Therefore, it is essential to declare a "world view when giving an account of any purposeful activity" (Checkland 1988, p. 244).

- **Building the Conceptual Model (4):** this stage is unique and important as it is considered the core of the SSM methodology. It is now required to establish the

system requirements from the information, which was gathered from the previous stages. The Conceptual model is a used as "debating point so that the actors can relate the model to the real world situation. Usually there is a conceptual model drawn for each root definition and the drawing up of several root definitions and conceptual models becomes an iterative process of debate and modification towards an agreed root definition and conceptual model" (Avison et al. 1993, p. 247). The stage has several steps: formal system thinking and monitoring the system.

- ***Formal System Thinking:*** serves as a guideline for checking the conceptual model to determine whether or not it meets the user's requirements.
- ***Monitoring the System:*** this step will assist the analyst to monitor the system by defining three activities: (1) evaluating the performance in respect to efficacy, efficiency, and effectiveness; (2) monitoring the activities in relation to the problem definition; and (3) taking control action.

- **Comparison (5):** In this stage, the analyst will compare the conceptual models developed in stage four (4) with the definition of the problem situation in stage two (2). The purpose behind this comparison is to define and analyze the differences and similarities between the model and the real world in order to have a "well-structured and coherent debate about a problematical situation in order to decide how to improve it" (Checkland et al. 2003, p. 42).
- **Definition of Desirable and Feasible Changes (6):** this stage is important as the analyst will define those changes that are most feasible and desirable, bearing in mind such considerations as cost and benefit behind the change. It is very important to take into consideration these issues especially before the implementation stage in order to have positive outcomes, which meet the system needs.
- **Recommended Action (7):** this stage defines the changes to the system, and these recommendations should have the approval of the top level in the management before the implementation.

This methodology is a flexible process, as most of the stages can be iterated within the process if improvement is needed. The Soft Systems Methodology seeks to "create a system of enquiry which may be used to examine problem situations and lead to action decisions at both the level of what is required, and how the requirement can be met" (Cropley and Cook 1999, p. 4).

The SSM methodology was created to support the human factors activities in complex existing and new systems. SSM is useful for two reasons: (1) it "bring clarity to confused situation and finding systems solutions in the world of human affairs using 'systems'" (Checkland 2000, pp. 807–813); (2) it helps an organization to allow their systems "less fragmented, less random, more organized, more capable of generating insights and producing commitments" (Checkland 2000, p. 823). This methodology is not appropriate for all situations, as it requires a large gathering of information and often it involves human factors in various stages of the methodology. This methodology is useful when the objectives for the new system need to be clearly defined and clarified and perhaps the most important issue is how the objectives

Table 6.2 Soft Systems Methodology (SSM) (Prepared by Tomayess Issa)

Stages / Principles	Planning	Analysis	Design	Testing	Implementation	Evaluation	Maintenance
User participation	1	3	2	0	0	0	0
Usability	0	0	0	0	0	0	0
Iteration	1	1	1	1	1	1	1
Real interaction	0	0	0	0	0	0	0
Strongest stage in SSM	☑	☑	☑	–	–	–	–

can be accomplished, via a high-level approach. However, this methodology does not provide for the development of detailed specifications or testing of the system, especially regarding technical aspects. It handles organizational human factors well but does not address detailed design or evaluation of user interfaces.

Table 6.2 indicates that user participation is moderately well utilized in the early stages. Iteration is available in all of the stages with minimum availability to assess if improvement within the system is needed. In contrast, there is a zero rating for usability and real interaction in this methodology. The strongest stages in SSM methodology are planning, analysis, and design. The planning stage examines the nature of the requirements for change and assesses how to address them. The analysis stage will require the analyst to perform the following: (1) evaluate the problem from different angles and from the view of different stakeholders; (2) evaluate the internal policies of the organization; (3) present a graphical presentation (called "rich picture") to the current situation to understand the problem in the system and how to solved it; (4) more informal and formal tools will be used to collect information about the system through. Observation, interviews; workshops and/or discussion. While in the design stage, a small number of considerations should be addressed to identify the purpose behind establishing this system such as: (1) what the system is; (2) how the system will work; and (3) the purpose behind using this system. In addition, users will be involved in the system design and participate in the decision-making.

6.3.3 User: Centered Development Methodology

Another methodology, which may be used to develop successful user interfaces for information systems, is the User-Centered Development Methodology. From the denotation, we learn that this method focuses on involving the user in the process as much as possible, with the ambition that the interface should meet the user's expectation. This can be achieved by user participation within the process activities, such as "observing users while they work, inviting users to participate on the design team and asking users to try out the product and following up on their feedback" (McCracken and Wolfe 2004, p. 5). This methodology involves numerous stages,

which focus on "gathering information, designing, building, and testing of a prototype of the interface" (McCracken and Wolfe 2004, p. 5). It is divided into eight sequential stages, with each needing to be completed before the next stage can be started. The stages may be described as follows:

- **Needs Analysis:** defining the purpose of developing the interface (or website).
- **User and Task Analysis:** defining the users' type and the type of work users will do with the user interface or the website. User and Task analysis focuses on user's goals and their activities, which are carried out by them to achieve their goals. For example, user analysis needs to define: age, education level and user computer knowledge. Task analysis examines user goals. McCracken and Wolfe (2004, p. 7) state that "many products fail because the development team didn't take the time to find out who their users are or what they want to do".
- **Functional Analysis:** defining the functions, which will be available in the interface. Through these functions, the users will define their activities in order to achieve their goals.
- **Requirements Analysis:** defining the "formal specifications (i.e. Data Dictionaries, Entity-Relationship Diagrams, and Object-Oriented Modeling) required to implement any system, including websites" (McCracken and Wolfe 2004, p. 7).
- **Setting Usability Specifications:** defining what usability means for the interface. For example "performance measure" (i.e. "number of tasks completed", "number of errors" "first impression" and "overall Satisfaction") (McCracken and Wolfe 2004, p. 7).
- **Design:** defining the appearance of the interface, which means, defining the content of the interface and to "organize it according to your user's exceptions". The design "includes the layout of individual pages and how to use visual organization techniques to create clarity and consistency between pages" (McCracken and Wolfe 2004, p. 7).
- **Prototyping:** developing the initial version of the interface. Prototyping can be classified as evolutionary or throw-away. "Evolutionary, means that the prototyping becomes part of the final project", whilst throw-away 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).
- **Evaluation:** testing the interface by using expert-based evaluation and/or user–based evaluation. According to McCracken "expert- based evaluation can be achieved by using a group of usability experts to critique the prototype" whilst user-based evaluation can be performed by asking "users to perform representative tasks with the prototype" (McCracken and Wolfe 2004, p. 8). Formative evaluation means "evaluation done during design to check that the product continues to meet users' needs" (Preece et al. 2002, p. 323).

This methodology is "highly iterative and involves as much testing and revision as possible" (McCracken and Wolfe 2004, p. 5). This cycle of repetition can occur in the design, prototype, and evaluation steps, and will be successively run until the interface meets the usability specifications. The most important step is to take into

Table 6.3 User-Centered Development Methodology (UCDM) (Prepared by Tomayess Issa)

Stages / Principles	Planning	Analysis	Design	Testing	Implementation	Evaluation	Maintenance
User participation	0	1	1	1	0	2	0
Usability	0	0	3	3	0	3	0
Iteration	0	0	1	1	0	1	0
Real interaction	0	0	0	0	0	0	0
Strongest stage in UCDM	–	☑	☑	☑	–	☑	–

consideration user goals and their tasks, as by missing this step, the results will be unsuccessful and unproductive. On the other hand, two basic concepts are missing in this methodology – that is, implementation and maintenance stages. It is also focused on the detail of user interface design without examining the overall relationship between social and technical aspects of the proposed system.

Table 6.3 demonstrates that the four key principles are available in numerous stages with ratings raging from minimum to maximum. User participation is incorporated in analysis, design, testing, and evaluation stages. Testing and evaluation stages are important to ensure that the system meets user requirements. Iteration has minimum rating in design; testing; and evaluation stages. Usability aspects are well covered to ensure user satisfaction with the interface. Finally, the real interaction has zero rating in this methodology.

The strongest stages in the User-Centered Development Methodology are analysis, design, testing, and evaluation. The analysis stage will help the analyst to identity the user's type, goals and the activities, which are carried out by them to achieve their goal. The design stage will define the appearance of the interface. Testing and evaluation stages are included in this methodology, as the interface will be tested by expert-based and user-based evaluation to ensure that the interface or website meets user's requirements.

6.3.4 ETHICS Methodology

Mumford defines a specific methodology with high levels of stakeholder participation called "ETHICS," standing for "Effective Technical and Human Implementation of Computer-based Systems" (Mumford 1995, p. 3). Designers need to involve the user from the beginning, to keep focused on the target audience, to evaluate their activities, and to see if they "address the needs of the contemporary consumer" (Boyer 1999, p. 113). Users, through involvement in the development process, may be able to help to "shape design decisions in ways that deal with their concerns or make their work easier" (Doll and Torkzadeh 1989, p. 1156).

Participation is central to the ETHICS methodology as Mumford defined it as "handing responsibility for the design of a new system to the employees who

eventually will have to operate it" (cited in Flynn 1992, p. 300). Two arguments were established from this definition. The first argument is user participation, which needs to be a part of the system development process, whether it be a new or existing system, so that decisions can be made which concern the purpose of the new system. User involvement in the design task can be through groups: "Involvement requires the creation of participative groups, and decisions on the amount and nature of their contribution to the total design process must therefore be made" (Mumford 1995, p. 50).

The second argument is the socio-technical approach that is mainly focused on increasing the ability of the individual to "participate in decision making and in this way to enable him/her to exercise a degree of control over the immediate work environment" (Mumford 1996, p. 70). The members of the Tavistock Institute for two specific reasons created this approach: to create "democratic organizations that are excellent in both human and production terms" (Mumford 1996, p. 73) and to consider the interaction between the social and technical parts of any work system. User involvement in the system development process, according to Mumford, "produces productivity, quality, coordination and control; but also provides a work environment and task structure in which people can achieve personal development and satisfaction" (cited in Flynn 1992, p. 301). Designing and implementing the social–technical approach is not an easy task, as it requires involvement from the users and management simultaneously. Furthermore, this approach requires "training, information, good administration, and skill" (Mumford 1996, p. 77). By adopting these approaches in the new system development process, the outcomes will offer benefits in respect to users' job satisfaction and success of an enterprise.

ETHICS is "pragmatically oriented and relies for its success on the practical abilities and the commitment of the participants to arrive at consensus decisions. It aims to build computer-based information systems which provide job satisfaction and met the efficiency needs of the organization" (Jayaratna 1994, p. 152).

The ETHICS methodology has three objectives focusing on the management of change. These objectives concentrate on the users and their participation in the computer system.

