

A WEB-BASED WIZARD FOR USABILITY PROCESS MODELING

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ABSTRACT

Conducting a user-oriented test is not always an obvious task even for experienced usability professionals. Several usability processes like Nielsen [1] or Rubin processes [2] have been proposed, standards like ISO 9241-11 [3, 4, 5] for “Quality in Use” or CIF (Common Industry Format) [6, 7] for reporting the testing process have been adopted and a few tools exist to cover parts of those processes or standards. But current usability testing processes are still incomplete and mostly informal. They do not always specify for each step of the process, the actors, their roles and how they must perform their tasks. On the other hand, existing usability tools do not clearly illustrate the usability testing process they implement. They are indeed very useful to collect data during the “conduct phase” of the testing process, but they do not guide the tester through the tasks he has to accomplish; the tester basically decides what actions he must perform and then uses the tool to do so. RANA Wizuse aims to remove that extra cognitive load from the tester by defining and implementing a complete and easy to follow process that will guide usability testers throughout the empirical study. The tester will not have to remember what tasks to perform at any given stage of the usability study; the web-based wizard will remind and assist him.

This report is submitted to fulfill the requirements for COMP7931-Major Report. The goal of the project was to clearly specify and implement the RANA web-based wizard for usability testing process.

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- *My supervisor Dr. Ahmed Seffah*
- *My teammate and friend Naouel Moha*
- *My teammate and friend Qing Li.*

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1 Introduction

1.1 Usability and Usability Testing

1.1.1 Usability and its benefits

ISO 9241-11 defines usability as *“the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use”* [3]. Several studies [8, 9, 10] in the last decade have shown its benefits. Put simply, usability helps to reduce costs and improve sells [11] as shown in Table 1 below.

Reduce Costs	Increase Sells
<ul style="list-style-type: none">▪ Increased user productivity▪ Decreased user errors▪ Decreased training costs▪ Reduced development costs▪ Decreased user support costs▪ Increased job satisfaction	<ul style="list-style-type: none">▪ Increased sales volumes and profits from improved user conversion rates▪ Increased customer satisfaction▪ Improved perception of the organization▪ Increased market share▪ Product/service differentiation▪ Valuable competitive advantage

Table 1 – The Benefits of Usability [11]

Standard quality assurance (QA) tests will help to detect and fix some usability issues, mostly software bugs; but they do not usually take into account the notion of “context of use” which is emphasized in the ISO 9241 usability’s definition. Usability tests on the other hand, focus more on the users’ characteristics, tasks and environment. By identifying the proper context of use of the product, the tests will be much more oriented to the users’ needs. It is not only the testing

phase that should focus on the users but the development process as well to ensure that the product meets users' needs and expectations.

1.1.2 How to ensure and verify usability?

The users decide when a product is easy to use and thus should be at the center of the development process to ensure usability. Dumas & Redish [12] gives several tips to achieve usability during a product's development:

- Allow users' needs to drive decisions
- Work in teams that include skilled usability specialists, interface designers and technical communicators
- Tests versions with users early and continuously
- Set quantitative usability goals early in the process
- Involve users throughout the process
- Iterate the design
- Test product for usability

Generally speaking, following a User-Centered Design (UCD) process specified by ISO13407 [4, 5, 13] leads to better product's usability. This process is iterative and focuses on the users throughout the development phases. Usability evaluation, on the other hand, focuses on the means to verify that a product is usable. It defines methods to collect, analyze and interpret quantitative data that assess the attributes of usability: effectiveness, efficiency and user satisfaction. For example heuristic evaluation [14] is a technique that allows usability specialists to validate that an interface meets guidelines on usability principles.

Several such techniques [15] exist and are currently used. But, a more formal approach to evaluate usability is to follow a user-oriented testing process. It observes representative users of the target population performing real tasks. The goal is to record and analyze users' behavior and measurable usability objectives in order to diagnose problems and recommend solutions [12].

1.2 Project Objectives

This project is a subset of the RANA (Remote Architecture for Net-Based Analysis) [16, 17] project. RANA aims to provide an integrated platform to conduct remote usability testing. The RANA project is presented in Chapter 3 of this report. This report only covers Phase 1 of the RANA project that is limited to put in place a web application to assist during the process of conducting usability tests. The goals set for this phase are to:

- Model the usability testing process in order to be generic and adaptable to any kind of usability tests
- Develop a tool (a web-based wizard) that will help usability professionals to define and customize usability testing processes
- Integrate the process model inside a web-based wizard to support the usability testing
- Define the architecture (web server and database server) to support the wizard
- Specify clearly the functionalities, implement the wizard's web application and validate it with a usability testing process

1.3 Report Organization

The remainder of this report is organized as follow:

- Chapter 2 gives a state of art of current usability testing processes and tools
- In Chapter 3, the RANA project and the proposed usability testing process are presented
- The web-based wizard architecture and functionalities are discussed in Chapter 4
- Finally, the conclusion and future work are covered in Chapter 5

1.4 Notes to the Reader

The terms “*Usability Test*” and “*Test*” are used throughout this report to refer to the “*process that employs participants who are representative of the target population to evaluate the degree to which a software system meets specific usability criteria*” [2].

Also, the terms “Usability Testing Process”, “Usability Evaluation Process”, “Testing Process”, “Evaluation Process” and “Process” are used interchangeably.

Two other graduate students (Naouel Moha and Qing Li) have been actively involved in the RANA project and they also deserve credits for the work presented in this report.

2 Current Usability Testing Processes & Tools

Although usability specialists have more confidence in the testing process than they did in the early years, usability evaluation processes are still informal. The confidence has grown because the data collection and analysis methods have been validated over times but the need of productivity (doing more with fewer resources) and faster development and release cycles tend to lead to less formality in the process [12]. Whether the process is formal or not, it should state the activities, the methods, the actors involved and the deliverables. Several processes have been proposed and among the most cited in the literature are the Nielsen usability evaluation process [1] and the Rubin testing process [2]. As for the C&C usability testing process [21], it is a logical extension of Rubin's process.

2.1 Nielsen Usability Evaluation Process

Nielsen's view of the usability process [1] is embedded in the product development life cycle as part of a User Centered Design (UCD) process. It is an integrative and generic process that would be difficult to implement. It is a process that focuses more on the software engineering life cycle with the purpose of integrating usability needs rather than a process dedicated to usability testing. Table 2 below summarizes Nielsen's Process.

Nielsen Usability Process Steps	
<ol style="list-style-type: none"> 1. Know the user <ol style="list-style-type: none"> a. Individual user characteristics b. The user's current and desire tasks c. Functional analysis d. The evolution of the user and the job 2. Competitive analysis 3. Setting usability goals <ol style="list-style-type: none"> a. Financial impact analysis 	<ol style="list-style-type: none"> 4. Parallel design 5. Participatory design 6. Coordinated design of the total interface 7. Apply guidelines and heuristics analysis 8. Prototyping 9. Empirical testing 10. Iterative design <ol style="list-style-type: none"> a. Capture design rationale 11. Collect feedback from field use

Table 2 – Nielsen Usability Evaluation Process

2.2 Rubin Usability Testing Process

Rubin proposes the six steps process [2] that focuses on the usability tester actions:

1. Developing the Test Plan
2. Selecting and Acquiring Participants
3. Preparing the Test Materials
4. Conducting the Test
5. Debriefing the Participant
6. Transforming Data Into Findings and Recommendations

Rubin presents the Test Plan phase as the foundation of the entire process. It defines the purpose and the goals of the usability study as well as how to achieve these goals. Although this process covers important milestones of the

test, it does not emphasize enough on the actors and their roles. Also, it could be argued that some implicit steps such as test design or conducting pilot test are major milestones of the process and thus should be clearly identified as such [19].

