Proceedings of the 30th International Conference on Ocean, Offshore and Artic Engineering
OMAE 2011
June 19-24, 2011, Rotterdam, The Netherlands

OMAE2011- 4904

THE CHALLENGE TO DEVELOP A SOFTWARE MANUAL FACING COMPLEX ACTIVITIES IN THE OIL & GAS SECTOR

Paula Cabral de Menezes
MBA, Journalist
PhDsoft Tecnologia Ltda
Rio de Janeiro, RJ, Brazil

ABSTRACT

This paper presents the stages of preparation of the C4D software user manual. This software has been developed by PhDsoft and is intended to be used in connection with complex tasks such as the management of the integrity of the structures of offshore platforms, FPSOs and vessels, by providing repair and maintenance services such as sizing and placing of anodes, assessment of paint deterioration, among others.

Oil companies tend to be huge in size and number of employees with different skills, psychological and behavior profiles. Considering that the software also serves as an interface with service providers, many other professionals were added, thereby greatly increasing this diversity. Therefore, meeting the needs of such heterogeneous expectations is the challenge faced by the author of the user manual.

The purpose of the software manual is to facilitate the transfer of information and knowledge so as to develop the user's skills and competencies. Since the software is an engineering tool, it is not enough to present the directions and the steps of the software's specific tasks and procedures. It is necessary to provide the users with the technical principles used in the software functions.

The manual must also be integrated to the company's strategy by adding value to the product so as to be perceived by the stakeholders as a strong aspect as regards the competitors, being also an effective instrument for establishing closer ties.

This paper presents the experience of using a journalist to draft an essentially technical text, in an attempt to unite the attractiveness of the text to the accuracy necessary for its effective use, by following the best practices recommended for documentation and establishing metrics to check the efficacy of same, especially in accordance with norm IEE 1063 – Standard for Software User Documentation.

INTRODUCTION

The basic role of a user manual is to provide instructions for use of the product, eliminating the most recurrent doubts and clarifying the product features by means of clear and precise information.

In accordance with this line of reasoning, according to Barker (2002), the role of a manual is to help users to improve their performance in the workplace. Barker adds that the manual is supposed to adapt the software to the user, by taking into account that the most important aspect is not the program itself, but how it may help users to improve their performance and keep their jobs, preferably with promotions.

And, in the case of the C4D, to achieve the objective of improving the user's performance in the workplace, it is necessary to take into account that it is not possible to evaluate beforehand the technical competencies of each user and also to consider the need to establish an efficient communication channel with every kind of user, bringing together technical information and information on the use of the product. This involves standardization in terms of content and language, in order to satisfy all groups that are part of the Adoption Curve proposed by Roger (1995).

Once the profile of the standard user has been defined, it is necessary to determine the precise formatting to bring together the information on the execution of the tasks (step by step commands to create Repair Campaigns; Painting Campaigns; Anode Campaigns, among other tasks related to maintenance) and the technical parameters used to check on the track record of repairs carried out and present the projections of

deterioration and repairs, based on measurements made over the course of time. This formatting should give rise to an objective document containing clear and accurate information, so as not to lead to any errors in interpretation that may prejudice the execution of tasks and procedures.
This paper will present all phases of the project, from the selection of tools to edit the manual, analysis of the user, usability, information architecture, information design through to the acceptance tests.

1. PHASES IN THE COMPILATION OF THE MANUAL

The C4D user manual was compiled in three phases:
1. Collection of the technical information without in-depth knowledge on the use of the software.
2. Structuring the manual, by compiling the technical part based on the use of the software by experienced users – developers of the software and the 3D modeling team of the company.
3. Restructuring after usability tests on the part of the editor (journalist) and understanding of the use of the software – step by step of the execution of tasks - for experienced and intermediate users as well as beginners.
The execution of all these phases by a journalist embedded in the Company enables a full interaction cycle that goes beyond the contents of the manual, giving rise to knowledge on all areas as may be seen in Figure 1.