Firstly, the users play a major role in the design of the system, to enrich both job satisfaction and efficiency gains. Mumford said user groups with job satisfaction are able to cope with the required job changes and are "better able to diagnose their own job satisfaction needs than any outside group of specialists" (Mumford 1995, p. 3). An efficiency gain concentrates on user knowledge and the experience in dealing with these interfaces. This experience can be gained by dealing with these interfaces daily, learning about the user needs and system problems. Therefore, users can make a "useful contribution to the specification of the former and the solution of the latter" (Mumford 1995, p. 3).

Secondly, the users are encouraged to contribute to the system design, to define and set satisfaction objectives and to supply additional information to the designer to aid in solving the problems within the system. In addition, the user can contribute his/her experience to explanations of "usual technical and operational objectives" (Mumford 1995, p. 3).

Thirdly, the ETHICS methodology can help ensure that the new technical system is surrounded "by a compatible, well-functioning organizational system" (Mumford 1995, p. 3). This objective is covered by the following concepts:

- Design of work procedures and instructions, for individual work or within groups;
- Define the relationship between the departments or functional areas which the new system will affect;
- The creation of good boundary management techniques;
- Focus on internal and external customers' needs.

(Mumford1995, p. 4).

The ETHICS methodology is basically a linear model where each stage must be completed before the next stage can be started. It involves definition of a set of system characteristics including: why change is needed; systems boundaries; description of the existing system; definition of the key objects and tasks; key information needs; diagnosis of efficiency needs; diagnosis of job satisfaction needs; design of the new system; technical options; preparation of detailed design work; and, implementation and evaluation (Jayaratna 1994).

This methodology recommends many guidelines which are useful for "the understanding and the design of human-centered systems" (Jayaratna 1994, p. 174), and to achieve improvements in efficiency, effectiveness and job satisfaction in the work environment. ETHICS is a "participative design strategy and so employees and users will always be involved in analyzing needs and problem and deciding on solutions" (Mumford 1995, p. 78).

However, the main flaws of this methodology are its inability to handle the "interpersonal and political conflicts that may arise from opening up human feelings and emotions" and its lack of any means, "of discussing or resolving many of the ethical dilemmas that could arise in system development" (Jayaratna 1994, p. 174). In addition, it is quite hard for unskilled users to do the design work appropriately when using this methodology. This methodology does not incorporate iteration between stages, for detailed technical analysis and design or for maintenance.

User participation is dominant in this methodology, to enrich both job satisfaction and efficiency gains. However, there are zero ratings for usability, iteration and real interaction in this methodology. The strongest stage in the ETHICS methodology is the analysis stage. This stage defines the user needs and problems, which allow the analyst to develop a system, which meets the users' requirements and their objectives (Table6.4).

6.3.5 Summary of Information Systems Development Methodologies

This section will provide a summary behind the Information Systems Development Methodologies

Table 6.4 Ethics methodology (Prepared by Tomayess Issa)

Stages	Planning	Analysis	Design	Testing	Implementation	Evaluation	Maintenance
Principles							
User participation	2	3	3	3	3	3	3
Usability	0	0	0	0	0	0	0
Iteration	0	0	0	0	0	0	0
Real interaction	0	0	0	0	0	0	0
Strongest stage in ETHICS	–	☑	–	–	–	–	–

For example, in the **Structured Systems Analysis and Design Methodology (SSADM)** only user participation and iteration stages are available in the design stage, while there is a zero rating for usability and real interaction. The strongest stage in SSADM methodology is the design stage, as this stage will help to define the data and the relationships between them and produce the trial design for the system.

In the **Soft Systems Methodology (SSM)**, numerous techniques for user participation and iteration are available, while there is a zero rating for usability and real interaction. The strongest stages in the SSM methodology are analysis and design. The purpose behind the analysis stage is to evaluate the situation from different angles, and to collect more information to understand the system problem, so as to solve it. The main focus of the design stage is to determine the purpose of establishing this system and involving the user in system design and decision-making.

User-Centered Development Methodology is different from the above methodologies as the four key principles are available in various stages with different ratings, ranging from minimum or maximum availabilities. The most dominant key principle in this methodology is usability to ensure that the interface is easy to learn, easy to use, and with less error frequency, while the real interaction has zero rating in this methodology. The strongest stages in the User-Centered Development Methodology are analysis, design, testing, and evaluation. The analysis will define the type of user(s) and their goals and activities, while the design stage will define the development of the interface. Experts and users combine testing and evaluation phases in one stage to test the interface.

Finally, with the **ETHICS Methodology**, only the user participation aspect is available, to enhance both job satisfaction and efficiency gains, while zero ratings are given for usability, iteration and real interaction. The strongest stage in the ETHICS Methodology is analysis, as via this stage, the analyst will define the users' needs so as to allow the new system to meet their requirements. Table 6.5 illustrates the strongest stages from the Information Systems Development Methodologies analyzed in this chapter and lists the rating availability for the four key principles in each stage. After reviewing the information systems development methodologies and studying each stage, it was noticed that implementation and maintenance were

Table 6.5 Summary of strongest stages in information systems development methodologies (Prepared by Tomayess Issa)

Stage	Information systems development methodologies	Principles			
		User participation	Usability	Iteration	Real interaction
Planning	Soft systems methodology	1	0	2	0
Analysis	Soft Systems Methodology (SSM)	3	0	2	0
	User Centered Development Methodology (UCDM)	1	0	0	0
	Ethics methodology	3	0	0	0
Design	Structured Systems Analysis and Design Methodology (SSADM)	1	0	1	0
	Soft Systems Methodology (SSM)	2	0	2	0
	User Centered Development Methodology (UCDM)	1	1	3	0
Testing	User Centered Development Methodology (UCDM)	1	1	3	0
Implementation	–	–	–	–	–
Evaluation	User Centered Development Methodology (UCDM)	2	1	3	0
Maintenance	–	–	–	–	–

not considered the strongest stages for any of these methodologies, since the focuses of these methodologies are:

- Defining the system problem and clarifying users' needs for the new system;
- Evaluating the current situation and collecting more information to solve the system problem;
- Defining the relationships between the information and produce the trial designs for the system;
- Testing and evaluating the system to ensure that it meets the users' requirements.

However, techniques for effective implementation and maintenance of information systems are included in other (more technical) information system development methodologies not considered above. Since the objective is to develop a methodology for websites, it will be more effective to seek implementation and maintenance techniques targeted to websites. This is addressed in the next section.

6.4 Methodologies for Developing Web Sites

There are many similarities between methodologies for developing information systems and web sites. However, there are also differences. In this section, a range of methodologies from the websites perspective will be discussed in detail, including: Human Factor Methodology for Designing websites; Relationship Management Methodology (RMM); W3DT Design Methodology; Information Development Methodology for the web; and the Web Site Design Method (WSDM). This discussion will define the stages, which need to be carried out, by the designer and users in order to design a website, which meets the user requirements. Most stages focus on feasibility, navigation, deployment, promotion, and measurement of usability and effectiveness.

At the end of each methodology, the researcher will present a table showing: (1) the ratings for the four key principles in each stage within the methodology; (2) the strongest stage for each methodology for developing web sites; and (3) the extra stages available in each methodology. These extra stages will add effectiveness to the new participative methodology for developing websites, and partly reflect the differences between ISDM and website development methodologies.

6.4.1 Human Factors Methodology for Designing Web Sites

Vora (1998) describes a methodology which provides for the development of effective HCI for websites, with the main task being to have a clear understanding of user needs, with particular attention given to: the types of users and their characteristics; and their specific tasks and environments. Vora (1998) also focuses on other important issues in the framework: maintenance, evaluation (expert), and iterative testing (feedback).

This methodology focuses on the human interaction perspective in designing a website. It is basically a linear model where each stage must be completed before the next stage can be started. The stages are as follows:

- **Planning:** the designer needs to answer the following question "Why design a Web Site?" (Vora 1998, p. 155). The stage has several steps: defining the goals; identifying content owners and authors; understanding the users and environments; and finally, the most important aspect is to understand very precisely the users' needs.
- **Analysis:** during this stage, "decisions are made about both content and process" (Vora 1998, p. 156). 'Content' refers to the material necessary to meet identified user tasks, addressing the information needs. The 'process' refers to how the information should be maintained and how "interactive aspects of the websites are handled behind the scenes so that they are transparent to users" (Vora 1998, pp. 156–157).
- **Design and Development:** "information gathered in the earlier stages is translated into actual design" (Vora 1998, p. 160).

- **Usability Testing:** the key to a successful system or (Website) is iterative testing. This testing should occur not only in the final stage, but also in every stage to ensure that the system is on the correct track.
- **Implementation:** this stage is very practical and straightforward, as the designer will transfer the system (or website) to a specific location, to be used by the real user.
- **Maintenance:** this stage is very important. The designer and content providers need to provide up-to-date information on the site to make sure that the changes meet the user needs and to make the site more interesting and useful for the users.

However, this methodology does not specify user participation except in testing and planning. Users can also play a key role in defining content. According to Mayhew, these concepts are very important, especially from the users' perspective, as "One of its great weaknesses, is its lack of quality control for both the content and for presentation" (Mayhew 1998, p. 2). Furthermore, a procedure for addressing user disabilities was missing in Vora's methodology as "designers should keep in mind that the target population includes millions of potential users of Web pages who have various handicapping sensory and physical conditions" (Laux 1998, p. 87). Table 6.6 shows that usability and iteration are the main aspects available in the Human Factor Methodology for Designing Websites. Usability is a very important aspect in this methodology with moderate to maximum rating to ensure that the website meets users' requirements in respect to performance and satisfaction. Iteration is available with minimum and moderate ratings in most stages, to ensure that the system is on the correct track. With respect to user participation, it is available only in the planning, testing and evaluation stages with minimum rating, to identify user goals and understand their environments, and to test the product and make sure it meet users' desires. Finally, the real interaction is available only in the analysis and maintenance stages with moderate to maximum rating to ensure that the website has met users' requirements and – the most important aspect – to make it attractive and approachable to the users.

In the Human Factor Methodology for Designing Websites, there are five strong stages: planning, analysis, testing, evaluation, and maintenance. Planning and

Table 6.6 Human Factor Methodology for Designing Websites (HFMDW) (Prepared by Tomayess Issa)

Stages / Principles	Planning	Analysis	Design	Testing	Implementation	Evaluation	Maintenance	Extra stages
User participation	1	0	0	1	0	1	0	Usability goals development
Usability	2	3	1	3	0	3	0	
Iteration	1	1	1	2	1	2	1	
Real interaction	0	2	0	0	0	0	3	
Strongest stage in HFMDW	☑	☑	–	☑	–	☑	☑	

analysis are essential stages. The former will define the users' goals and examine the environment very carefully in order to meet the users' needs. The main areas of focus of the analysis stage are content (materials to suit user tasks) and process (how information should be maintained). In this methodology, the testing stage is iterative involving "expert evaluation," which means experts will evaluate the website and suggest solutions to problems. Finally, the maintenance stage is also important in this methodology. To make the website more interesting and to attract more users to visit it, designer and content providers need to provide up-to-date information in the site.