2.3 C&C Usability Testing Process

C&C (Computing & Communications UCD group at University of Washington) [20] proposes a 4-steps process [21] that includes a detailed description of actors involved and their roles. This process is summarized in the following table.

Steps of the Process	Actor's Description
1. Plan the test Actors: Usability Engineer, Designer/Developer, Usability Coordinator	Usability Engineer: A person having formal training in usability testing who is responsible for evaluating the product and managing the test. Designer/Developer: One or more people responsible for designing the product being evaluated. Usability Coordinator: A person responsible for recruiting and scheduling participants for the test.
2. Design the test Actors: Usability Engineer, Designer/Developer, Usability Coordinator	
3. Conduct the test Actors: Usability Engineer, Designer/Developer, Usability Coordinator	
4. Analyze and report the test results Actors: Usability Engineer, Designer/Developer	

Table 3 – C&C Usability Testing Process

C&C usability testing process states clearly the actors and their roles during the process, but fails to mention the methods and techniques used at each stage to collect the data. Furthermore, the list of actors does not mention the representative users of the target audience selected for the test or any other actors who do not fit into the three (3) categories defined (Usability Engineer, Usability Coordinator, Designer/Developer). Finally, a process of 4 steps is too synthesized and important milestones are not visible.

2.4 Usability Testing Tools

An extensive survey of tools used during user-oriented tests that was conducted by the HCSE (Human-Centered Software Engineering) Group of Concordia University [22] came up with the following taxonomy:

- Automated Usage Capture Tools;
- Video/Audio Capture, Indexing, Storage and Retrieval Tools;
- Video-Conferencing Systems Tools;
- Online Surveys and Questionnaires Tools;
- Data Analysis and Mining Tools;
- Prototyping and Simulation Tools;
- Testing Process Management and Improvement Tools;
- Participant Recruiting Databases and Tools;
- Usability Measurement Tools;
- Remote Control Software Tools.

Tools Group	Example of Tools
Automated Usage Capture Tools	Noldus Observer, OvoStudios Tools, UsabilityWare 4.0, WebVIP & FLUD, Keystroke Recording, Camtasia Studio
Video/Audio Capture, Indexing, Storage and Retrieval Tools	MPEG-7 Standard, IBM Research - VideoAnnEx Annotation Tool, Screen Capture Module, Remote Control Systems
Video-Conferencing Systems Tools	SightSpeed, Umeeting Web Conferencing, Microsoft Exchange 2000 Conferencing Server, Cisco IP Phone, Reality Fusion TeamView 3.0, NetMeeting, WebEX
Online Surveys and Questionnaires Tools	Customer Satisfaction Survey, Ezpolls, QUIS, NetReflector - Instant Survey, Question master, SNAP Survey Software, WebSurveyor, Vividence tools
Data Analysis and Mining Tools	SPSS tools, IBM EZSort, WebQuilt, WebSAT, WebCAT, SAS Data Mining Solution
Prototyping and Simulation Tools	IBM EasyChart, SILK: Sketching Interfaces Like Krazy, SUEDE, CrossWeaver, MS PowerPoint, PatchWork
Testing Process Management and Improvement Tools	FogBUGZ, OvoStudios
Participant Recruiting Databases and Tools	PopRecruit
Usability Measurement Tools	ErgoLight, Quip, SUMI, WAMMI, MUMMS
Remote Control Software Tools	Timbuktu, Compaq Carbon Copy, NetOp for Windows, pcAnywhere, Symantec ProComm Plus, Unicenter Remote Control, ControlIT

Table 4 – Taxonomy of Usability Tools

From this taxonomy, we can deduce that current tools are mostly designed to support only parts of the existing processes. None of the ten (10) groups of tools actually covers the whole testing process, except for the Testing Process Management and Improvement Tools. Some of them have been designed for purposes not related to usability (Video-Conferencing Systems or Remote Control Software Tools for example) but were adopted by the usability professionals because they provide answers to some of their needs. They are very helpful and particularly effective in the “conduct phase” of the tests, but they often pose some issues to novice users, especially when they are confronted with the decision of when and how to use a particular method or technique. Most of the time, the process they implement is not clearly stated. OvoLogger (OvoStudios) [23] for example implements a process based on the CIF (Common Industry Format) [6, 7] standard report; but the activities to perform and their sequence are not clearly shown or implemented as such. Basically, the tester can do almost anything he wants and when he wants. The assumption by OvoLogger is that the tester is particularly familiar with the CIF report and must be aware of what to do at any given stage of the process. That lack of clarity in the process implementation in existing usability tools might be the consequence of the non-existence of a well-defined process upon which the usability community agrees.

2.5 Weaknesses of Current Processes and Tools

All the 3 processes presented above shared common grounds in the sense that they all focus on representative users of the target audience. Three important milestones (Plan test, Conduct test and Report test) appear in all processes although their scope may vary from one to another. In the Rubin's process for example the test plan implicitly includes the design phase whereas in the C&C process the two steps are clearly separated. It is a reason why the process defined in the RANA project and covered in detail in Chapter 3 of this report is composed of 10 steps instead of 4 or 6. This process goes one step beyond the current processes by specifying for each step the methods that can be applied in addition to the actors, the activities and the deliverables. It has been implemented inside the RANA platform as an online wizard to assist usability professionals.

In the first phase of RANA project, the goal is to emphasize more on the process before the techniques i.e. the means to collect data. The RANA Wizuse implements a usability management system that is based on a well-defined and structured process. It is seen as a complement or a support to current usability tools, not an alternative. Current tools are mostly dedicated to collect qualitative and quantitative data and do not illustrate enough the process. This is why the role of the wizard is to guide the actors through each step of the process, thus removing unnecessary cognitive and administrative load that will result into more effectiveness and performance gain.

3 RANA Project

3.1 What is RANA?

RANA (Remote Architecture for Net-Based Analysis) [16, 17] is an ongoing research and development project administered by the Human-Centered Software Engineering Group of the University of Concordia. It is an integrative process-sensitive software infrastructure for remote usability and user-centered empirical studies. It is a core component of the Concordia Usability and Empirical Studies Lab.

The platform RANA aims to provide via different tools a web access for capturing, visualizing and analyzing the results of empirical studies and usability tests. This infrastructure will support some usability tools and offer an architecture adapted for conducting remote usability tests. Ultimately, RANA will provide a Web-based and adaptable interface to a large empirical studies toolbox, including:

- Video-conferencing and groupware
- Applications for virtual focus groups
- Online participatory design workshops
- Web surveys and interviews
- Remote field observations
- Performance testing

Fundamentally, RANA is a Computer-Assisted User Testing Environment (CAUTE). A CAUTE provides to usability and human factors professionals the kind of functionalities a CASE tool provides to software engineers. It is intended to control the entire user-centered empirical studies process. CAUTE allows repetitive, well defined activities to be automated, thus reducing the cognitive load on the usability and empirical software engineers involved [19].