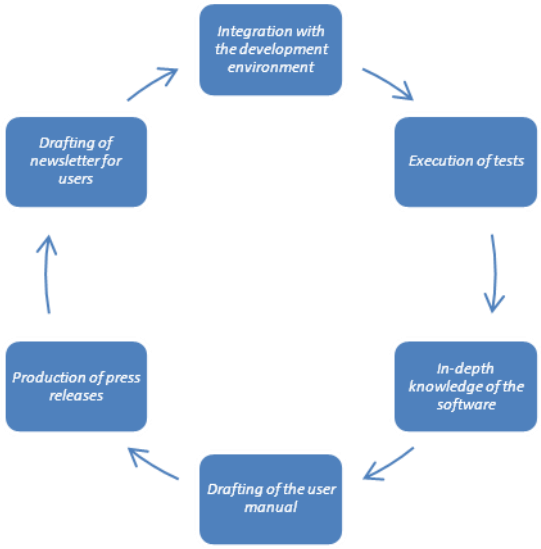

Figure 1. Knowledge Cycle

2. SELECTIONS OF TOOLS – BIBLIOGRAPHY AND SOFTWARE

Concomitantly to the beginning of the collection of information about the parameters used in the execution of tasks of the management maintenance system by the software, research was conducted on the bibliography dealing with techniques for the drafting of manuals and tools used in the preparation of same. The bibliography was obtained through research via the Internet and, after tests focusing on cost/benefit, the program selected for the release and updating of the manual (PDF and web versions) was the Help & Manual software.

3. USERS ANALYSIS

After collection of the technical information and selection of tools, the user analysis phase was launched in order to determine the language, form and presentation of the manual, by taking into account the Adoption Curve concept.
The software has been in use at Petrobras and Transpetro for 14 years, by engineers from different areas of maintenance and new users of these companies are often integrated to this Universe. Concomitantly, the goal of PhDsoft is to win over new clients in other companies and this will lead to a marked increase of this Universe.

3.1 Diversity of users: the Adoption Curve

With the incorporation of new users, mainly those from companies other than Petrobras and Transpetro, the range of experience with respect to the software will be broadened with users who are totally unfamiliar with the software operation in the day-to-day of the maintenance of the assets, including those who use the software sporadically with an intermediate level of knowledge, at least with respect to particular tasks, and culminating with the “hard users”.
It is precisely at this point that the Adoption Curve concept makes mapping of these users possible in order to locate convergence areas among them. According to Figure 2, the users of technology may be divided into five kinds: Innovators; Early Adopters; Early Majority; Late Majority and Laggards.
Each group has its needs and expectations in relation to the product and its use depending on its personality.
The Innovators only require technology and neglect the manual.
The Early adopters, also known as Visionaries, think of how they will use the new technology to acquire competitiveness and demand a manual to help them to solve their problems.
The group formed by the Early and Late majority is not interested in taking risks and is in search of tested and confirmed technologies and, further, require a manual without any shortcomings, which is tried and tested and easy to use.
The last group, the Laggards, is even more demanding in relation to the ease of use of the innovation and consequently the use of the manual, since it is normally obliged to adapt to the new technologies.

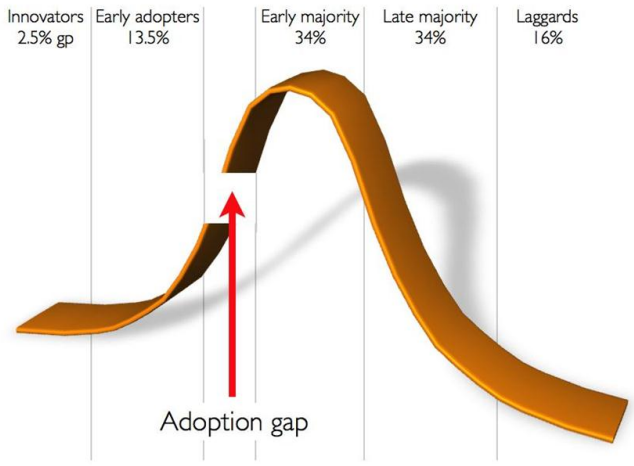

Figure 2. Curve of Adoption of Innovations

3.2 Search Behavior of Every Kind of User

Every group of users searches for a type of information in the manual in a different way.

Laggards will probably search for information on how to execute the basic tasks, both in the summary and the index, where they expect to find a synopsis that leaves no doubt about the contents.

The group formed by the Early and Late majority will probably search for information on the subtasks within given tasks, both in the summary and index.