6.4.2 Relationship Management Methodology (RMM)

Isakowitz et al. (1995) describe a methodology, which provides for the development of effective websites for highly structured applications such as online conference proceedings, directories, academic journals, courseware and electronic-commerce.

In other words, this methodology is "most suited to applications that have a regular structure, especially where there is a frequent need to update the information to keep the system current" (Isakowitz et al. 1995, p. 43). The main goal of this methodology is to reduce complexity and make the website easy to navigate and maintain, thereby saving time, money, and making it more attractive to the users. This methodology is divided into four sequential stages, where each stage must be completed before the next can be started. The feedback loops between the RMM design stages are shown by dashed lines. While the remaining feedback loops, "although present in RMM, are not shown" (Isakowitz et al. 1995, p. 39).

The stages of RMM may be described as follows:

- **Feasibility:** this stage provides the foundation for the RMM design methodology, as via this stage, the designer needs to define the objectives, user requirements, user analysis, and cost-benefits analysis.
- **Hardware Selection:** this stage involves definition of the hardware requirements for the website.
- **Information/Navigation Requirements Analysis:** during this stage, the designer identifies user tasks and develops an understanding of the information needs and likely use scenarios.
- **Design Methodology:** this stage provides the foundation for designing the relationship between the entities in the web site. The stage has several steps, such as E-R Design, Entity Design, Navigation Design, Conversion Protocol Design, User-Interface Screen Design; and Run-Time Behavior Design.
  - ***E-R Design (S1):*** this step of the design process "represents a study of the relevant entities and relationships of the application domain" (Isakowitz et al. 1995, p. 39). These entities and relationship of data are considered the basis for the hypermedia applications.

- ***Entity Design (S2):*** this step is unique to the hypermedia application, as, through it, the designer will determine "how the information in the chosen entities will be presented to users and how they may access it" (Isakowitz et al. 1995, p. 40).
- ***Navigation Design (S3):*** this step defines how the navigation will be established between the entities, which are based on "associative relationships" (Isakowitz et al. 1995, p. 41).
- ***Conversion Protocol Design (S4):*** this step sets the conversion rules to "transform each element of the RMDM diagram into an object in the target platform" (Isakowitz et al. 1995, p. 43).
- ***User Interface Design (S5):*** this step involves the design of screen layouts for each object appearing in the RMDM diagram obtained in Step 3. Via this step, the designer will design the "button layouts, appearance of nodes and indices and location of navigational aids" (Isakowitz et al. 1995, p. 43).
- ***Run-Time Behavior Design (S6):*** this step considers the "volatility and the size of the domain to decide whether node contents and link endpoints are to be built during application development or dynamically computed on demand at runtime" (Isakowitz et al. 1995, p. 43).
- ***Construction and Testing (Evaluation) (S7):*** this stage is similar to the one in the traditional software development process. Special care must be taken in this stage to test the website to determine if it is running according to the user requirements, especially the navigational paths.

This methodology is best suited to large websites focusing on product catalogs and hypermedia front-ends of databases. The main flaw of this methodology is that it is missing the maintenance stage. This concept is very valuable, particularly from the users' perception to attract new users to visit the website, and to encourage the current users to visit and work with it. Finally, this methodology does not distinguish "between how information is abstracted and how it is presented. Relationships are just translated to navigational paths and no other communication among the entities is allowed" (Isakowitz et al. 2000). Iteration is available in the design stage with a moderate rating but in the rest of the stages with a minimum rating. The purpose of the iteration stage is to ensure that the website is running according to the user requirements, especially the navigational paths. To prevent any confusion in this methodology, the feedback loops in the design stage were shown as dashed lines, while the remaining feedback present in this methodology is not shown as in the diagram.

There are zero availability ratings for user participation, usability, and real interaction in this methodology. This means that these aspects are not well considered in this methodology.

The strongest stages in the RMM methodology are the planning and design. The planning stage defines the objectives, user requirements and analysis, and cost benefits analysis. While the design stage is the dominant stage in this methodology as the designer will classify: (1) the relationship between the entities in the web site; (2) the navigational path between the entities; and (3) the design of screen and button layouts (Table 6.7).

Table 6.7 Relationship Management Methodology (RMM) (Prepared by Tomayess Issa)

Stages / Principles	Planning	Analysis	Design	Testing	Implementation	Evaluation	Maintenance	Extra stages
User participation	0	0	0	0	0	0	0	Hardware selection; navigation design and user interface
Usability	0	0	0	0	0	0	0	
Iteration	1	1	2	1	1	1	1	
Real interaction	0	0	0	0	0	0	0	
Strongest stage in RMM	☑	–	☑	–	–	–	–	

6.4.3 The W3DT Design Methodology

Bichler et al. (1996) describe the W3DT (World Wide Web Design Technique), a methodology especially for designing a large-scale Web-based hypermedia application. This methodology focuses on two main parts: modeling techniques and computer-based design. The former gives the designer the possibility to "generate a running prototype of the system, including HTML-pages and CGI-scripts," while the latter allows the designer to define and draw a "graphical representation of a web-site's structure" (Bichler et al. 1996, p. 328). The major requirement for dealing with W3DT is to keep the models "clear and intuitively comprehensible" (Bichler et al. 1996, p. 328).

The essential design primitives and their interaction are best described by the W3DT Meta Model, which shows "the class hierarchy of the different elements" (Bichler et al. 1996, p. 330). The first essential design primitive is Site. One or more diagrams can be found under the site, and each diagram serves two purposes: to indicate a hierarchical refinement of a model; to include sub models into a unified view (Bichler et al. 1996, p. 330).

Usually, a Diagram consists of one page with the option to have "layout" and "link" on the same page. The main purpose of Layout is to hold information about website headers, footers, and background images. On the other hand, the link can be more than just a "hypertext reference to another document" (Bichler et al. 1996, p. 330). Furthermore, page, form, index, and menu are the basic elements for building a "hypermedia application information domain" (Bichler et al. 1996, p. 330). There is no major difference between an Index and a Menu in the W3DT Meta Model, as the former is used to list a complete set of links, while the latter is a "navigational aid with the main purpose to provide access structures" (Bichler et al. 1996, p. 330). It was noted that this methodology has been widely used by several groups of students at universities, colleges, and website developers in organizations "showing very promising results" (Bichler et al. 1996, p. 333). However, this methodology is missing seven essential concepts: planning, analysis, implementation, testing, iteration, evaluation, and maintenance. These stages are very important in the development process as, via them, the designer will test and evaluate the system (or the website) to check whether users' requirements were met.

Table 6.8 The W3DT design methodology (Prepared by Tomayess Issa)

Stages / Principles	Planning	Analysis	Design	Testing	Implementation	Evaluation	Maintenance	Extra stages
User participation	0	0	0	0	0	0	0	Navigation design and building a hypermedia application
Usability	0	0	0	0	0	0	0	
Iteration	0	0	0	0	0	0	0	
Real interaction	0	0	0	0	0	0	0	
Strongest stage in W3DT	–	–	☑	–	–	–	–	

Table 6.8 indicates zero ratings for the four key principles in the W3DT Design Methodology. This means that none of the above four key principles were incorporated in this methodology to any significant degree. The strongest stage in the W3DT design methodology is the design stage. This stage gives the designer the chance: (1) to generate a first trial product of the system with a hypermedia application; and (2) to draw a graphical representation of the website construction.

6.4.4 Information Development Methodology for the Web

John December (1996) describes a methodology which provides for the development of effective websites for technical communicators, writers, designers and software developers. The main task of this methodology is to decrease difficulty and make the website easy to navigate, maintain, and more attractive to the users. This methodology is very usable for dynamic and competitive web design. December argued that this "methodology was based on the characteristics and qualities of the web on the experiences of web users" (December 1996, p. 372). This methodology is divided into six sequential stages (or elements, according to John December), where each must be completed before the next stage can be started. The stages are as follows:

- **Planning for the Audience and Purpose:** this stage defines several items, which are very useful to build a web site, such as the purpose of the website and audience information. The audience information can include: concerns, background and characteristics. December stated that this planning and analysis requires asking and answering questions such as "Who will use this web? And what will they gain from it?" (December 2003)
- **Setting Objectives and Gathering Domain Information:** after considering the purpose and audience, the designers and analysts need to concentrate on the objectives and goals that the website needs to accomplish.
- **Designing a Web:** to make the web flexible, efficient, and easy to use a relationship should be established between the pages of the web. Therefore, to design a website, the designer should have a thorough grounding in "hypertext, multimedia,

Java and other programming possibilities as well as knowledge about how particular web structures affect an audience" (December 2003).

- **Implementing a Web:** the purpose behind this stage is to create files of HTML and other software. The initial implementation might be a "prototype which is not released publicly, but available for analysis [and use] by a set of representative users" (December 2003).
- **Analyzing a Web:** this stage involves the designer examining the web structure and contents to determine if it meets the objectives, goals, and the purpose of the web.
- **The Web's Release and Promotion and Ongoing Innovation:** involves the web being "publicity released for general web audiences, potential users and current users" (December 1996, p. 372). Furthermore, it involves ongoing support and work to improve the web in order to meet the user requirements.

This methodology is limited to websites for information, art, general services, and entertainment. The methodology is missing two essential aspects: iteration and evaluation stages. These concepts are very important, especially from the users' perspective. Table 6.9 indicated that the four key principles have zero ratings in the Information Development Methodology for the Web except for user participation and real interaction, which have a minimal rating in the implementation stage because of the role of representative users in reviewing the prototype.

The real interaction is available in the maintenance stage to improve the web in order to meet the user needs. The strongest stage in Information Development Methodology for the Web is implementation. This stage releases the first sketch of the website and is checked by representative users in order to make sure it complies with the user requirements.

6.4.5 The Web Site Design Method (WSDM)

Olga De Troyer (1998) describes a methodology for web site design. The main goal for this new methodology is to develop a site which provides information "in such a way that both the provider and the inquirer benefit from it" (De Troyer and Leune 1998, p. 88). The main mission statement for this methodology is [to describe] the

Table 6.9 Information development methodology for the Web

Stages / Principles	Planning	Analysis	Design	Testing	Implementation	Evaluation	Maintenance	Extra stages
User participation	0	0	0	0	1	0	0	Promotion and prototyping (is available under the implementation Phase)
Usability	0	0	0	0	0	0	0	
Iteration	0	0	0	0	0	0	0	
Real interaction	0	0	0	0	0	0	1	
Strongest stage in IDMW	–	–	–	–	☑	–	–	

subject purpose and the target audience for this website. Without giving good consideration to the mission statement there "is no proper basis for decision making or for the evaluation of the effectiveness of the website" (De Troyer 1998, p. 53).

This methodology has adopted the "user-centered" approach in order to create effective communication and to define the different types of users and characteristics and their information requirements. This will lead to definition of the "perspectives." A perspective "is a kind of user subclass", which means, "all users in a user class with the same characteristics and usability requirements" (De Troyer 1998, pp. 54–55). This methodology consists of the following stages: User Modeling, Conceptual Design, Implementation Design and the actual Implementation.