The implementation of the platform is divided into 3 phases:

- Phase 1 – Implementation of a web based usability testing process wizard and administration tool
- Phase 2 – Implementation of a complete web based usability testing management system
- Phase 3 – Integration of usability tools such as QUIM, MOUDIL, WEBVIP, WEBSTAT or online usability questionnaires found at <http://www.acm.org/~perlman/question.html> [32]

Again, this report only covers Phase 1 of the project that is limited to put in place a web application to ease and formalize the process for conducting usability.

3.2 RANA Usability Testing Process

As stated earlier, a complete usability testing process must clearly specify the activities and the methods, the actors and the roles and finally the deliverables or artefacts. The HCSE (Human-Centered Software Engineering) group of Concordia University [16] has defined the following usability testing process.

3.2.1 Steps, Activities and Deliverables

The main steps, activities and artefacts of RANA usability testing process are:

Plan – This activity consists in producing a testing plan which answers the following questions: what, why, how, when and where to study and test. The test plan document describes in detail the test purpose and usability goals, the target audience, the schedule, the resources and the outcomes.

Design – It consists in defining the profile of the participants, selecting and adapting the research methods, and preparing the required equipment for conducting the tests. Several deliverables are produced during the design phase among which, the screening questionnaire, the orientation script and the tasks scenario.

Acquire – Generally needed for large tests, this activity consists of selecting, hiring and interviewing participants. A list of selected participants and test session schedule is produced at the end of this step.

Setup – Here, the hardware equipment and the software tools needed for tests are deployed, installed, configured, and tested.

Preview – This step consists of conducting a battery of pilot tests to ensure that the test environment, materials, and resources are appropriate and functional. This step will help produce appropriate data collection sheets.

Conduct – The real test is performed in this step and several quantitative and qualitative data are gathered including participant feedback, video observations, and screen snapshots.

Debrief – In this step, the testers review with the participant his or her actions, reactions, and feedback during the test to gather more data.

Compile – The data is aggregated, consolidated, annotated, and properly archived to facilitate their later retrieval and analysis.

Analyze – Using appropriate data analysis and data mining techniques, this step aims to transform the qualitative and quantitative test results into findings and patterns.

Report – This step consists of transforming findings and patterns into recommendations. A final report that summarizes the usability test is produced.

3.2.2 Methods and Tools

The methods represent in the usability testing process the different techniques used to collect, compile and analyze data. It may seem not very relevant at first sight to specify them in a usability testing process, but when one looks more closely, it can be very confusing for testers to determine the appropriate technique among hundreds. *“Over the last 15 years, a large set of methods has been proposed. Ivory and Hearst [24] analyzed and classified the most popular methods from the automation perspective”* [19]. Those that have been successfully applied within the industry have been selected and classified according to the different steps and activities of the RANA process. There are techniques for data collection and analysis, techniques for interviewing the participants, as well as for monitoring the tests or specific methods for measuring the user performance and satisfaction. A study at Daimler Chrysler Research and Technology Centre [15] has classified the methods into the following categories: Inquiry, Inspection, Testing, Prototyping, Cognitive Modeling, Requirements Analysis and Analytical and Predictive Methods. Table 5 [15] presents an overview of the taxonomy while Table 6 gives an example of methods for each of the ten (10) steps of RANA usability testing process.

Method Category	Example of Methods
Inquiry	<ul style="list-style-type: none"> ▪ Contextual Inquiry ▪ Ethnographic Study/Field ▪ Observation ▪ Interviews and Focus Group ▪ Surveys ▪ Questionnaires ▪ Self-reporting Logs ▪ Screen Snapshots
Inspection	<ul style="list-style-type: none"> ▪ Heuristic Evaluation ▪ Cognitive Walkthroughs ▪ Formal Usability Inspection ▪ Pluralistic Walkthroughs ▪ Feature Inspection ▪ Consistency Inspection ▪ Standards Inspection ▪ Guideline checklists
Testing	<ul style="list-style-type: none"> ▪ Thinking Aloud Protocol ▪ Co-discovery Method ▪ Question Asking Protocol ▪ Performance Measurement ▪ Eye-Tracking
Prototyping	<ul style="list-style-type: none"> ▪ Paper, Pictive and Video Prototyping ▪ Storyboarding ▪ Scenario Sketching
Cognitive Modelling	<ul style="list-style-type: none"> ▪ Affinity Diagrams ▪ Archetype and Persona ▪ Blind Voting ▪ Card Sorting ▪ Education Evaluation
Requirements Analysis	<ul style="list-style-type: none"> ▪ Task Analysis ▪ Contextual Inquiry ▪ Focus Groups and Surveys ▪ Persona and Scenarios ▪ Use Case Maps
Analytical and Predictive Methods	<ul style="list-style-type: none"> ▪ GOMS Performance Analysis ▪ Cognitive Task Analysis ▪ Task Environment Analysis ▪ Knowledge Analysis ▪ Design Analysis ▪ Programmable User Models ▪ Simulations

Table 5 – Taxonomy of Usability Methods [15]

Step	Example of Methods
Plan	Context of Use Analysis
Design	Prototyping
Acquire	Advertisements
Setup	Check List
Preview	Formal Inspection
Conduct	Thinking Aloud Protocol
Debrief	Usability and Satisfaction Survey
Compile	Transfer Handwritten Note to a Computer
Analyze	Statistical and Data Analysis Technique
Report	Report Guidelines

Table 6 – Example of Usability Testing Methods by Step

As for the tools used in the field, the extent to which they cover the usability testing process varies from one to another. Camtasia, Survey System, OvoLogger (OvoStudios), IBM MPEG-7 Annotation Tool, IBM Ezsort & Ezcalc, Microsoft NetMeeting, Server Infrastructure Video Server, Clementine Data Mining Tool, Sigma Stat, Sigma Plot and SPSS Products have all been analyzed for that purpose. OvoLogger (OvoStudios) [18] for example covers almost all steps of the RANA usability testing process while IBM MPEG-7 Annotation Tool can be used only at the “Compile Step”. The summary of studies made on those tools can be found at <http://rana.cs.concordia.ca/tools/index.htm> [29]. Figure 1 [19] below gives for each step of the process examples of tools that can be used.

