HF 710: Managing the Development of Information Products

Assessment Memorandum

Prepared by Waltham Interactive Design for Sun Microsystems, Inc.

Usability Evaluation of the OpenOffice Suite

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1.0 Executive Summary

As a first step toward an upgrade of the new product, Waltham Interactive Design assessed the usability of three applications in the OpenOffice 6.0 product suite: namely, the word processing, spreadsheet, and presentation applications. This project report contains the results of that assessment, including a description of our methodology, the evaluation approach and criteria used during the assessment, and our evaluation observations, marketing implications, and conclusions.

The project team's usability assessment methodology comprised six stages. First, we defined a number of office scenarios for use as evaluation goals. We assumed that a close look at the tasks required to achieve each goal would give us insight into both positive and negative user experiences. Second, the project team selected the evaluation criteria, which was a combination of the critical incident assessment criteria as defined by management and Jakob Nielsen's ten usability heuristics. Third, the project team defined the user archetype and noted some evaluation assumptions. The archetype was considered a college-educated and computer literate person capable of performing simple tasks using office applications, and all evaluators on the team met or exceeded this knowledge requirement. The evaluation assumptions included an expectation that the OpenOffice suite would be more feature-rich than its competitor, but at the same time may be weaker with regard to usability if most of the open source focus was development-centric. Fourth, the project team developed a standard data gathering form for knowledge management. Our objective was to have a form that would enable users to record tasks and any related incidents (based on the heuristics and other predefined assessment criteria) as they attempted to complete the goals in each application. More information on all of these processes can be found in *Section 2.0, Assessment Approach*.

Once project team members completed some individual data analysis, we selected the top three usability heuristics for more detailed discussion. These heuristics were Visibility of System Status, Match Between System and Real World, and User Control and Freedom, each of which is extremely important for creating a positive user experience. The specific evaluation observations for each heuristic are discussed in terms of user experience and usability/human factors implications, and can be found in *Section 3.0, Evaluation Observations*.

Given Microsoft's recent efforts and very public effort to improve usability in their products, our *Marketing Implications* and *Conclusions* (*Sections 4.0 and 5.0*, respectively) indicate that if OpenOffice is to be a viable competitor of Microsoft, then OpenOffice developers must focus on creating positive experiences for users who may already be familiar with Microsoft Office 2000.

2.0 Assessment Approach

This section provides a detailed discussion of how Waltham Interactive Design conducted the OpenOffice Suite Assessment Project. It contains information about the office scenarios used in the evaluation, discusses the project team's overall approach to the evaluation, and explains the usability/human factors criteria used during the evaluation.

2.1 Office Scenarios

Because each member of the project team had experience with office-related applications, we decided that a few of our frequently performed tasks could be used as simple office scenarios. As such, Waltham Interactive Design team members evaluated the suites and applications listed in the following table.

Office Suite	Word Processing Application	Spreadsheet Application	Presentation Application
OpenOffice 6.0	Text Document	Spreadsheet	Presentation
Microsoft Office 2000	Microsoft Word	Microsoft Excel	Microsoft PowerPoint

The project team elected to compare the OpenOffice 6.0 applications with similar applications found in the Microsoft Office 2000 suite both because of our familiarity with the suite and because of Microsoft's current dominance in the office application market.

The remainder of this section provides details about the office scenarios the project team used as goals during our evaluation of the two office suites.

2.1.1 Word Processing Application Scenario

In the word processing application scenario, the user attempted to achieve the goals described in the following sections.

2.1.1.1 Create a New Style for Assignment to Document Text

Although the word processing applications in both suites have a set of predefined styles available for use, the purpose of this goal was for the user to create a new style for subsequent assignment to text within the document. The style to be created had the following characteristics:

- Name: UserDefStyle
- Font face: Helvetica
- Size: 14 pt
- Font style: Bold italic
- Spacing: 6 pts before, 6 pts after
- Indentation: 0.5 inches
- Alignment: left

For the purposes of the evaluation form, this was considered word processing application goal #1.