- **User Modeling:** this stage is divided into two steps: User Classification and User Class Description. The purpose behind this stage is to concentrate "on the potential users of the Web site" (De Troyer et al. 1998, p. 88).
  - ***User Classification:*** this step will help the designers to identify the future users or visitors of the website and classify them into user classes. Therefore, the purpose of this step is to identify the target audience by "looking at the organization or the business process which the website should support" (De Troyer 1998, p. 53).
  - ***User Class Description:*** this step will help the designer to analyze in more detail the user types in order to identify not only their "information requirements but also their usability requirements and characteristics" (De Troyer 1998, p. 54). Examples of information requirements are "levels of experience with websites in general, language issues, education/intellectual abilities, age." Some of this information can be "translated into usability requirements" (De Troyer 1998, p. 54).
- **User Conceptual Design:** this stage is divided into two steps: User Modeling and the Navigational Design. This stage utilizes different "user classes and their perspectives" which will allow the users to efficiently "navigate through the Web site" as each user class has its own "navigation track" (De Troyer et al. 1998, p. 90).
  - ***Object Modeling:*** this step will help the designers to identify information requirements of different user classes and their perspective.
  - ***Navigational Design***: this defines the specific navigation path through the website for each user class.
- **The Implementation Design:** this stage will help the designer to design the "look and feel" of the website, to "create a consistent, pleasing and efficient look and feel for the conceptual design made in the previous phase" (De Troyer 1998, p. 55).
- **The Implementation:** is the "actual realization of the website using the chosen implementation environment, e.g. HTML" (De Troyer 1998, p. 55).

The WSDM methodology is "user centered" rather than "data driven", which means the starting, point for this methodology "is the set of potential visitors of the

Web site" (De Troyer et al. 1998, p. 85). The user participation is not strong in this methodology; however, the WSDM methodology seeks to learn more information about the users in respect to their knowledge in dealing with the website, language, education, and age. This information will help the designer to translate these user characteristics into usability needs and requirements of the website. However, the WSDM methodology is missing a few stages in the development process, namely: testing, iteration, evaluation, and maintenance. These stages are important, as, through them, the designer will learn if the website meets users' requirements.

Table 6.10 indicates that user participation is covered in the planning; analysis and design stages with minimal rating, as the designer is seeking to gain more general information about the users such as language, age and education, as some of this information will be translated into usability requirements. Usability aspects are available in planning, analysis, design, and implementation with a moderate rating, while the real interaction has a similar rating but in analysis and design. For iteration, the rating is zero, which means it is not considered in this methodology. The strongest stages in the WSDM are the planning, analysis and design. The planning stage will help the designer to identify the target audience to the website and to classify them into user classes; while the analysis stage will help the designer to analyze in more detail the user types in order to identify information and usability requirements and characteristics. Finally, the design stage will help the designers to identify the information required, how it will be presented, and the navigation paths for user types.

6.4.6 Summary of Methodologies for Developing Web Sites

This section will provide a summary behind the methodologies for developing Web sites:

For example, in the **Human Factor Methodology for Designing Websites,** the four key principles are available but in varying degrees in different stages. Usability is very dominant in analysis, testing and evaluation stages with maximum rating, while in the planning and design stages it has a moderate rating. This means that usability is a very significant aspect in this methodology to ensure that the website

Table 6.10 The Web Site Design Method (WSDM) (Prepared by Tomayess Issa)

Stages / Principles	Planning	Analysis	Design	Testing	Implementation	Evaluation	Maintenance	Extra stages
User participation	1	1	1	0	0	0	0	User modeling and conceptual design
Usability	2	2	2	0	1	0	0	
Iteration	0	0	0	0	0	0	0	
Real interaction	0	2	2	0	0	0	0	
Strongest stage in WSDM	☑	☑	☑	–	–	–	–	

is running without any errors and enhancing job satisfaction. Iteration is available in some stages with minimum rating that is in planning, analysis, design, implementation, and maintenance, with a moderate rating in testing. User participation is available only in the planning, testing and evaluation stages with a minimum rating, while the real interaction has a moderate rating in analysis, and maximum rating in the maintenance stage. In the Human Factor Methodology for Designing Websites, there are five strongest stages: planning, analysis, testing, evaluation, and maintenance. Planning and analysis are essential stages for defining the users' goals, understanding the environment, and the way that information should be maintained. The testing and evaluation stages are also very important. Finally, the maintenance stage incorporates the provision of up-to-date information, in order to make the website more attractive and interesting.

In the **Relationship Management Methodology (RMM)**, only iteration is available with minimum or moderate ratings in all the stages. Zero rating for user participation usability and real interaction in this methodology means that usability, user participation, and real interaction are largely ignored. The strongest stages in the RMM methodology are design and planning. Design and planning are essential, as the former will help the designer to define the relationship and navigational path between the entities and to design the screen and button layouts; whilst the latter will define users' goals and an understanding of the cost benefits analysis.

The four key principles have zero ratings in **The W3DT Design Methodology** and the **Information Development Methodology for the Web** except for a minimum rating for user participation in the implementation stage and with minimum rating for real interaction in the maintenance of the latter methodology. This means that the four key principles are largely ignored in these methodologies. The strongest stage in the **W3DT Design Methodology** is the design stage. The strongest stage in the **Information Development Methodology for the Web** is implementation. This stage permits the users to check the first draft of the website to ensure it meets the users' requirements and needs.

Finally, the four key principles are addressed in the **Web Site Design Method (WSDM)**, except for iteration. User participation is incorporated into various stages, such as in planning, analysis and design with minimum rating; while usability is available with minimum and moderate rating in planning, analysis, implementation and design respectively, and real interaction is available with moderate ratings in the analysis and design. The strongest stage in WSDM is the design stage. This stage will help the designers to distinguish the future users or visitors of the website and gain more information about their characteristics.

After reviewing the methodologies for developing web sites, extra stages are collected from these methodologies (see Table 6.11). The main focuses of these extra stages are: usability, navigation, promotion, prototyping and identifying user types. These stages are very significant for developing web sites. Therefore, most of these stages will be taken into consideration by the researcher to be added to the new participative framework for developing websites.

Table 6.11 Extra stages from methodologies for developing Web sites (Prepared by Tomayess Issa)

Methodology (developing web sites)	Extra stages
Human factor methodology for designing websites	Usability goals development
Relationship Management Methodology (RMM)	Hardware selection; navigation design and user interface
The W3DT design methodology	Navigation design and building a hypermedia application
Information development methodology for the web	Promotion and prototyping "is available under the Implementation phase"
The Web Site Design Method (WSDM)	User modeling and conceptual design

Table 6.12 demonstrates the strongest stages from methodologies for developing web sites, and presents the rating availability for the four key principles in each stage. It was noticed that all the stages were covered in the methodologies for development of web sites as the main focus for these methodologies are:

- Defining the users' goals and understanding the environment very precisely in order to meet the users' needs and analyze the cost benefits;
- Defining the materials to identify user tasks and how information should be maintained;
- Defining the navigational path between the entities in the website, designing of screen and button layouts, generating a first trial product of the system, and defining user usability requirements and their characteristics;
- Releasing the first sketch of the website that will be checked by representative users in order to ensure that it complies with the user requirements;
- Making the website more interesting and attractive so that more users visit it, via content providers contributing up-to-date information to the site.

6.5 Marketing Methodologies

This section will examine the actual values added by Marketing Methodologies and the benefits they will bring to the e-commerce framework, especially in developing websites. In this section, the researcher will examine several methodologies from the marketing perspective such as e-Marketing Plan, and will review methodologies, which were created by companies, which are developing websites for marketing. At the end of each methodology section, the researcher will present a table showing: (1) how the four key principles are addressed in each stage within the methodology; (2) the strongest stage for each methodology for developing web sites; and (3) the extra stages of each methodology. These extra stages will help the researcher to develop a more comprehensive structure for the new participative methodology for developing marketing websites.

Table 6.12 Summary of Strongest Stages from Methodologies for Developing Web Sites (Prepared by Tomayess Issa)

Stage	Methodologies for developing web sites	Principles			
		User participation	Usability	Iteration	Real interaction
Planning	Human Factor Methodology for Designing Websites (HFMDW)	1	2	1	0
	Relationship Management Methodology (RMM)	0	0	1	0
	The Web Site Design Method (WSDM)	1	2	0	0
Analysis	Human Factor Methodology for Designing Websites (HFMDW)	0	3	1	2
	The Web Site Design Method (WSDM)	1	2	0	2
Design	Relationship Management Methodology (RMM)	0	0	2	0
	The W3DT design methodology	0	0	0	0
	The Web Site Design Method (WSDM)	1	2	0	2
Testing	Human Factor Methodology for Designing Websites (HFMDW)	1	3	2	0
Implementation	Information development methodology for the web	1	0	0	0
Evaluation	Human Factor Methodology for Designing Websites (HFMDW)	0	3	2	0
Maintenance	Human Factor Methodology for Designing Websites (HFMDW)	0	0	1	3
	Information development methodology for the web	0	0	0	1

6.5.1 E-Marketing Plan

The E-Marketing plan is a "guiding, dynamic document that links the firm's e-business strategy with technology-driven marketing strategies and lays out details for plan implementation through marketing management" (Strauss et al. 2003, p. 46). The main ideas behind an e-Marketing plan are: (1) to achieve an effective and efficient e-business objective; (2) to increase revenues and reduce costs; (3) to serve "as a roadmap to guide the direction of the firm, allocate resources, and make tough decisions at critical junctures" (Strauss et al. 2003).

Strauss et al. (2003) suggest that there are two common types of e-marketing plans: the 'napkin plan' and the 'venture capital plan'. The former approach is to just "jot ideas on a napkin over lunch or cocktails and then run off to find financing" (Strauss et al. 2003, p. 47). However, these plans work only sometimes. While the latter plan basically focuses on building a suitable business plan to increase the profit and reduce the cost. Therefore, the traditional marketing plan needs to be introduced to define and clarify key questions about topics such as capital, new customers, product and service, pricing and customer support required to retain the customers. Sound planning and "thoughtful implementation are needed for long-term success in business" (Strauss et al. 2003).