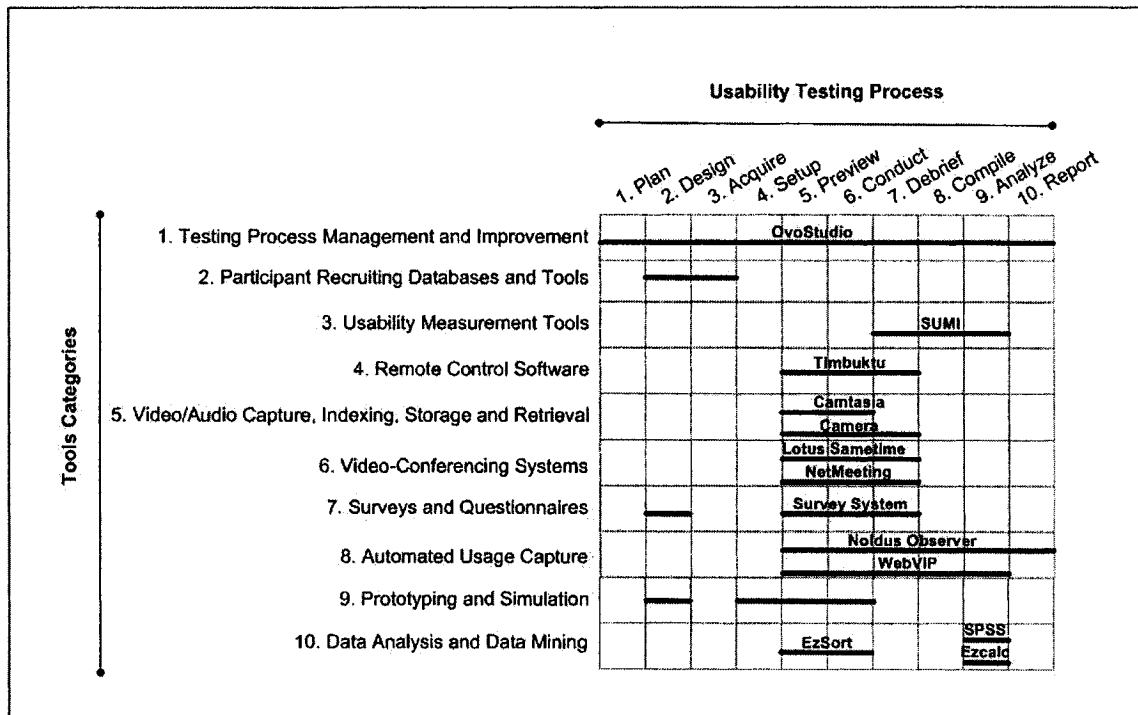


Figure 1 – Example of Usability Tools by Step [19]

3.2.3 Actors and Roles

Several types of users with clearly stated roles are needed in any usability testing process. For the RANA project, the following groups of users have been identified:

- **Managers/coordinators:** They are the usability team project leader. They are indeed the managers of the usability study as they assign roles to usability team members and coordinate their works.
- **Monitors:** they own the technical knowledge of the equipment and the software used in the tests. The monitors are responsible for installing

and configuring the lab, and during the tests they have to ensure the smooth functioning of the test equipment.

- **Recruiters:** their tasks are to select, recruit and schedule the participants for the tests. They can also set up the materials for conducting the tests with the monitor.
- **Evaluators:** they conduct testing, analyze and report the results. They are the primary persons responsible for testing the product design, analyzing, documenting the results and presenting the report to the development team.
- **Data Analysts:** they attend preview, conduct and debrief steps. The Data Analysts also help Evaluator to compile usability data into electronic format. During the test session, they use predefined data collection sheets or computers to record all usability data needed to be collected. They also help the evaluator to record important event when participants interact with the system.
- **Observers:** they observe the users during tests sessions; they do not intervene during the tests (usually they sit behind a one way mirror or watch the test through a video signal), but provide their feedbacks at the end of the session. Observers may include any stakeholders of the

project. Any person who has an interest in the test and in the product being tested can participate as observers.

- **Users/Participants:** they are a representative sample of people who use the system and are selected to test it. They may be direct users (generally called end-users) who use the system to complete their tasks, or indirect users who use it for other purposes such as system administrators, installers or demonstrators. They are the most important actors of the user-oriented testing. They perform the tasks handed to them by the evaluator and provide their comments.
- **Designers and Developers:** they are the expert in installing, customizing and developing the target product of the test. They usually participate in the test as observers or evaluators.

3.2.4 Process Workflow

After having defined the elements of the usability testing process, the next step is to link them together. Figure 2 [19] below illustrates the sequence of events during the user-oriented testing process.

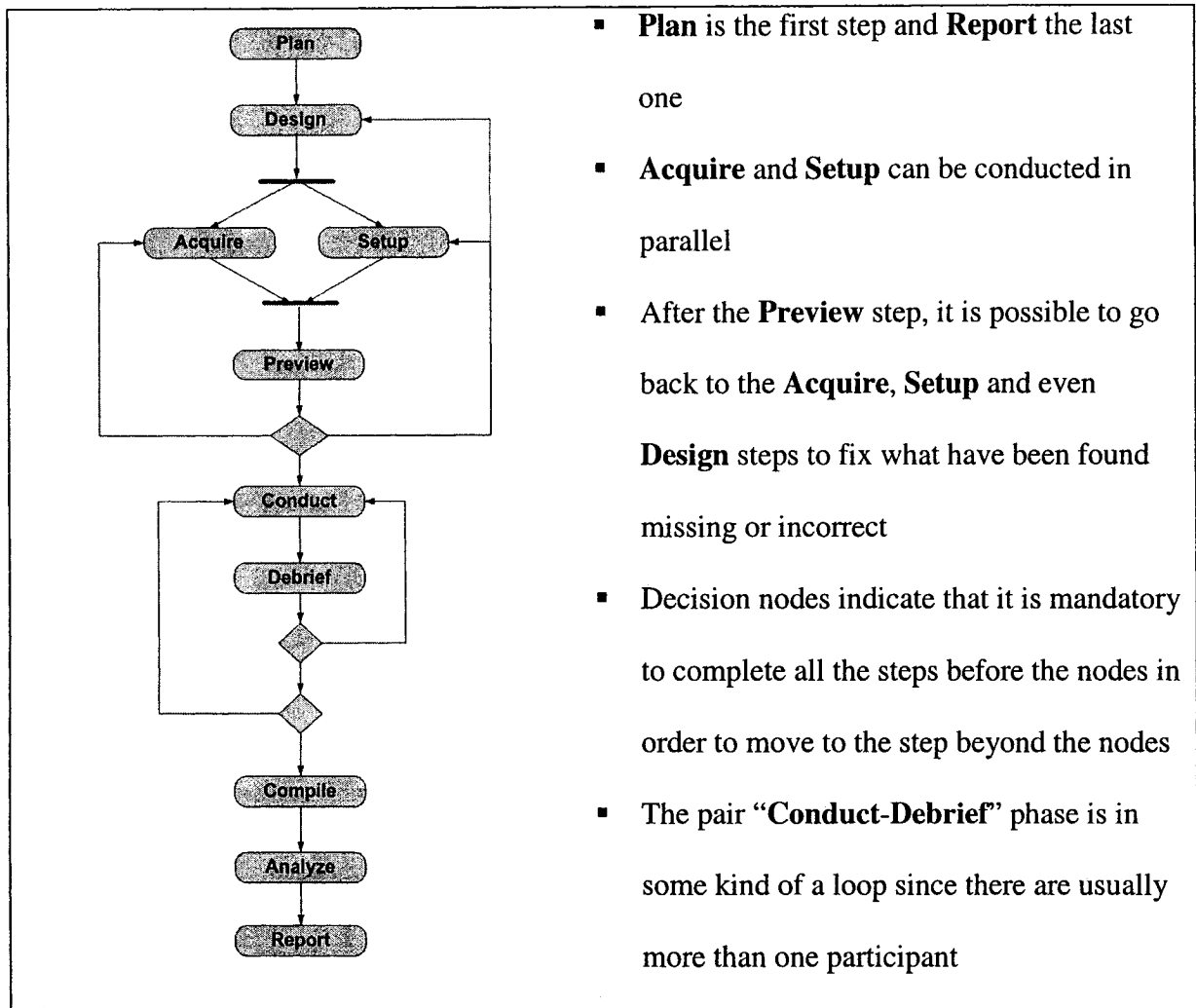


Figure 2 – User-Oriented Testing Process Workflow [19]

The actors are involved in the process according to their roles. The following use-case diagram (Figure 3) [19] summarizes the different actors' implication during the usability testing process.

NB: The use case diagram of Figure 3 is not standard UML.