2.1.1.2 Assign the New Style to Text

As a follow on to the first goal, the user attempted to apply the newly defined UserDefStyle to text within a document. The style was applied to text that would be used as a header in the document; therefore, it was assumed that the user would be able to continue typing body text in the normal, default style immediately following the header (that is, after pressing the Enter key).

For the purposes of the evaluation form, this was considered word processing application goal #2.

2.1.1.3 Tracking Modifications

The purpose of this goal was to determine how well the word processing applications handled the tracking of document modifications. This feature of the applications is particularly useful for collaborative writing activities. To accomplish this, it was expected that the user (acting as both original author and editor) would be able to:

- Create and save a simple text document.
- Locate and use the application's tracking feature to:
  - Insert additional text into the document.
  - Remove text from the document.
- Save the document with a slightly different filename.
- Locate and review the editor's comments in the edited version of the document.
- Decide whether to accept or reject each change. For accepted changes, incorporate them into the original document and resave the document.

For the purposes of the evaluation form, this was considered word processing application goal #3.

2.1.1.4 Pasting an Existing Spreadsheet Chart into a Document

The purpose of this goal was to test the cross-compatibility of the word processing and spreadsheet applications. To accomplish this goal, the user was to copy a chart from an existing spreadsheet and paste it into the word processing application.

For the purposes of the evaluation form, this was considered word processing application goal #4.

2.1.2 Spreadsheet Application Scenario

In the spreadsheet application scenario, the user attempted to achieve the goal described in the following section.

2.1.2.1 Creating a Chart

The purpose of this goal was for the user to create a chart. The chart to be created had the following characteristics:

- Chart type: bar chart
- Dimensions: two-dimensional (x and y variables)
- Data points: 16 integers
- Chart size: 4 x 3 inches
- Chart text:
  - Font face: Arial
  - Font size: 7 pt
  - Font style: Normal
- Colors: none (black and white)

For the purposes of the evaluation form, this was considered spreadsheet application goal #1.

2.1.3 Presentation Application Scenario

In the presentation application scenario, the user attempted to achieve the goals described in the following sections.

2.1.3.1 Creating a Simple Presentation

The purpose of this goal was for the user to create a simple presentation, which consisted of the following sub-goals:

- Select a predefined presentation template.
- Create a title slide.
- Create a slide consisting of a subtitle and three bullet points.
- Create a slide consisting of a subtitle, a clipart graphic, and two bullet points.

For the purposes of the evaluation form, this was considered presentation application goal #1.

2.1.3.2 Pasting an Existing Spreadsheet Chart into a Presentation

The purpose of this goal was to test the cross-compatibility of the presentation and spreadsheet applications. To accomplish this goal, the user was to copy a chart from an existing spreadsheet and paste it into the presentation application.

For the purposes of the evaluation form, this was considered spreadsheet application goal #2.

Note: It was expected that there might be multiple ways to accomplish these goals within each application. Therefore, users executed the tasks they believed would allow them to successfully accomplish each goal. If problems arose, users were free to consult the product's documentation or other user support for guidance.

2.2 Evaluation Criteria

This section describes the project team's approach to the assessment and provides information about the criteria that was used during the assessment.

2.1.1 Overview of Evaluation Approach

The project team used a combination of the critical incident assessment criteria described in management's handout (see *Section 2.1.2, Critical Incident Assessment Criteria*) and Nielsen's Ten Usability Heuristics (see *Section 2.1.3, Nielsen's Ten Usability Heuristics*) to create a form for evaluation. Each team member used the same form to record their individual attempts to perform the goals described in Section 2.1, Office Scenarios. Based on the pattern that emerged from this data collection process, the project team selected the most prominent and critical usability heuristics for more detailed discussion (see *Section 3.0, Evaluation Observations*). Completed evaluation forms can be found in *Attachment A*.