The E-Marketing plan is divided into seven steps:

- **Situation Analysis:** this step will help the Marketers to define and review the firm's environment and involves SWOT (strengths, weakness, opportunities, and threats) analyses. Strengths and weakness of the company's internal situation need to be identified, new opportunities need to be defined to improve the current situation of the company, while the threats "are areas of exposure" (Strauss et al. 2003, p. 50). Also under this step, a review and analysis of the existing marketing plan needs to be carried out to identify appropriate strategies, objectives, and performance metrics for e-business.
- **E-Marketing Strategic Planning:** this step involves "determining the fit between the organization's objectives, skills and resources and its changing market opportunities" (Strauss et al. 2003, p. 51). Additionally, the Marketers will create a sustainable e-marketing strategy for the e-business goals from "marketers design segmentation, targeting, differentiation, and positioning strategies" (Strauss et al. 2003). This includes demographics, geographic location, psychographics, and behavior of potential customers. This information will help the marketers to formulate the e-marketing objectives.
- **Objectives:** three main issues need to be defined in an e-marketing plan: task (what one is planning to achieve by building this e-business); measurable quantity (how much); and time frame (setting a time to accomplish the e-business job).
- **E-Marketing Strategies:** in this step, the marketers need to identify the 4Ps (product, pricing place and promotion) and the relationship management requirements to "achieve plan objectives regarding the offer" (Strauss et al. 2003, p. 53). Product: What is planned to be produced at the end (by building the e-business) in terms of service, information, selling products or advertising; Pricing: what it will cost for the e-business to be implemented; Place: the location of the

e-business work; Promotion: the techniques that will need to be adopted in order to promote the e-business work. The relationship management strategies need to identify how to "build relationships with a firm's partners, supply chain members, or customers" (Strauss et al. 2003, p. 57). Some companies use Customer Relationship Management (CRM) or Partner Relationship Management (PRM) approaches. PRM software is used to build and develop a complete database, which retains information about business partner capabilities and communication. While the purpose of the CRM software is "to retain customers and increase average order values and life time value" (Strauss et al. 2003, p. 57).

- **Implementation Plan:** the marketers select the 4Ps, relationship management strategies, and other tactics to achieve the e-marketing objectives and to develop the implementation plan. To achieve the implementation plan, the firm needs to check if the following aspects are available to accomplish the firm's objectives "staff, department structure, application service providers, and other outside firms" (Strauss et al. 2003, p. 57). Furthermore, special tactics will be used in the website to collect information about users who are dealing with it, such as forms, feedback e-mail, and online surveys. According to Strauss et al. (2003), additional tactics, which can be used to collect information, include: "1) Web site log analysis software helps firms review user behavior at the site and make changes to better meet the needs of users, 2) Business intelligence uses the Internet for secondary research, assisting firms in understanding competitors and other market forces".
- **Budget:** the key aspect of this stage is to identify the expected costs and returns from the investment. Returns are matched "against costs to develop a cost/benefit analysis, ROI calculation, or internal rate of return (IRR)" (Strauss et al. 2003) to determine if it is worthwhile to continue with the project. Furthermore, during the implementation stage, the marketers observe whether the results (cost and revenue) are on the correct track for achieving the predicted cost/benefit ratio.
- **Evaluation Plan:** is used to evaluate the success of the website. The tracking system should be available before activating the website. "E-marketers use tracking systems to measure results and evaluate the plan's success on a continuous basis" (Strauss et al. 2003, p. 60).

This e-marketing plan is a very important tactic for the marketers to gain more information about the current situation of the business before releasing the new version of e-business. However, this plan lacks a few stages which need to be available in order to achieve user exceptions and requirements, such as design, testing, iteration and maintenance.

The strongest stages in the E-Marketing Plan are E-Marketing Strategies (under the planning stage), the implementation stage and the evaluation stage. E-Marketing Strategies will allow the designer to identify the 4Ps: product, pricing, place and promotion, and the relationship management requirements to achieve plan objectives for the website. In the implementation stage, the marketers will utilize the 4Ps, the relationship management strategies, and other tactics to achieve the e-marketing objectives. The evaluation stage involves tracking systems to measure results and evaluate the plans for the website.

Table 6.13 indicates that usability and iteration have zero ratings for this methodology. User participation is available in the planning and implementation stages

Table 6.13 E-marketing plan (Prepared by Tomayess Issa)

Stages / Principles	Planning	Analysis	Design	Testing	Implementation	Evaluation	Maintenance	Extra stages
User participation	1	0	0	0	1	0	0	E-marketing strategies objectives and budget
Usability	0	0	0	0	0	0	0	
Iteration	0	0	0	0	0	0	0	
Real interaction	0	0	0	0	0	3	0	
Strongest stage in E-marketing plan	☑	–	–	–	☑	☑	–	

with minimal rating, and real interaction is available in the evaluation stage with maximum rating. To formulate the e-marking objectives, the marketers will collect general information about the users such as demographics, geographic location, psychographics and behavior of potential users in the planning stage, while in the implementation stage, special tactics will be used to collect information about the users such as forms, feedback e-mail, and online surveys.

6.5.2 The Advertures Company Methodology

The Advertures Company released a process methodology to enhance the development of websites from a marketing perspective in 2004. This methodology has five stages, each of which should be completed before moving to the next stage.

- **Orientate:** this stage will help the designers to know why they are developing this website. In this stage, the designer will define the following concepts: the goals, product details, and competition. These concepts will also help to determine the cost and time for establishing this website.
- **Blue Print:** this stage will produce the first sketch for the website, where the "marketing, technology and creativity collide; banging heads and eventually coming upon the best way to mix all three aspects and create the optimum product" (Advertures 2004).
- **Model:** this stage will combine the technology possibilities and the creativity from the sketch to produce the working model.
- **Build:** during this stage, the designers will build up the new system and make sure that the proposed website is tested repeatedly until it meets users' requirements.
- **Maintain:** through this stage, the website will be maintained in order to "continue functioning at optimum levels" (Advertures 2004).

From the Advertures company point of view, this methodology will meet the users' requirements when building a website from the marketing perspective; however, not all the possible stages are available in this methodology. When compared with other system development processes, it lacks detailed design.

Table 6.14 The Advertures Company Methodology (Prepared by Tomayess Issa)

Stages / Principles	Planning	Analysis	Design	Testing	Implementation	Evaluation	Maintenance	Extra stages
User participation	0	0	0	0	0	0	0	Blue print and model
Usability	0	0	0	0	0	0	0	
Iteration	0	0	0	2	0	0	0	
Real interaction	0	0	0	0	0	0	0	
Strongest stage in The Advertures Company Methodology	–	–	–	☑	–	–	–	

Table 6.14 shows that user participation; usability and real interaction have zero rating; while iteration is available in the testing stage with moderate rating to ensure that the website is tested repeatedly until it meets users' requirements. The strongest stage in this methodology is testing, which allows the designer to test the project repeatedly until it meets users' requests and desires.

6.5.3 The Market-Vantage (Internet Performance Marketing) Methodology

The Market-Vantage Company introduced a new methodology process for developing websites to enhance the strategy of the websites in order to "reduce cost, increase customer loyalty and market analysis" (Market-Vantage 2003). This methodology has four stages, each of which should be completed before moving to the next stage.

- **Internet marketing goals, target markets, and strategy:** this stage helps the designers to ask the following questions in the planning process: what are you selling? Who are the buyers? Who are your competitors? In addition, how can potential customers find the product? (Market-Vantage 2003). Answers to these questions will give the designer a full picture of the purpose behind building this website.
- **Define/Refine Internet Marketing Strategy:** this stage helps the designers in two aspects: learning about users [the purpose behind the visit and tracking their visit]; and how the business will be enhanced by using the Internet for introducing the new products.
- **Implementation:** this stage establishes the website so that the users can start using the new product and check if it meets their requirements.
- **Measurement:** is part of ongoing maintenance of the website and checking if the results of using the website are meeting its goals, using software to track current and new users. Continuing support and recommendations are available from the designer to the website manager.

We notice that this methodology includes iteration, so as to ensure that the website is meeting the user requirements and providing appropriate company outcomes. However, this methodology is missing a few stages such as detailed analysis and design. These stages are imperative in developing a website so that the website achieves the goals of e-business and as well as meeting users' requirements.

Table 6.15 identifies that user participation and usability have zero rating (except in the maintenance stage), while iteration is available in the implementation stage with moderate rating to ensure that the website meets users' requirements. Real interaction is available in the maintenance stage with moderate rating to check if the website meets users' requirements and needs after the changes have been made.

The strongest stages in the Market-Vantage (Internet Performance Marketing) Methodology are the planning, implementation and the maintenance stage, which is under the measurement stage. The planning stage will help the designers to identify the purpose behind building the website, namely, the products/service being sold, the firms' competitors and buyers, and how to find the product via the web. The implementation stage is important in Market-Vantage to allow users to use the new product and to check if it meets their requirements. User information is used in the maintenance stage to review on-going performance of the website.

6.5.4 EnSky's Unique Methodology

EnSky Company initiated a new methodology for developing websites from the marketing perspective. This methodology has into nine stages, each of which should be completed before moving to the next stage.

- **Evaluation Overview:** this methodology divides the evaluation aspect into two types: pre-and post-evaluation. The former is a phase to define the user needs and

Table 6.15 The Market-Vantage (Internet performance marketing) methodology (Prepared by Tomayess Issa)

Stages / Principles	Planning	Analysis	Design	Testing	Implementation	Evaluation	Maintenance	Extra stages
User participation	1	0	0	0	0	0	2	Define/refine Internet marketing strategy; and measurement
Usability	0	0	0	0	0	0	0	
Iteration	0	0	0	0	2	0	0	
Real interaction	0	0	0	0	0	0	2	
Strongest stage in The Market-Vantage methodology	☑	–	–	–	☑	–	☑	

requirements for success and to determine the approach to be used in the latter stages, namely to define "the methods to track the results in post-evaluation" (EnSky 1997). The initial pre-evaluation stage establishes the goals of the project and identifies the existing branding, "marketing strategies, middle market demographics, competitors, and developing an understanding of the business and sales models" (EnSky 1997). According to EnSky's methodology, the post-evaluation process is very useful to measure the effectiveness of the site against the goals, which were set in the pre-evaluation.

- **Design:** during this stage, the designer will define the specifications and requirements and document the design of the look of the "end product that extends from the branding and marketing strategies already employed" (EnSky 1997).
- **Develop:** this stage will carry out the outcomes from the design phase to build the website by using various tools such as templates and graphical files, which were created in the design stage.
- **Testing:** during this stage, the prototype website will be tested to determine if it meets the requirements of the users. According to the EnSky methodology, once the "testing requirements have been met and approved by the client the project is ready for deployment" (EnSky 1997).
- **Deployment:** during this stage, the designer will transfer all the files of the website to the in-house web server. After this stage, the designer will follow the methodology by using the promotion and maintenance stages so as to begin "the process of both updating the content on the site to keep it relevant, and marketing the site to create awareness and drive traffic to it ensuring ultimate ROI" (EnSky 1997).
- **Promote:** this stage will help to promote the website to the public, by using various tools such as press releases, link building, banner ad campaigns, and paid search engine or directory listing campaigns. These processes will be repeated from time to time in order to make sure that the promoting phase is effective.
- **Maintain:** via this stage, the designer will make sure that the website is updated and maintained regularly and facilitates "the adoption of global technological advances" (EnSky 1997).
- **ROI:** this stage reviews the cost and investment of developing the website and compares it with likely returns.
- **Measurement:** is part of the ongoing maintenance of the website, and is integral in determining the ROI. According to EnSky, various types of tools are used for these measurements such as, "search engine ranking and website visitor statistics, tracking sales, new customers etc." (EnSky 1997).

This methodology contains most of the stages, which are needed for the designer to develop a website which meets the e-business objectives, and to evaluate the returns against the costs. However, two stages are missing – detailed analysis and iteration.