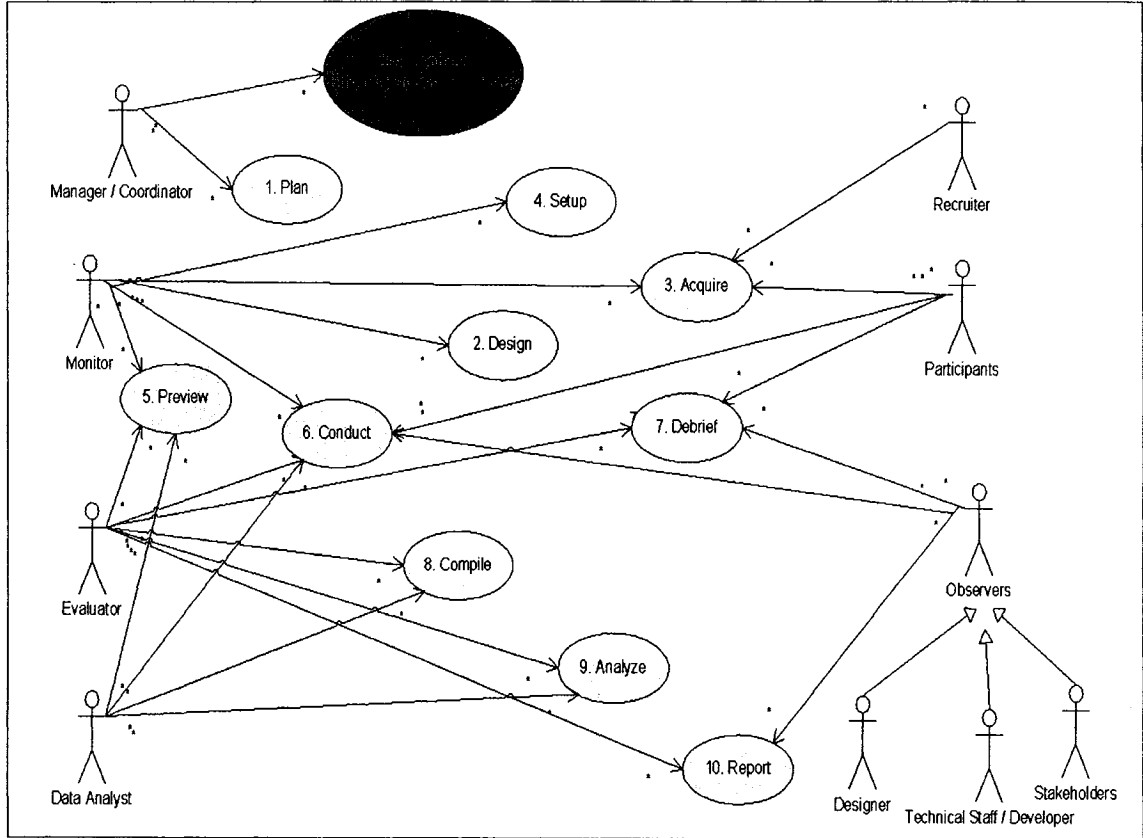


Figure 3 – User Roles in the User-Oriented Testing Process [19]

- The Manager/Coordinator is essentially involved in the Plan step. He coordinates the task of the usability team members throughout the process.
- The Monitor is the technical expert and therefore is needed for the Design, Acquire, Setup, Preview and Conduct steps.
- The Recruiter acquires the Participants.

- The Evaluator attends Preview, Conduct, Compile, Analyze, and Report steps. He is responsible of running the test and reporting the results.
- The Observer (Designer/Developer) helps in the Conduct, Debrief and Report steps.
- The Data Analysts like the Evaluator attend Preview, Conduct, Compile, and Analyze steps.
- The Participants are involved during the Acquire, Conduct and Debrief steps.

4 RANA Wizuse Architecture & Functionalities

4.1 Architecture Description

The choices made for this project mostly rely on the development team skills and expertise, the available materials at the Concordia Usability and Empirical Studies Lab, the current practices in the industry, the portability and maintainability of the application, the timeframe, and finally the costs.

Development Environment	Description	License
Development Platform	Windows XP	Not Free
Development Tool (HTML)	Macromedia Dreamweaver MX	Not Free
Database Design Tool	DBDesigner4	Free
Languages	PHP 4.3.8 HTML, XML, JavaScript	GPL
Report Generator	PDF Writer (Embedded with PHP)	Free
Control Version Tool	RANA Shareware Portal [16]	Not Free
Production Environment	Description	License
Production Platform	Redhat Linux 8.0	Free
Web Server	Apache 2.0.50 with PHP handler	Free
Database Server	MySQL 4.0.20	Free
Administration Tools	PhpMyAdmin 2.5.7	Free
Hardware	Two 1266 MHz Pentium III 1.2 GB RAM, 16.6 GB HD	--

The development process will be a standard 3-tier process following MVC (Model View Controller) design pattern [25] to ensure robustness, good maintainability and enhance portability. In a 3-tier application, the Data, Business and Presentation components are all separated and can even be on different machines, thus offering maximum flexibility.

The system architecture is pretty much alike any existing web application. At one end, a MySQL Database server [26] will handle requests from the Apache Web server [27] through the PHP functions calls; and at the other end, users will interact with dynamic web pages following HTTP requests to the web server. The MySQL database and the Apache Web server will run on the same server although the following diagram (Figure 4 below) may suggest the opposite. But, there is no major constraint in having them running on different machines.

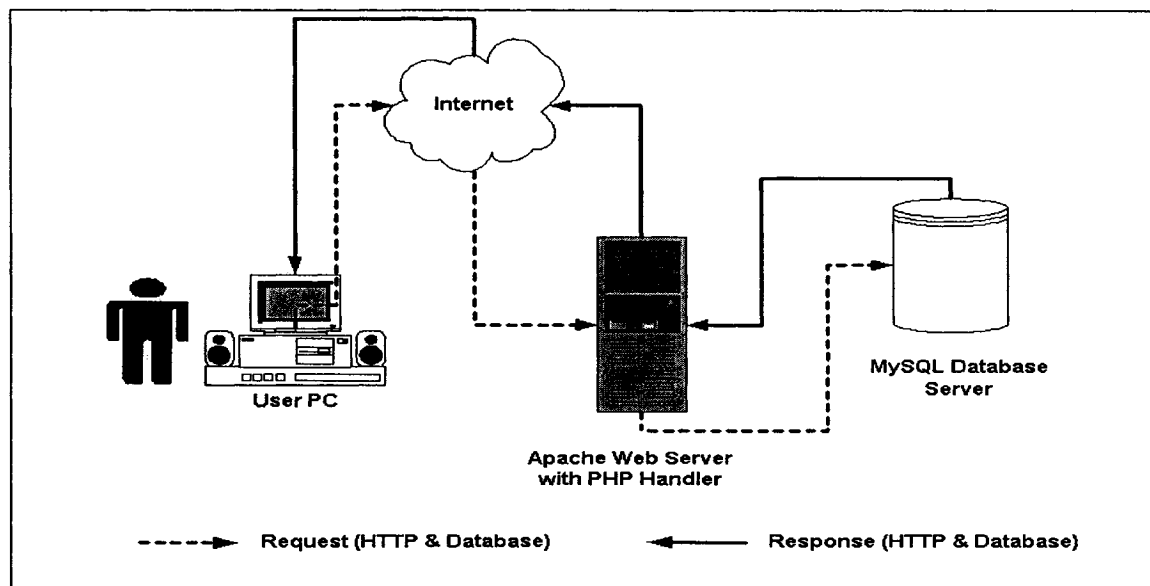


Figure 4 – Application Architecture Diagram

Logically, the application structure could be view as 3 almost independent layers. The end-user will only interact with the presentation layer as business and data layers are hidden from him. The business layer will interact with the data layer to get data for the presentation layer or to submit data from the presentation layer.