2.1.2 Critical Incident Assessment Criteria

The critical incident assessment criteria that were considered during development of the evaluation form are as follows:

- Record where you were within the interface when the incident occurred.
- Briefly describe the type of system interaction you were engaged in when the incident occurred.
- Briefly describe the details of the incident. Indicate the features of the interface and the function that led to the success or failure you experienced.

- Determine how critical the incident was in affecting your ability to complete the task, using the following scale (1 Extremely Non-critical > 7 Extremely Critical).
- Indicate whether you were able to complete the task.
- Identify whether you consulted online help or other user support; record whether the resource enabled you to complete the task.
- Estimate how long it took you to complete the task, or estimate how long you worked at the task before giving up.
- Indicate whether the time spent was acceptable or unacceptable.

2.1.3 Nielsen's Ten Usability Heuristics

The specific human factors/usability criteria by which the project team assessed the two office product suites were taken directly from Nielsen's Heuristics for User Interface Design (1990 (a)) and are listed below for quick reference.

- **Visibility of system status**: The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.
- **Match between system and the real world**: The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.
- **User control and freedom**: Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.
- **Consistency and standards**: Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.
- **Error prevention**: Even better than good error messages is a careful design that prevents a problem from occurring in the first place.
- **Recognition rather than recall**: Make objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.
- **Flexibility and efficiency of use**: Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.
- **Aesthetic and minimalist design**: Dialogues should not contain information that is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

- **Help users recognize, diagnose, and recover from errors**: Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.
- **Help and documentation**: Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

2.1.4 User Archetype

The project team defined the archetypical user as college-educated and computer literate. At a minimum, this user can accomplish simple tasks using office applications (such as writing and saving a letter in a word processing application, creating a simple chart in a spreadsheet application, or creating a simple presentation in a presentation application). All evaluators acting as the archetypical user met or exceeded the knowledge requirement. In fact, most were proficient using office applications in the Microsoft Office suite.

All evaluators acting as the archetypical user of the office applications used OpenOffice 6.0 (provided by management on CD-ROM) and Microsoft Office 2000. For some evaluators who did not already have the JDK installed on their machine, OpenOffice 6.0 was installed without this option.