Table 6.16 indicates zero rating for the four key principles except for minimal user participation in the testing and maintenance stages and a minimal rating for real interaction in the maintenance stage. This means that the four key principles are

Table 6.16 EnSky's unique methodology (Prepared by Tomayess Issa)

Stages / Principles	Planning	Analysis	Design	Testing	Implementation	Evaluation	Maintenance	Extra stages
User participation	0	0	0	1	0	0	1	Develop; ROI; measurement; and promotion
Usability	0	0	0	0	0	0	0	
Iteration	0	0	0	0	0	0	0	
Real interaction	0	0	0	0	0	0	1	
Strongest stage in EnSky's unique methodology	–	–	–	–	–	–	☑	

mainly ignored in this methodology. The strongest stage is maintenance (under the measurement stage). This stage is important to the designer and users simultaneously, as it will attract more users to visit the site. In addition, this stage includes changes and correction of errors in hardware and software to meet user requirements.

6.5.5 Review of Marketing Methodologies

The analysis above indicates that most stages in the marketing methodologies are similar to those in lifecycles, methodologies, and models, with extra stages focusing on the marketing perspective, such as measurement, promotion and cost/benefit analysis. These extra stages will help the firm to achieve "its desired results as measured by performance metrics according to the specifications of the e-business model and e-business strategy" (Strauss et al. 2003, p. 60).

6.5.6 Summary of Marketing Methodologies

This section will provide a summary behind the Marketing Methodologies

E-Marketing Plan usability and iteration have zero rating while user participation is available in planning and implementation with minimal rating to collect general information about the users. Real interaction is available in the evaluation stage with maximum rating as the e-marketers use tracking systems to measure the results and ensure that the website meets users' requirements. The strongest stages in E-Marketing Plan are E-Marketing Strategies, implementation and evaluation. E-Marketing Strategies will allow the designer to identify the 4Ps: product, pricing, place and promotion, and the relationship management requirements to achieve plan objectives for the website. To achieve the implementation stage, the firm needs to check if all the objectives are available to accomplish the firm's needs. The evalu-

ation stage is for tracking the users' behaviors to establish whether the website meets their requirements.

In **the Advertures Company Methodology**, user participation, usability, and real interaction have zero rating, while iteration is available in the testing stage with moderate rating. Testing is the strongest stage in this methodology as this allows the designer to test the project frequently until it meets users' requests and desires.

The **Market-Vantage (Internet Performance Marketing) Methodology** is similar to the Advertures Company Methodology, as user participation and usability have zero rating (except for a moderate rating for participation in the maintenance stage). Iteration can be found in the implementation stage to ensure that the website meets users' requirements. Real interaction is available in the maintenance stage. The strongest stages are planning, implementation, and maintenance. The planning stage will allow the designers to gain more information about the rationale behind building the website; i.e. what is being sold; the firm's competitors and buyers; and how to find the product via the web. The implementation stage will allow the users to use the new product and check if it meets their needs. User satisfaction is tested during the maintenance stage.

The **EnSky's Unique Methodology** has zero ratings for the four key principles, except for a minimal rating for participation in the testing stage and real interaction in the maintenance stage. The strongest stage in EnSky's Unique Methodology is maintenance. This stage involves ongoing changes and correction of errors in hardware and software, in order to continue to meet user requirements.

After reviewing the marketing methodologies, extra stages were identified (see Table 6.17), focusing mainly on: promotion, prototyping, budget, ROI (return on investment) and measurement. These stages are important for developing websites from the marketing perspective. Therefore, the researcher will take into consideration these stages for the new participative framework for developing websites. The key techniques involved are:

- Identify the 4Ps for the E-Marketing plan: product, pricing, place and promotion;
- Identify the time frame to accomplish the job;
- Identify the expected returns from investment;
- Produce the first sketch for the website, evaluate it, then move on to produce the working model;
- Learn about the users by tracking their visit and the purpose behind the visit.

Table 6.17 Extra stages of marketing methodologies (Prepared by Tomayess Issa)

Methodology (marketing)	Extra stages
E-marketing plan	E-marketing strategies, objectives and budget
The Advertures Company Methodology	Blue print and model
The Market-Vantage (Internet performance marketing) methodology	Define/refine Internet marketing strategy and measurement
EnSky's unique methodology	Develop, ROI, measurement and promotion

Table 6.18 Summary of marketing methodologies

Stage	Marketing methodologies	Principles			
		User participation	Usability	Iteration	Real interaction
Planning	E-marketing plan	1	0	0	0
	The market-vantage(Internet performance marketing) methodology	1	0	0	0
Analysis	–	–	–	–	–
Design	–	–	–	–	–
Testing	The Advertures Company Methodology	0	0	2	0
Implementation	E-marketing plan	1	0	0	0
	The market-vantage(Internet performance marketing) methodology	0	0	2	0
Evaluation	E-marketing plan	–	–	–	3
Maintenance	The Market-Vantage methodology	2	0	0	2
	EnSky's unique methodology	1	0	0	1

Table 6.18 demonstrates the strongest stages for Marketing Methodologies and presents the rating for the four key principles in each stage. The main focuses of these methodologies are:

- Identify the product, pricing, place, promotion, and the relationship management requirements to achieve plan objectives for the website;
- Planning the purpose behind building the website; i.e. what are you selling; your competitors and buyers; and how to find the product via the web;
- Testing the website repeatedly until it meets users' requests and desires;
- Maintaining the website to attract more users (new as well as old) to visit it

6.6 Detailed Website Design and Implementation

The previous sections highlighted the need for a detailed approach to website design. This can lead to an effective website implementation, including organizational aspects. Two types of approaches will be discussed from the web-based hypermedia application perspectives in this section: The Object-Oriented Hypermedia Design Model and the Implementation Model.

6.6.1 *The Object-Oriented Hypermedia Design Model (OOHDM)*

Schwabe and Rossi (1995) describe an (Object-Oriented Hypermedia Design Model) OOHDM, a new model especially for designing a complex Web-based hypermedia application. The main aims of this approach are to: reduce complexity, make the website easy to navigate and maintain, thereby saving time and money, and make it more attractive to the users. This approach clearly separates the "navigational from conceptual design by defining different modeling primitives in each step" (Schwabe and Rossi 1995, p. 46). This approach is divided into four sequential stages, where each must be completed before the next stage can be started, although iteration can be used. Each stage "focuses on a particular design concern, and an object-oriented model is built" (Schwabe and Rossi 1995, p. 45). The stages are as follows:

- **Domain Analysis**: in this, stage the "conceptual model of the application domain is built using well-known object-oriented modeling principles" (Schwabe and Rossi 1995, p. 45).
- **Navigational Design**: in this stage the navigational structure for the hypermedia application will be defined in "terms of navigational contexts (focusing on the users and their tasks), which are induced from navigation classes such as nodes, links, indices, and guided tours" (Schwabe and Rossi 1995, p. 46).
- **Abstract Interface Design**: this stage provides the "perceptible objects" (i.e. picture, a city map … etc.) in "terms of interface classes" (i.e. text fields and buttons) (Schwabe and Rossi 1995, p. 46). Furthermore, this step will establish the communication between the interface and navigation in the hypermedia application.
- **Implementation**: In this stage, the hypermedia application will be implemented according to the user requirements and needs.

Table 6.19 illustrates that the design stage is very important for development of two key aspects of the website: navigational design and abstract interface design.

Table 6.19 The OOHDM methodology – extra stage (Prepared by Tomayess Issa)

The OOHDM methodology – extra stage
Design: two aspects will be defined in this stage: (1) navigational design; and (2) abstract interface design. The latter will define the navigational structure for the hypermedia application, while the former will establish the communication between the interface and navigation in the hypermedia application
Construction (Implementation): involves the technical implementation of the design

6.6.2 *Implementation Methodology*

Sampson et al. (2001) describe a methodology, which provides for the development of effective websites for counseling and career services. This methodology is very useful as it "can be used to consider opportunities for enhancing the design and use of the site" (Sampson et al. 2001) and it incorporates organizational aspects of implementation.

This model is divided into seven sequential stages, each of which must be completed before the next stage can be started. The stages are as follows:

- **Program evaluation:** this stage provides the foundation for the implementation process, helping to "ensures that the website is used for the right reasons with the right clients" (Sampson et al. 2001). The step has several sub steps: evaluate the current resources and services; establish a committee; prepare an implementation plan; and seek stakeholder support.
- **Web site development:** this stage helps the designer to make sure that the "web site developed has the potential to effectively meet client and organization needs" (Sampson et al. 2001). The stage has several steps: develop and evaluate website contents and features, and develop site documentation. In addition, this stage focuses on the development of website contents. Three questions need to be asked: "Whom does the website serve? What are the needs of users and what resources exist that would meet each of the identified needs?" (Sampson et al. 2001).
- **Web site integration:** this stage involves the users to make sure that the website outcomes will meet their requirements. It begins with the "staff reviewing current needs and current resources and services" (Sampson et al. 2001), and then determining how the website will be used in delivering services and how it will operate according to user requirements.
- **Staff training:** necessary training is given to the staff to incorporate the web site with existing service delivery.
- **Trial use:** this stage requires the users to try out the website to see if it meets their needs. Moreover, continuing training is available in this stage, and observation and interview methods are used in order to determine if the website training is effective.
- **Operation:** this stage allows the user to operate and use the website.
- **Evaluation:** evaluation and comments are collected from the users to ensure that the website services are running according to the user requirements. Therefore, the "results of the evaluation are used to indicate needed improvements in web site design and use" (Sampson et al. 2001).

Finally, the feedback loops are indicated by the arrows and the staff responds to feedback as the implementation process continues. It was noted that this model is most suited to the development of websites for counseling and career services. However, it also has a wider application. This method includes a stage, which is essential to the system development process, which is Training Staff (see Table 6.20).

Table 6.20 Implementation methodology – extra stage – prepared by Tomayess Issa

Implementation methodology – extra stage
Training Staff: from Implementation Model. This phase provides necessary training to the staff about the new system

6.7 Summary of Information Systems Development Methodologies, Methodologies for Developing Web Sites, and Marketing Methodologies

New challenges have been imposed since the growth of use of the Internet as a global means of delivering information, selling goods, and entertainment. These new challenges suggest the need to develop a new methodology for developing websites which meet users' requirements and needs in order to avoid potential client frustration, make the website enjoyable, effective and efficient, and most importantly, to improve performance.

In this section, the researcher will summarize the results from the earlier analysis of Information Systems Development Methodologies, Methodologies for Developing Web Sites, and Marketing Methodologies. The purpose behind the analysis is to:

- Identify the strongest stages of each methodology;
- Identify how well the four key principles are addressed in each methodology;
- Identify the extra stages from website and marketing methodologies.

Identifying the strongest stage for each methodology will help the researcher to define the framework for the new participative methodology for developing websites.