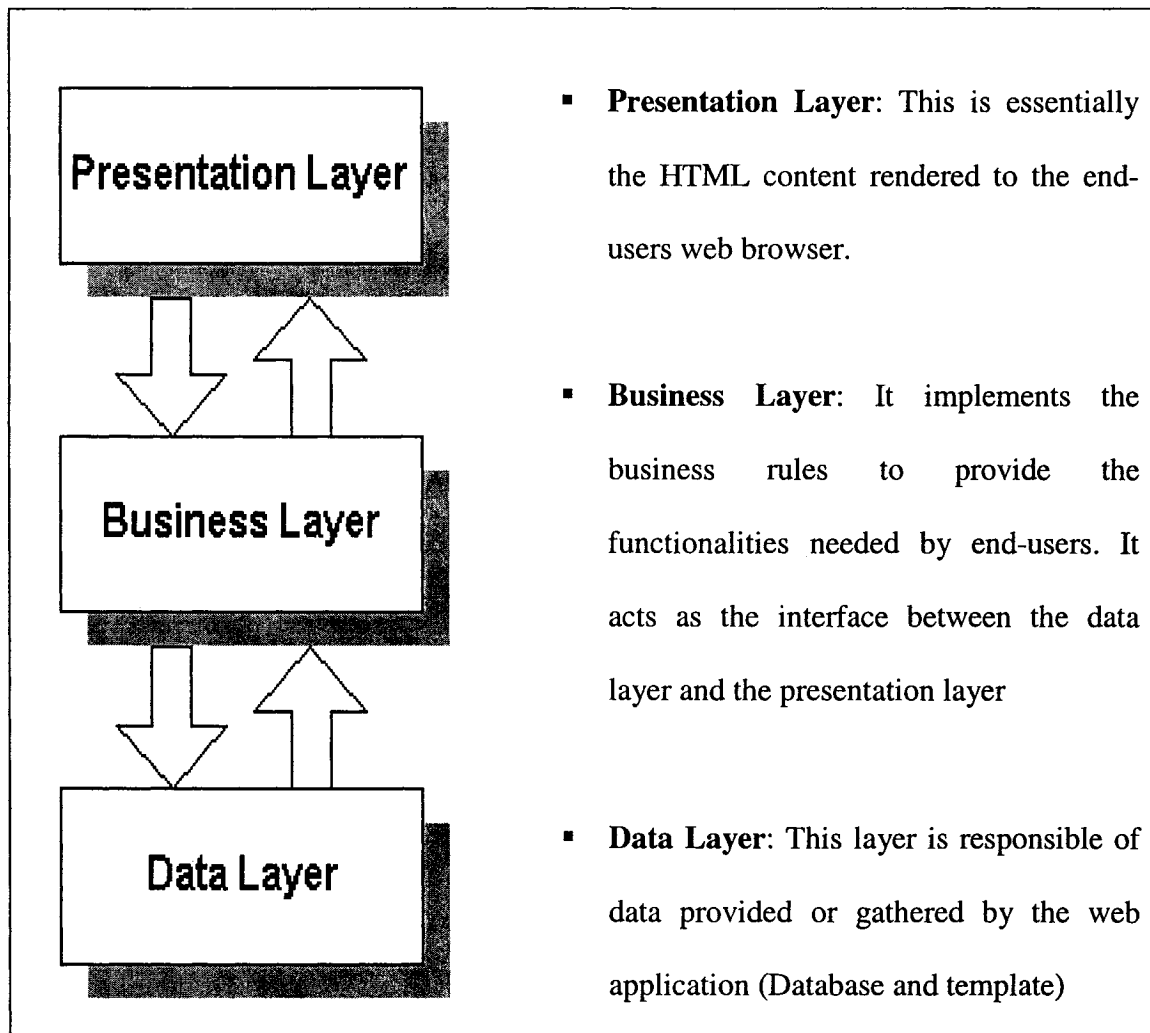


Figure 5 – Application Logical View

4.2 System Description and Functionalities

A web application has been developed to fully support the RANA usability process or any usability process that can be modelled as shown in Figure 6 below. That model presents the usability process as a sequence of ordered steps that produce deliverables and are composed of activities executed by actors who use particular methods and tools.