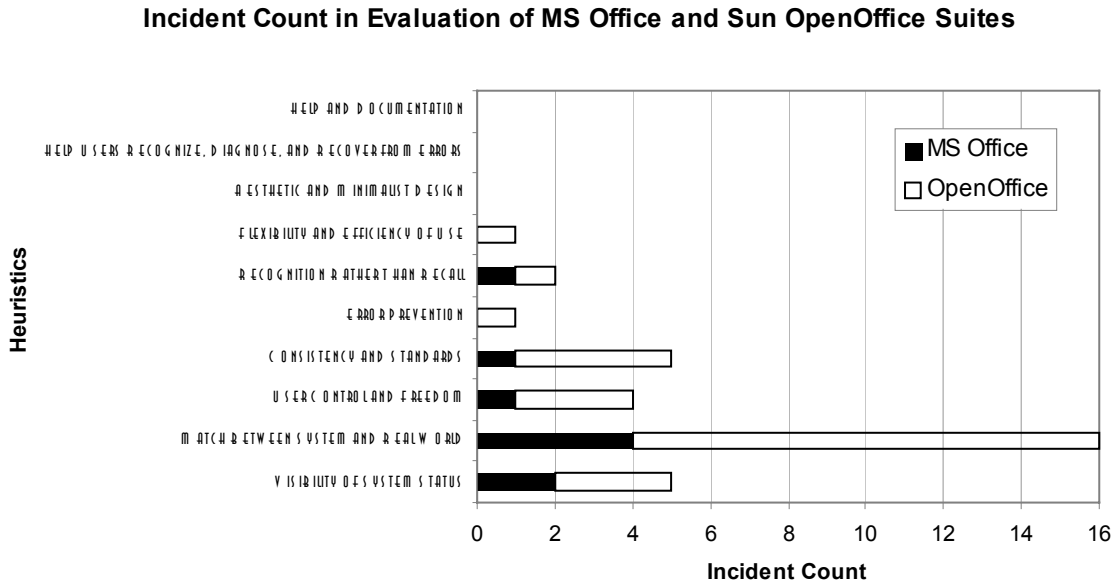
2.1.5 Evaluation Assumptions

The assumptions formed by the project team prior to the individual evaluations were as follows:

- With the effort and brainpower of developers around the world, we expect that the OpenOffice suite may be more feature-rich and more usable than its nearest competitor (although it might not yet be as popular).
- Although cross-platform compatibility and standardization is an important feature for those on non-Microsoft operating systems, it is still interesting to learn how the OpenOffice Suite works with Microsoft operating systems because this is still represents most of the operating system market.
- In contrast to the first assumption, the open source initiative may also hinder usability efforts if most of the thought and innovation focuses around developer/programmer involvement.

3.0 Evaluation Observations

The chart shown below illustrates the positive and negative incident counts encountered by the project team during individual evaluations of the OpenOffice and Microsoft Office suites. The raw data for this chart is available in *Attachment B, Raw Incident Data*.



As the focus of this discussion on evaluation observations, Waltham Interactive Design has selected the three heuristics shown at the bottom of the chart. The Visibility of System Status and Match Between System and Real World heuristics were selected because they had the highest and second highest incident counts. User Control and Freedom was selected over Consistency and Standards because the team felt that Consistency and Standards was in many ways similar to the Match Between System and Real World heuristic. (See *Attachment A, Completed Evaluation Forms* for more detailed explanations of these and other evaluation results.)

Observations are grouped according to the usability heuristic that was either supported or violated in an OpenOffice interface. For each of the heuristics described, we provide examples of how the heuristic affected the user experience, and describe the associated implications of the experience from a usability/human factors standpoint. When relevant, we provide information about how similar applications in the Microsoft Office suite performed in comparison to the OpenOffice applications or provide general recommendations for future product incarnations. Finally, the last section discusses the marketing implications associated with the project team's heuristic evaluation.

3.1 Visibility of System Status

The users recorded several incidents with regard to the visibility of system status heuristic while attempting to achieve the predefined goals.

3.1.1 User Experience

The user's experience in the OpenOffice word processing application alone resulted in a total of three incidents for the visibility of system status heuristic, several of which were deemed unacceptable by users primarily because of the severity associated with the incident. One such incident involved an editorial task where the user was unsure if the application actually processed the requested task. For example, the user was could not see a strikethrough line through text and was forced look into "Accept and Reject Changes" window to determine what change was made to the text. Another incident where the system status was not visible occurred after copying a chart. The user remarked that, although the chart was visibly marked after selection, the user was not sure if the chart was actually copied onto the clipboard when the appropriate tasks were executed.

Additionally, users found that starting the OpenOffice word processing application was significantly slower than the time required to start Microsoft Word. It was estimated that it took nearly 30 seconds for OpenOffice to start up, while Microsoft Word took less than 10 seconds. Furthermore, OpenOffice failed to provide any indication to the user during this extended startup period. The user also hypothesized that on slower machines, the perceived or actual time for the application to start might be worse.

Comparatively, the user recorded two incidents regarding visibility of system status while using the Microsoft Word application. One incident involved an unlabeled drop-down list. Although it was not labeled as Style, the user was able to notice that this drop-down menu always showed the current style being applied to text. The user encountered the other incident while attempting to paste an existing chart into a file, when clicking operations failed to show the selection of the entire chart (similar to the OpenOffice incident, previously described). Overall, these incidents were deemed to be critical in severity, but users still rated these incidents as acceptable because the problems did not prevent them from achieving their goals.