The researcher identified several stages from the development life cycle, which are: (1) planning, (2) analysis, (3) design, (4) testing, (5) implementation, (6) evaluation, and (7) maintenance. These stages are considered the basic and essential requirements for the system development process, as via these stages the designer will develop a system (interface or website) which meets the users' requirements.

Additionally, under the tables summarizing stages in the methodologies the researcher added four extra rows: "user participation," "usability," "iteration" and "real interaction." These key principles were either not fully considered in some methodologies, or were totally ignored. These principles are identified as being fundamental to the proposed system development process of a website for marketing purposes, producing an effective interface or website. Simultaneously, through these principles, the designer and user will develop the new system (interface or website) to meet the user requirements and needs in order to make the design system flexible and adjustable, and to limit user frustration when working with it. These principles are the main foundation for this research.

The first row is "**user participation**." It was noticed that user participation is a very practical approach in the development process. With it, the users will perform

some activities and tasks and "these activities may pertain either to the management of the ISD project or to the analysis, design, and implementation of the system itself" (Hartwick and Barki 2001, p. 21).

Furthermore, according to Hartwick and Barki (2001), four dimensions of user participation can be identified: ***Responsibility; User-is Relationship Hands-on Activity,*** and the most important aspect, which is ***Communication Activity.*** These dimensions can deliver the following information to the designer.

- **Responsibility**: "the performance of activities and assignment reflecting overall leadership or accountability for the project."
- **User-IS Relationship**: "the performance of development activities reflecting users' formal review, evaluation and approval of work done by the IS staff".
- **Hand-On Activity**: "the performance of specific physical design and implementation tasks."
- **Communication Activity**: "activities involving formal and informal exchange of facts, needs, opinions, visions, and concerns regarding the project among the users and between user and other project stakeholders" (Hartwick and Barki 2001, p. 22).

Therefore, the designer needs to work very closely with these dimensions in order to gain the basic information from the user about the system requirements and to identify the problems of the system. Furthermore, "user objectives, assumptions, strategies, actions, errors, problems, attitudes, etc., should surface so they can be explicitly considered in the system design and implementation processes" (Hartwick and Barki 2001, p. 22).

In addition, communication between the designers and users is an important aspect, which helps to identify the problems and to develop various solutions for the system by using different negotiation approaches and placing more emphasis on listening to users' needs and desires. For example, Joint Application Development (JAD) workshops are "facilitated by a session leader trained in group dynamic techniques, where users and developers work together to plan and design a new system" (Hartwick and Barki 2001, p. 22).

The second row is "**usability**." This term is very important in the system development process as usability involves "an assortment of support for needs such as ease of use, ease of learning, error protection, graceful error recovery, and efficiency of performance" (Carroll 2002, p. 193). Usability will be emphasized in this research as it is considered very important especially in a methodology for developing websites.

The third row is "**iteration**." This term is very important in the system development process, as it can occur in each stage to ensure that the web site is meeting the user requirements and company outcomes. This will enable the designers to build up the new website and make sure that the project will be tested repeatedly until it meets user requirements.

The fourth row is "**real interaction**." This term is very important in developing a website as it occurs in the maintenance and evaluation stages to ensure that user

requirements are being met, by tracking use of the website by real users to achieve their specific objectives.

Finally, for the new participative framework for developing websites, a column will be added called "**participation rating**" which will help the researcher to identify the level of need for user participation in each stage. The participation rating will be from 0 to 3, indicating zero participation to maximum participation. The 1 and 2 ratings are minimum and moderate participation respectively

The researcher earlier reviewed the Mumford (1995) classification of user participation approaches in the system development process. In this research, the researcher will be using only the first two approaches: the Consultative Approach and the Representative Approach. Both of these approaches are very appropriate in all the stages in order to secure the agreement between users and designers at the beginning and to identify the key aspects, such as system objectives, problems, and the creating of various solutions to the system. The Consensus Approach will not be adopted in this research as it "does not always emerge easily and conflicts which result from different interests within a department may have to be resolved first" (Mumford 1995, pp. 18–19).

Extra stages were added from various methodologies for developing web sites, mainly focusing on: identifying user types, navigation, promotion, and prototyping. In addition, the researcher included more stages from marketing methodologies mainly focusing on: promotion, prototyping, budget, ROI (return on investment), and measurement.

The requirements of a new participative methodology for developing websites include:

- Participation at all stages (different participation rate);
- Provision of detailed contents acquisition and maintenance requirements;
- Provision for detailed design of presentation;
- Provision of usability evaluation (at various stages);
- Provision of regular maintenance.

Table 6.21 summaries the key aspects of the methodologies discussed in earlier sections of this chapter.

6.8 New Participative Methodology for Marketing Websites (NPMMW)

The New Participative Methodology for Marketing Websites (NPMMW) is developed from various existing models of system development and methodologies including lifecycle models, information systems development methodologies, methodologies for developing websites, marketing methodologies, and additional detailed techniques (see Figs. 6.1 and 6.2).

Table 6.21 New participative ***framework*** for developing websites (Prepared by Tomayess Issa)

Stage	Partici-pation rating	Methodologies	Principles			
			User participation	Usability	Iteration	Real interaction
Planning	3	Soft system methodology	1	0	2	0
		Human Factor Methodology for Designing Websites (HFMDW)	1	2	1	0
		Relationship Management Methodology (RMM)	0	0	1	0
		The Web Site Design Method (WSDM)	1	2	0	0
		E-marketing plan	1	0	0	0
		The Market-Vantage (Internet performance marketing) methodology	0	0	0	0
Analysis	2	Soft Systems Methodology (SSM)	3	0	2	0
		User Centered Development Methodology (UCDM)	1	0	0	0
		Ethics methodology	3	0	0	0
		Human Factor Methodology for Designing Websites (HFMDW)	0	3	1	2
		The Web Site Design Method (WSDM)	1	2	0	2
		Task analysis				
Design	3	Structured Systems Analysis and Design Methodology (SSADM)	1	0	1	0
		Soft Systems Methodology (SSM)	2	0	2	0
		User Centered Development Methodology (UCDM)	1	3	1	0
		Relationship Management Methodology (RMM)	0	0	2	0
		The W3DT design methodology	0	0	0	0
		The Web Site Design Method (WSDM)	1	2	0	2
		Navigation				
		Prototyping				

(continued)

Table 6.21 (continued)

Stage	Partici-pation rating	Methodologies	Principles			
			User participation	Usability	Iteration	Real interaction
Testing	3	User Centered Development Methodology (UCDM)	1	3	1	0
		Human Factor Methodology for Designing Websites (HFMDW)	1	3	2	0
		The Advertures Company Methodology	0	0	2	0
Implemen-tation	2	Information development methodology for the web	1	0	0	0
		E-marketing plan	1	0	0	0
		The Market-Vantage (Internet performance marketing) methodology	0	0	2	0
		Construction				
		Promotion				
		Staff training				
Evaluation	3	User Centered Development Methodology (UCDM)	2	3	1	0
		Human Factor Methodology for Designing Websites (HFMDW)	0	3	2	0
		E-marketing plan	0	0	0	3
		Measurement				
Mainte-nance	2	Human Factor Methodology for Designing Websites (HFMDW)	0	0	1	3
		The Market-Vantage methodology	2	0	0	2
		EnSky's unique methodology	1	0	0	1

Participation rate is from 0 to 3. Zero represents no participation while 3 indicates maximum participation. Ratings of 1 and 2 are minimum and moderate participation respectively. The ratings are based on the Consultative and Representative approaches according to Mumford (1995)

There are various comparisons with respect to the stages between methodologies for developing information systems, websites, or marketing strategies; however, integrating stages from information systems methodologies into a website with marketing methodologies is very valuable to improve websites that are more operative and effectual. User participation should be included in these methodologies to ensure that transaction processes, tracking, maintenance, and updating of the website meet the users' requirements.

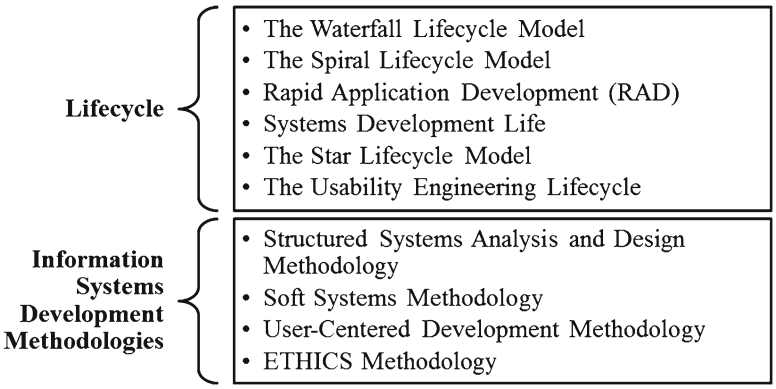

Fig. 6.1 Academic methodologies for development of websites

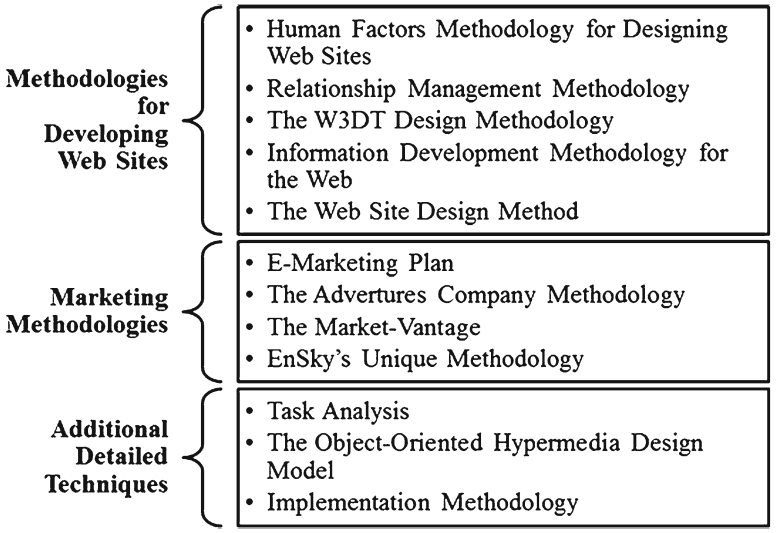

Fig. 6.2 Academic and commercial methodologies for development of websites

Each methodology was reviewed to determine two elements: (1) the stages needed for the system development process; and (2)the utilization of four key principles (user participation, usability, iteration, and real interaction (i.e. the monitoring of user interaction with aprototype site)). These principles were chosen to address the main deficits identified in existing website development methodologies, and to produce a new methodology, which will assist in the development of websites with high usability.