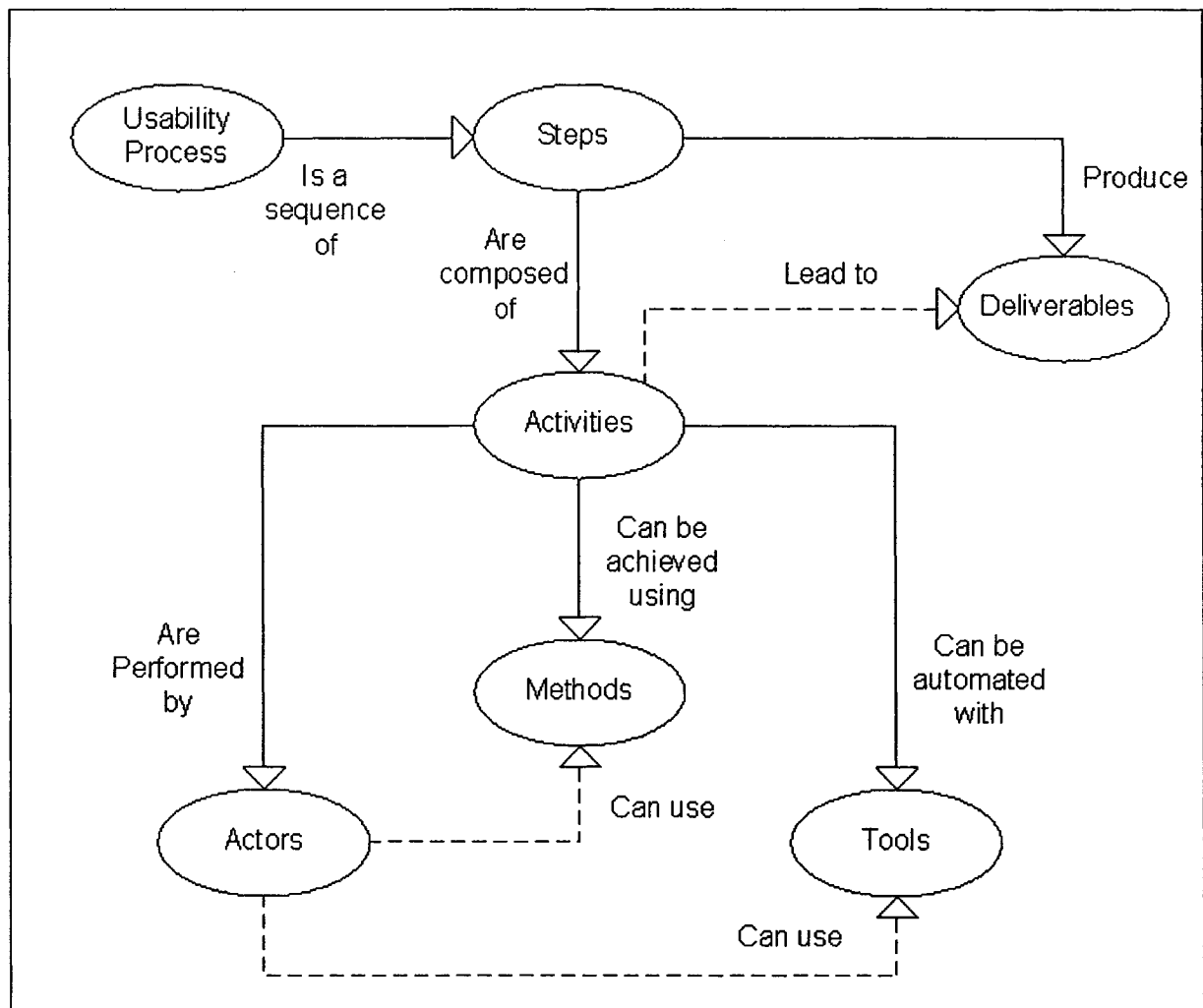


Figure 6 – Usability Process Model

The web application is composed of two (2) main sections:

1. Administration interfaces of usability testing processes
2. Interfaces to visualize the usability testing process

NB: *The user interface was designed by Qing Li, a graduate student, member of the Human-Centered Software Engineering group of Concordia University who is also involved in the RANA project.*

4.2.1 Administration Interfaces of Usability Testing Process

This section of the web application is used to define, customize and maintain usability testing processes. It is needed to support the evolution of the process and the RANA platform. The functionalities offered in the administration section are:

- **Manage Usability Process** – It provides the interfaces to initialize a new usability testing process, update process information and delete process. A process is defined by its name, version, description and status;
- **Manage Usability Process Steps** – The user can define, update or delete a process step through these interfaces;
- **Manage Usability Process Step Activities** – Allow user to create new activities for a process step, update and delete existing ones;

- **Manage Usability Actors** – It gives the ability to define new actors that can later be assigned to a process, update and delete current ones;
- **Manage Usability Artefacts and Utilities** – Through these interfaces, the user can define, update and delete usability artefacts, methods, tools and templates;
- **Assign/Remove Actors to/from Usability Process** – This functionality is used to define the role of the actor in the steps of the process;
- **Assign/Remove Usability Artefacts and Utilities** – It helps to define the association between deliverables, methods, tools and templates on one side and process step and activities on the other side.

The following figure is a screenshot of the interface to manage a process.

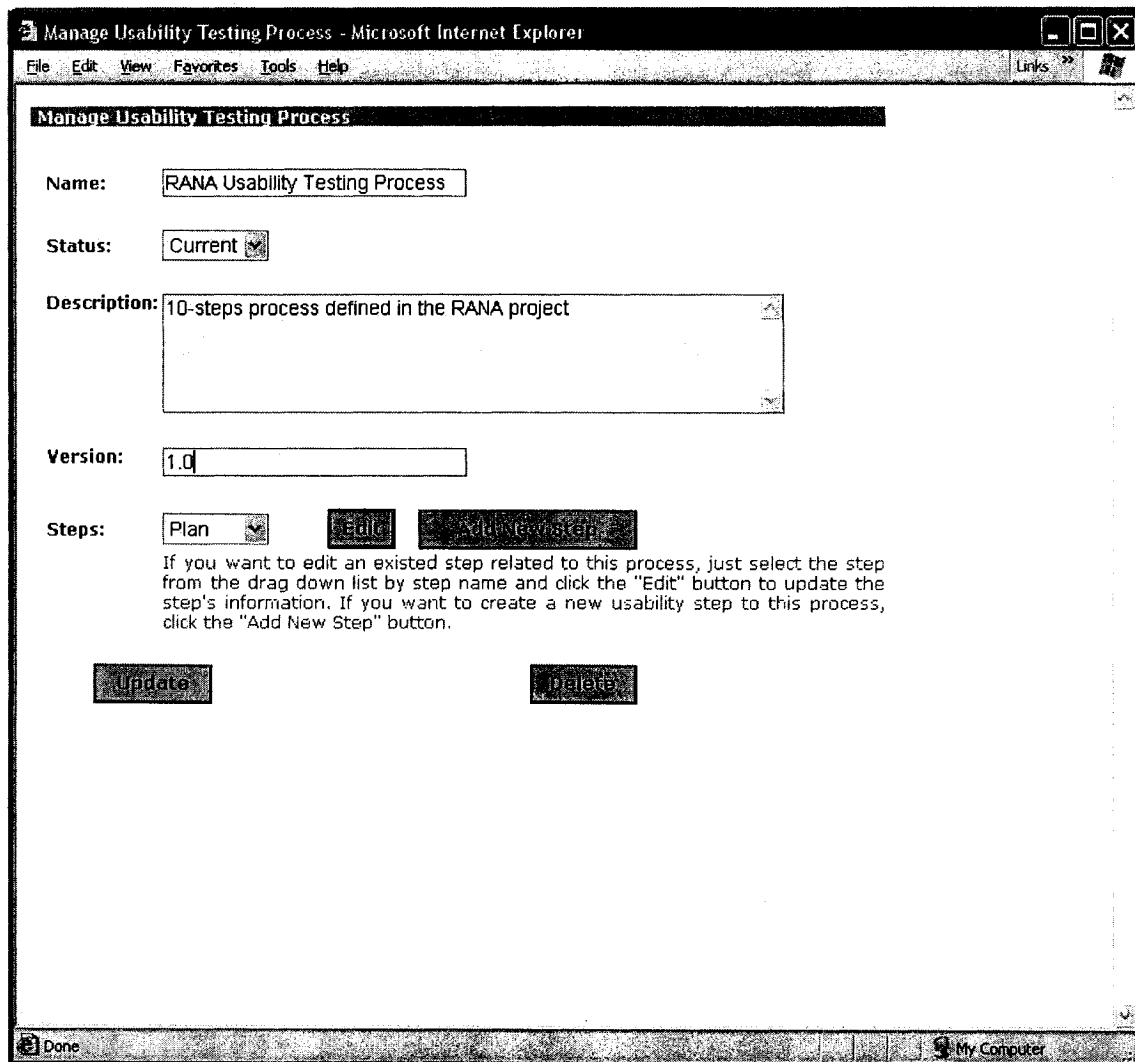


Figure 7 – Manage Process Interface

4.2.2 Interfaces to Visualize Usability Testing Process

The interface to visualize the process is composed of three (3) layers:

1. The left side layer that identifies the process and its steps. The current step is always highlighted and some visual elements help distinguishing between the steps already completed and the ones left to do. Thus the tester is always aware at which step of the process he is;
2. The top-right side layer gives a snapshot of the current step. The activities are clearly shown as well as the actors, the methods, the tools, the deliverables and the available templates of the step. More information can be accessed for each of those elements by clicking on the element hyperlink. This layer also provides means to navigate through the process steps and to keep track of the steps completed.
3. The bottom-right side layer that is used as the target of the hyperlinks in the top-right side layer. For example, if the user click on a tool or method name in the top-right side layer, the result of that request is displayed in this layer. By default, when a step is loaded, this frame shows the global description of the step.

The advantage of having such a layered-structure is that the main elements of the process are always visible. Figure 8 below is the screenshot of the wizard at the Acquire Step.