3.1.2 Usability/Human Factors Implications

The usability/human factors implications of an application with inadequate visibility of system status may be decreased performance due to the additional time and steps required to achieve goals, and a perceived negative user experience (Coe, 170). In each incident recorded, the visual feedback of the OpenOffice system was not only inadequate but was also critically absent, resulting in experiences of confusion and frustration as extra effort was required to determine if a task was successfully accomplished.

The user time estimate for startup of the OpenOffice word processing application was approximately 30 seconds. In terms of response time, this start up time exceeds the 10-seconds typically cited as the limit for keeping a user's attention focused on the dialogue (Nielsen, 1994 (b)). Because it may not be programmatically feasible to decrease the system start up time, the user may have no alternative but to wait. However, if the system provided the user with information on the status of the application during this time, it might distract the user from the extended timeframe. For example, Nielsen recommends percent-done progress indicators for operations taking more than 10 seconds. Progress indicators have three main advantages: they reassure the user that the system has not crashed but is working on his or her problem; they indicate approximately how long the user can be expected to wait, thus allowing the user to do other activities; and they finally provide something for the user to look at, thus making the wait less painful (1994 (b)).

3.2 Match Between System and the Real World

The users recorded several incidents with regard to the match between the system and the real world heuristic while attempting to achieve the predefined goals.

3.2.1 User Experience

The first type of negative incident occurs when a user expects an OpenOffice application to have the same feature set as a comparable Microsoft Office application. For example, when creating a presentation, the user believed that there would be some predefined set of graphics (clipart) that she could select from and insert into a presentation slide. Unfortunately, the user quickly learned that a clipart gallery is not a standard feature of OpenOffice. To compensate for this, the user then attempted to insert her own graphic, but had some difficulty determining whether there was a special location in the directory structure where the graphic should be saved (again, as specified by Microsoft Office conventions). A second example of this incident occurred in the spreadsheet application. In this case, the user believed that clicking on the x or y-axes would open a dialog box where he could then label the axes.

The second type of negative incident reflects the heuristic in its purest sense (without so much relevance to prior knowledge of the Microsoft Office suite). For example, when attempting to create a chart in the OpenOffice spreadsheet application, the user selected Data Pilot from the Data menu, mistakenly believing that this option would invoke a wizard that would allow him to create the chart. However the user was not able to accomplish his goal by following this path. Another, simpler example of incompatible system and real world expectations is when the user selected two lines of text in the OpenOffice word processing application and then pressed the Tab key. She expected both lines to indent as a result of this action, when in fact, only the first line did.

Fortunately, not all incidents recorded by OpenOffice users were negative. The suite had quite a few positive examples with regard to this important heuristic and in some cases, the incidents illustrated areas where the OpenOffice

application was deemed more usable than the comparable Microsoft application. For example, the tasks users performed to select predefined presentation and individual slide templates were well received. (This could be attributed to the fact that the tasks reflected previously established Microsoft conventions.) However, though inserting slides was initially met with some confusion (since it breaks with the Microsoft convention), one complete pass through the procedure convinced the user that the OpenOffice technique was superior. Another positive incident was recorded by a user who is familiar with Microsoft Word's change tracking feature, but was extremely pleased to find that in the OpenOffice word processor, this option was located under the Edit (as opposed to the Tools) menu, because that is where the user always expects the feature to be located.

3.2.2 Usability/Human Factors Implications

The Match Between the System and Real World heuristic is essentially a measure of how well software applications leverage their users' mental models. According to Hackos and Redish, a mental model is an individual and somewhat variable "collection of associations in people's minds," which they use to make sense of their environment and to understand new experiences. If one is able to link a new experience with prior knowledge, learning will occur more quickly. Additionally, these associations set users' expectations of how their world (physical or virtual) will respond to their interactions with it (41).