The major stages of the New Participative Methodology for Marketing Websites (NPMMW) are presented in Fig. 6.3. Table 6.22 shows the issues, tools and techniques for each stage and step, which need to be carried out by the designer in order

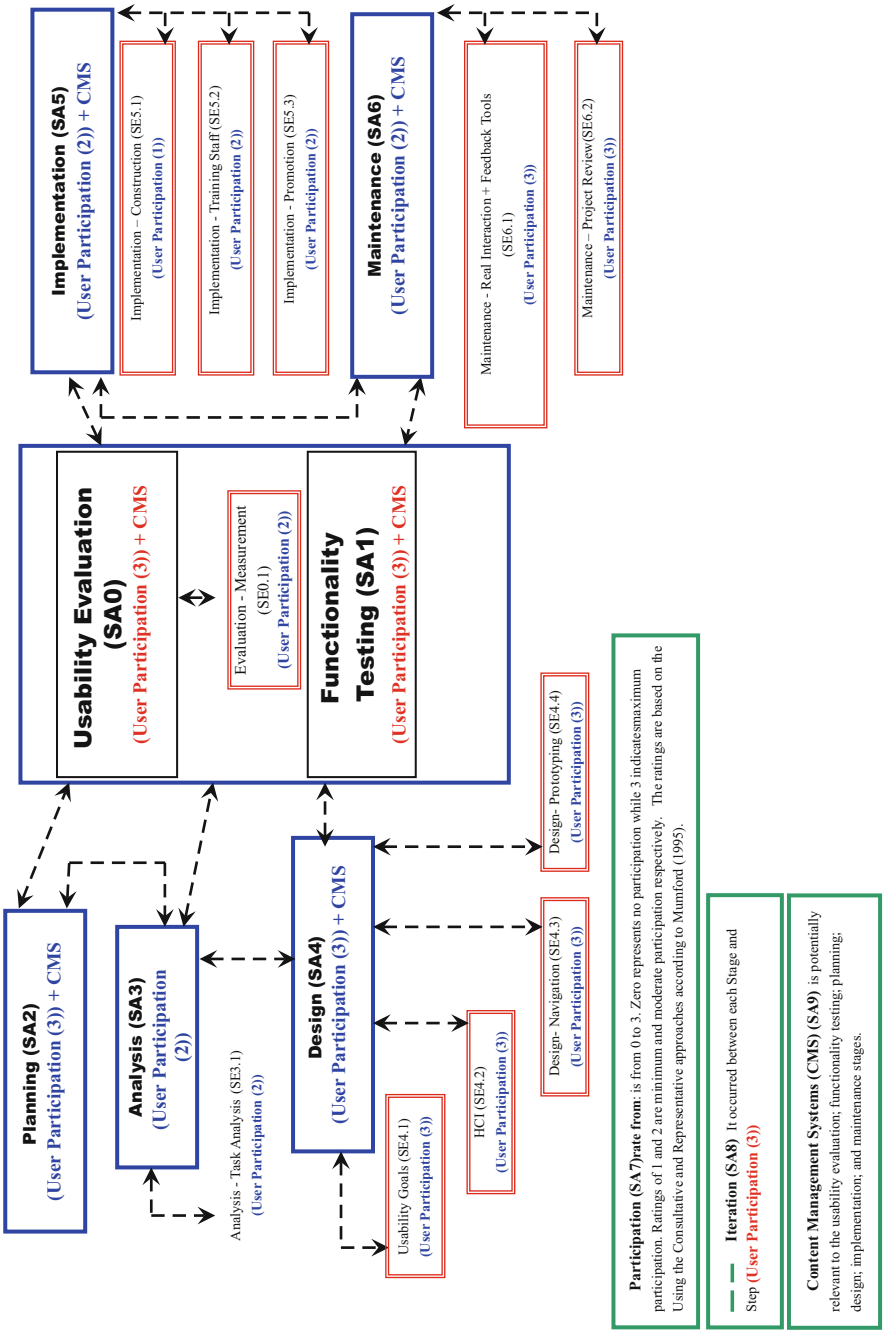

Fig. 6.3 New participative methodology for developing websites from the marketing perspective (Prepared by Tomayess Issa)

Table 6.22 Issues, tools and techniques for the new participative methodology (Prepared by Tomayess Issa)

Stage (*and step*)	Issues, tools and techniques
Usability evaluation	Formative usability evaluation by expert and user based
Measurement	*Ongoing evaluation*
Functionality testing	Functionality testing by expert- and user-based
Planning	Define the objectives User requirements User analysis Cost-benefits analysis Alternatives and constraints What is your product? Who are the buyers? Who are your competitors? Where should it be located? How to promote your website?
Analysis	To add, improve and correct the initial website requirements
Task Analysis	*Define user types, their work, goals and activities*
Design	To define: What the website is? How the website will work to achieve the purpose behind using this website? User involvement in decision making Future users
Usability goals	*User usability – Web design should be* *Efficient* *Effective* *Safe* *Utility* *Easy to learn* *Easy to remember* *Easy to use* *Easy to evaluate*
HCI goals	*Usable* *Practical* *Visible* *Job satisfaction* *Extra techniques, text style, fonts, layout, graphics and color*
Navigation	*Site, layout, link, navigational structure for the hypermedia application*
Prototyping	*High-fidelity* *Low-fidelity*
Implementation	Implementing the website using software
Construction	*Technical application* (i.e. *HTML, Dreamweaver; Cold Fusion and ASP)*
Training Staff	*Necessary training*

(continued)

Table 6.22 (continued)

Stage (*and step*)	Issues, tools and techniques
Promotion	*Press releases* *Link building and banner-ad campaigns* *Paid search engine* *Directory listing campaigns to promote the website* *Traditional marketing (*i.e. *Newspaper; Radio and TV)*
Maintenance	Update changes and the corrector of errors in the website
Real interaction + feedback	*Log file* *Forms, survey, discussion forum, contact form and telephone number*
Project review	*Checklists*

to achieve a user-friendly website to prevent user frustration when s/he deals with this interface. The major stages of the methodology may be described as follows:

Usability Evaluation (SA0): this stage is located at the center of the new methodology, as, before the process moves on to another stage, it is necessary to evaluate the results from the previous stage, which is known as "formative evaluation." ***Usability Evaluation – Measurement (SE0.1):*** this step is an ongoing evaluation of the website to ensure that it achieves its intended purposes.

Functionality Testing (SA1): this stage is also located at the center of the new methodology (with the usability evaluation) to test the results from the previous stage before moving to another stage. Expert-based and user-based evaluations will test the website to ensure that it functions effectively from the technical perspective.

Planning (SA2): this stage allows designers and users to address various project-scoping issues: (1) the requirements for developing a website; (2) the nature of the product and the buyers; (3) the firm's competitors; (4) the location of the site and how to promote the website. In addition, this stage involves developing a detailed schedule of activities required in order to carry out the development of the website in an efficient and effective manner.

Analysis (SA3): in this stage, users, analysts, and designers expand their findings in enough detail to indicate exactly what will and will not be built into the website design, and to add, improve, and correct the initial website requirements if they are not meeting the users' needs and wishes. Analysis – ***Task Analysis (SE3.1):*** this step will define the purpose of developing the website, the type of users, the type of work users will do with the website, users' goals, and their activities.

Design (SA4): the design stage will utilize the requirement specification from the previous stage to define: (1) what the website is; (2) how the website will work; (3) user involvement in decision-making; (4) future users; (5) usability requirements. ***Design –Usability Goals (SE4.1):*** this step will allow users (end-users and client-customer users), analysts, and designers (internal and external) to confirm that the website design is efficient, effective, safe, useful, easy to learn, easy to remember, easy to use and to evaluate, practical, and visible, and that it pro-

vides job satisfaction. ***2 Design – HCI (SE4.2):*** this step will allow users (end-users and client-customer users), analysts, and designers (internal and external) to identify that the website design is practical. There are many specific issues that need to be taken into consideration when designing website pages, such as text style, fonts, layout, graphics, and colour. ***Design –Navigation (SE4.3):*** this step will define the specific navigation paths through the website among the entities to establish the communication between the interface and navigation in the hypermedia application. ***Design –Prototyping (SE4.4):*** this step is essential in the website design process, to allow users and management to interact with a prototype of the new website, to suggest changes, and to gain some experience in using it. This step allows the management to reduce costs and increase quality through early testing.

Implementation (SA5): this stage involves the technical implementation of the website design. It allows users to use the new product and to check whether it meets their requirements. ***Implementation –Construction (SE5.1):*** this step involves the technical implementation of the website design. ***Implementation –Training Staff (SE5.2):*** this step will give the necessary training to the staff about the new website. ***Implementation –Promotion (SE5.3):*** this step will use various tools such as press releases, link building and banner-ad campaigns, paid search engines, directory listing campaigns, and traditional marketing methods (e.g. Newspapers, radio and TV) to promote the website.

Maintenance (SA6): this stage involves ongoing maintenance of the website, including updating changes and the correction of errors in the website. ***Maintenance –Real Interaction and Feedback Tools (SE6.1):*** During the maintenance stage, real interaction needs to be tracked by using the server log file. This information is very useful to the designers for improving and enhancing the structure and the functionality of the website in order to encourage more users to visit it. In addition, feedback tools should be available on the website to enable the users to contact the website owner for information or personal communication and to provide feedback about the website. For example, forms, surveys, discussion forum, contact form, telephone number, and a prize should be available on the website to encourage the users to provide feedback about the website. The first author recommends that, in order to prevent spam, the organization's e-mail address should not be made available on the website. ***Maintenance –Project Review (SE6.2):*** this step should be available to ensure that the website is working towards the project goals. This means that, after putting the website online, the designers need to check the website after 1 week to evaluate whether the website construction and structure are working according to the users' needs and requirements. One example of a tool that can be used for the project review is a checklist for the goals and objectives, usability and technical requirements.

User Participation (SA7): this aspect is a very important concept in the methodology, as the main purpose is to allow user participation in the website development process in order to gain more information about the problems and alternative solutions from the users and to familiarize them with the system before it is

released. For each stage, there is a rating (from 0 to 3), which indicates the extent of user participation in the development process.

Iteration (SA8): this occurs between each stage and step in the New Participative Methodology for Marketing Websites, to check that the website does indeed meet users' (end users' and client-customer users') requirements and company objectives before moving to another stage.

Content Management Systems (CMS) (SA9): this aspect is relevant to the usability evaluation, functionality testing, planning, design, implementation, and maintenance stages in the New Participative Methodology for Marketing Websites. This tool will allow the users to manage the web contents by allowing them to add, edit, remove, and submit information by using various templates and workflows without needing any previous knowledge of the website editing tools.

6.9 Conclusion

This chapter has outlined the basic concepts behind Methodologies including: life-cycle models, IS development methodologies, methodologies with explicit human factors aspects, websites methodologies, marketing methodologies, and additional detailed techniques such as task analysis and detailed website design and implementation. The main focus has been on defining users' requirements and needs, planning, analysis, design, testing, implementation, evaluation and maintenance. These stages are very useful in any methodology, as, via them, the designer will make sure that the system is running according to the needs of users and the client organizations. In addition, four key principles (user participation, usability, iteration, real interaction) were identified as fundamental aspects to develop systems in an effective manner. The four key principles are the main foundation for this research.

Having reviewed the stages from a wide range of methodologies, the chapter concludes with an introduction to the New Participative Methodology for Developing Websites from the Marketing Perspective combining the most effective aspects of the methodologies.

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