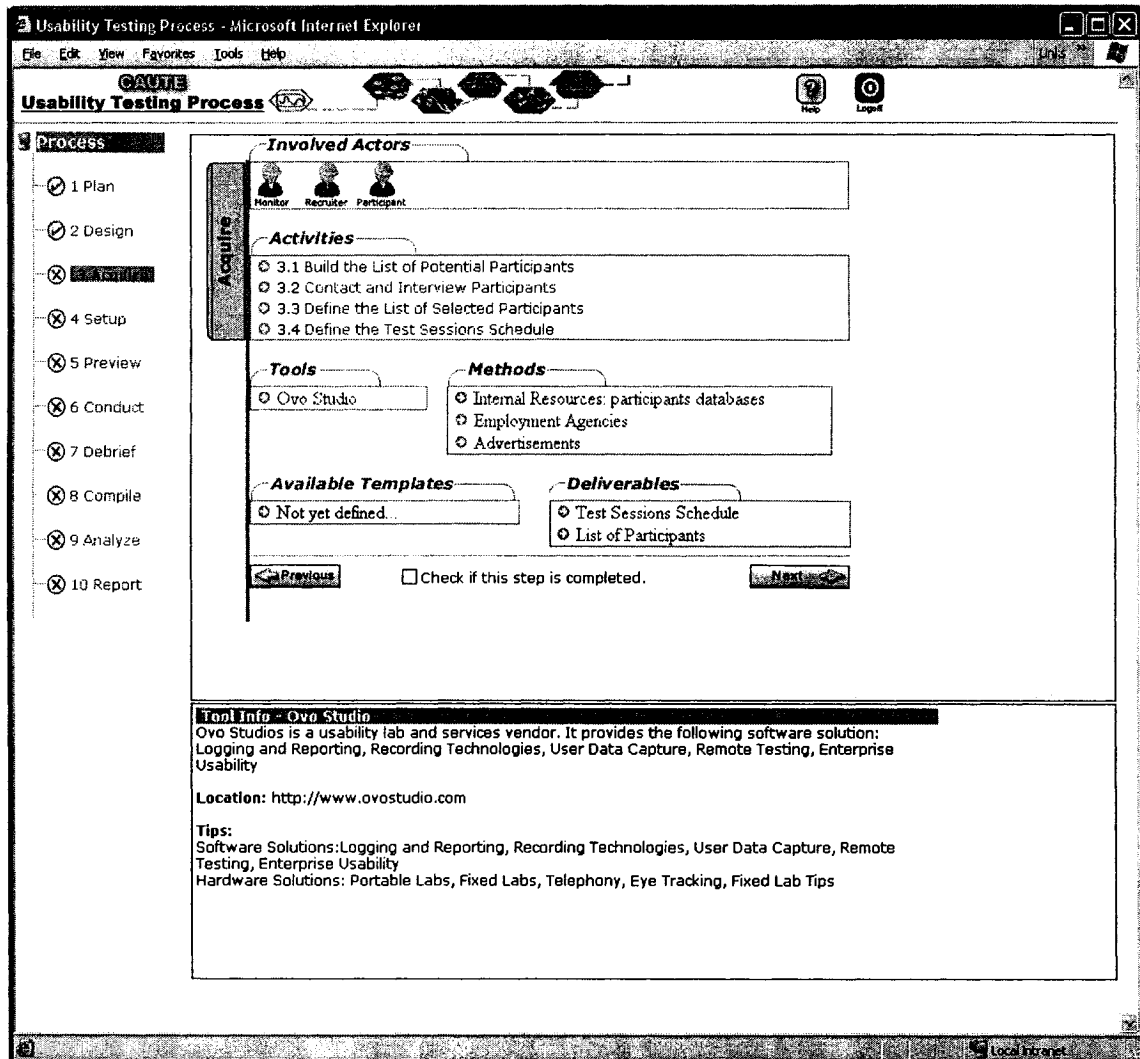


Figure 8 – Wizard Process Step View

4.2.3 Other Interfaces and Functionalities

Additional interfaces such as User Registration and Account Management interfaces are available. They are mostly needed for the next phases of the RANA project where the platform will customize the interfaces and the process according to the user profile. They are used in this phase for authentication purpose and session management. The user must provide valid User Id (Login Name) and Password to access the wizard; and their session expired once he/she logouts or after a long period of inactivity. These interfaces allow the following actions:

- Create User Account
- Manage User Account: Update User Profile, Lock/Unlock User Account, Delete User Account
- Login / Logout

Usability Test Wizard-----Registration Page - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Human Centered Software Engineering Group

Usability Test Wizard

Home Getting Start Login Registration Help@

Registration

New user registration

Please fill in the following information so that we can create a new user account.

Family Name*

Given Name*

Login (User ID)*

Password*

The password is case sensitive, must be between 6 and 12 characters long.

Re-enter Password*

User Group*

Password Hint Question*

Password Hint Answer*

If you forget your password, you can retrieve it by answering your **hint question**.

Gender*

Email Address*

Year of Birth (YYYY)

Address: Street & Appt #

City

Province/State

Postal/Zip Code

Country

Phone Number

Other Phone Number

Local intranet

Figure 9 – Create Account Interface

4.3 RANA Wizuse Advantages

The web-based wizard presented in this report is very useful and offers a few advantages. Although it is not a tool to actually conduct a usability test, RANA Wizuse is a kind of tutorial to usability testing process that will link to or suggest appropriate tools, standard reporting templates and methods at any given step of the process. It will guide and assist the usability professional throughout the testing process. The added value of such tool is that:

- It follows and integrates current usability standards and processes;
- It is easy to follow for novice as well as experienced usability professionals;
- It is a step-by-step process that can help in training staff;
- It supports usability testing performance;
- It provides usability best practices;
- It helps to customize the process;
- It can lead to the integration of some usability tools;
- It is suitable for small and large tests;
- The usability test is conducted in a more formal way.

5 Conclusion and Future Work

The art of conducting user-oriented tests still remains too informal in spite of the recognition of the importance of usability over the last decade [12]. This situation is in part explained by the lack of a well-defined and well-structured usability testing process. The Nielsen, Rubin and C&C processes described in this report emphasize more on the major steps (Plan, Conduct, and Report) and not enough on the actors, methods and deliverables. Also, most of the current usability tools tend to focus more on gathering the usability data and less on the process thus putting a lot of load on testers. In this phase of the RANA project, a new user-oriented testing process have been proposed, modelled and implemented in a web application. The proposed process defines clearly elements that have been so far overlooked by existing processes: the actors and their roles, the methods and the deliverables. It also suggests usability tools that could be used to perform some activities. It is well structured and will lead to more formal empirical studies. The web application implemented to support that process model presents several advantages for usability professionals. It is task-oriented systems that will help them conduct more systematically their tests. This wizard represents a knowledge based of current usability tools, standards and best practices. It can therefore help to train staff, increase effectiveness and performance. The process administration interfaces will allow the smooth evolution and maintenance of the wizard and the RANA platform. Finally, the wizard is easily accessible since it is web based.

A major limitation of the RANA wizard is the fact it will add up to an already long list of usability tools. The survey of existing usability tools [22] have shown that they usually cover only parts of the process. Thus a complete usability test will rely on more than one tool. Another issue with the wizard is that it does not record any usability data during the process. But, this usability tool should be seen only as the first phase of the RANA project. The following ones will target the integration of some current usability tools to the platform and the establishment of a complete usability management system.

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