Because the users evaluating the OpenOffice 6.0 suite had extensive experience using the Microsoft Office 2000 suite, they brought a number of previously formed notions with them when asked to achieve the office scenario goals. Although these expectations may not be considered "real world" in the physical sense, the users have become habituated to the Microsoft Office mental models in the virtual world and are therefore affected by these notions as if they were from the real world. One user stated, "I completed the entire presentation in 5 minutes. Had no trouble adding the graphic to the file. The software just did it. I didn't have to do anything. It's a bit odd to select system/real world match in that the real world for me is Microsoft Office products, since that is what I use and know."

Therefore, the ease with which users can successfully perform tasks that will lead them to the accomplishment of their goal is, perhaps unfortunately, guided by how well the OpenOffice interface matches the standard set by Microsoft. It would be almost impossible to find test users whose mental models have not been affected by the Microsoft Office standards in one way or another. In cases where the OpenOffice application does not meet users' expectations (by breaking with convention), the interface must demonstrate it superior usability by successfully guiding the user through the unusual process the first time, and then by making the benefit immediately recognizable.

3.3 User Control and Freedom

The users recorded several incidents with regard to the user control and freedom heuristic while attempting to achieve the predefined goals.

3.3.1 User Experience

A total of four incidents were recorded for this heuristic, all of which were discovered in the word processing applications. Three incidents were recorded for OpenOffice, while only one incident was recorded for the Microsoft product.

The first incident occurred while using the OpenOffice word processing application to perform one of the tasks for Goal 2. The user found that the Paragraph popup window that "initially opened to the right of the text document" covered the document content when she started typing. The user found ways, however, "to close and effectively minimize it" without too much difficulty, assigned to it an acceptable task-to-completion time, and considered it to be a positive experience.

Although the user was able to create the new style in both word processing applications, the user also found that the Microsoft Word application anticipated her behaviors by changing back to a normal paragraph style when she pressed the Enter key. In contrast, the OpenOffice word processor provided more user control and freedom by remaining in the user-defined style until the user explicitly indicated there should be a change. (It is interesting to note, however, that because the user was an expert in Microsoft products, the behavior she expected was the former, and OpenOffice's failure to anticipate her actions was perceived as frustrating. For more information, see *Match Between System and Real World*.)

A similar incident occurred in OpenOffice while the user was performing a task for Goal 4: Pasting an Existing Spreadsheet into Document. She said of OpenOffice, "Centering the chart on the page is a nice default, but maybe the user wanted it to left align it with the previous text. Possibly this alignment could be modified, though this user did not attempt." While the user did not actually test if the alignment could be modified, her expectations were that it might not be able to be left aligned because the application's default is to center the object on the page. While arguments for either method could be made (anticipatory action versus explicit user control), it is notable that both word processing applications did allow the user some form of explicit style and alignment manipulations, although only the default behaviors were immediately apparent to the user.

Lastly, the user recorded a negative experience and assigned the only unacceptable task completion time of 10 seconds while trying to save the file for Goal 2, because the OpenOffice word processing application required her to step through the directories one-at-a-time to find the directory in which to save. The user indicated, "when saving the file…the Save As dialog only allows the user to

step up one directory at a time. If there are many layers of directories (as was the case here), this can be time consuming and frustrating for the user."

3.3.2 Usability/Human Factors Implications

The implications of user control and freedom are crucial to positive user experiences, especially for a new, competing product. If users are not given the control and freedom they need to perform tasks, they may become frustrated, anxious, and apprehensive of the software application. The user who recorded the unacceptable task completion for Goal 2 when trying to save her file using the Save As dialog box is an expert user. But she was forced to navigate through the directory layers one-at-a-time to save her file, and recorded her frustration and annoyance at this usability defect in the OpenOffice application. Had she been a novice learner, she may not have been able complete the task. Ben Shneiderman notes that users should be given controls that permit easy reversal of actions because "this feature relieves anxiety, since the user knows that errors can be undone, thus encouraging exploration of unfamiliar options" (75).

The user experiences for the goals evaluated in the OpenOffice word processing application as they relate to user control and freedom were primarily positive. In some cases, the OpenOffice word processing application actually provided greater user control than Microsoft, such as during the creation of a new text style. However, sometimes there are tradeoffs with regard to heuristic support, and decisions about how closely to follow the Microsoft model must be considered.

3.4 Marketing Implications

As Nielsen indicates, each usability problem identified during a heuristic evaluation "can have a devastating effect on the popularity of a product" and thus, has an important impact on product marketing (1990(b)). Individually, these issues may seem like small hurdles that users can overcome with some persistence. However, these small hurdles can build up exponentially, leaving users tired from the cognitive friction the interface produces and giving them reason to abandon the product (Cooper, 20, 34). With Microsoft Office being so readily available and already perceived as "easy to use" based on years of habituation and market saturation, it would not take many usability problems for users to return to the infamously familiar office suite. And, since most of the examples described for the three heuristics were rated as "slightly critical" or higher on the user severity scale, it is essential for Sun and the open source initiative to be aware of the affect Microsoft has had on user's mental models and to take these general usability issues seriously.

If one of the objectives of OpenOffice is to directly compete with Microsoft, developers for OpenOffice will need to focus on creating positive experiences for users who may already be familiar with Office 2000. Doing so does not necessitate modeling every task on Microsoft Office methods, but it does require developers to consider how the interface design will support the heuristics discussed. OpenOffice must make performing the simplest of tasks, such as navigating directories, as easy (or easier than) the same tasks performed in Microsoft Office applications. The suite of applications must also pay

special attention to system feedback and allow users (at least) the level of control they have come to expect through years of using Microsoft products.

Currently, the openoffice.org Web site has almost no information about building usability into the product suite. It is unfortunate that Sun Microsystems seems to be relying solely on the open-source marketing cache of OpenOffice without providing explicit coverage on usability. Comparatively, Microsoft has taken definitive steps to make usability improvements and has received press coverage on its usability efforts. The Dallas Morning News recently reported:

> *"Since the usability group was started in 1988, the tests have played an increasingly critical role in the design process. Because software is so easily modified, the company can respond to test findings almost immediately during product development. Usability tests also aid the company in designing its help features"* (Goldstein).

Microsoft's Web site also contains a detailed press release about how their engineers developed a new version one of their products, MSN Explorer, using Alan Cooper's concept of personas (2000). Although Microsoft secured its market share by means other than usability, it is clear that they are beginning to focus on eliminating this weakness in their products.

Competing products (such as the OpenOffice suite) that fail to keep up with these usability efforts by Microsoft will have little chance of sharing space with this market leader. Perhaps more importantly, such products will result in little return on investment for their creators, financial or otherwise.

4.0 Conclusions

The heuristic evaluation performed by Waltham Interactive Design identified some usability problems with the OpenOffice application interfaces, which may be of great educational benefit to software developers. Even when one "estimates the value of usability problems based on expected user population," it is clear that these problems, when fixed, will add significant value to the product (Nielsen, 1994 (a)). It is important for Sun Microsystems management to act upon this data, and incorporate it into the development lifecycle of future product releases.

Sun Microsystems has a prime opportunity and an undeniable ability to compete directly with Microsoft's office products. OpenOffice has advantages that Microsoft Office does not – the brainpower of intelligent programmers worldwide, platform independence, alliances with other software firms (such as Palm Inc. in the handheld PC market), and the potential to provide network-centric services to users with the release of StarPortal. Despite these advantages, Sun cannot afford to ignore Microsoft's current, public work on usability issues.

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6.0 Attachment List

Attachment A: Completed Evaluation Forms

Attachment B: Raw Incident Data

Attachment C: Post-implementation Team Document