The Early adopters, in turn, will probably search for calculations and technical grounds used in each function to be sure of how the software may assist in their tasks, seeking for a specific term in the index.

3.3 Use of the Program Profile

To structure the manual so as to clearly and objectively present all its features to the different groups of users, it is necessary to know in addition to their personality the way they interact with the software, how they use it to facilitate and expedite their work and how it imparts the information obtained.

It is necessary to understand how users interpret and execute the procedures (ordered series of steps followed by them to execute one or more tasks) inherent to the software and how they are related with their work, since all activities or tasks regarding the maintenance of assets require communication and interaction with other people in the work environment and suppliers.

It is necessary to emphasize the action (tasks) with details but with a sense of balance: if the information is too detailed, it may become confusing; if it is too simplified, it may be incomplete or inadequate for a given group, taking into account that learning is individualized and is linked to the competencies of same.

Figure 3 shows how the selection of the information and the communication of same must take into account the user context.

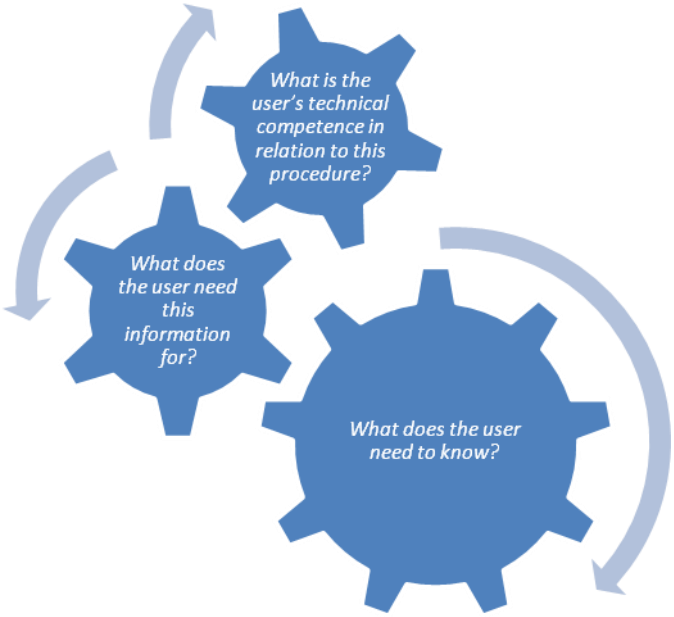

Figure 3. User context

3.4 User´s Level of Knowledge on Integrity Management

There is no way of measuring the technical competence of each user and it is therefore necessary to stipulate a "standard" user and the kind of language, information and documents for this target public, so as to establish productive communication.

3.5 Level of Knowledge and Functions of the software

This is another point where there is no way of measuring the knowledge of all C4D users or their exact position in the Adoption Curve, it therefore being necessary to present, in the manual, from the pages dedicated to the software and its items (Figure 4.), the step by step features such as the Visualization Options (Figure 5.) through to technical communication about information made available in the Degradation Curve tool (Figure 6.).

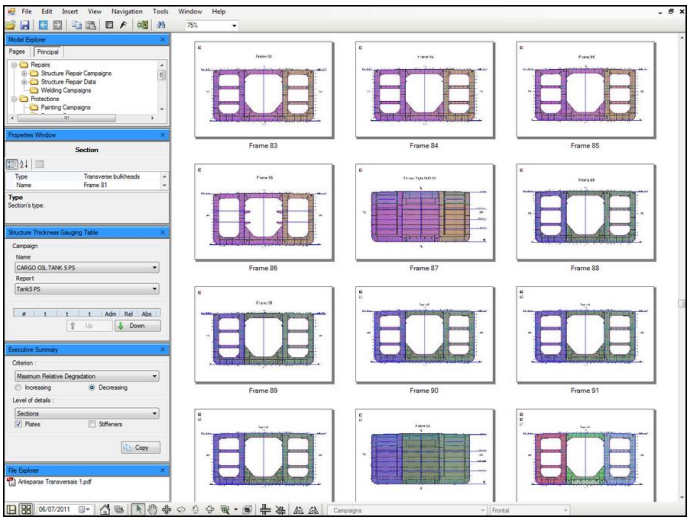

Figure 4. Presentation screen

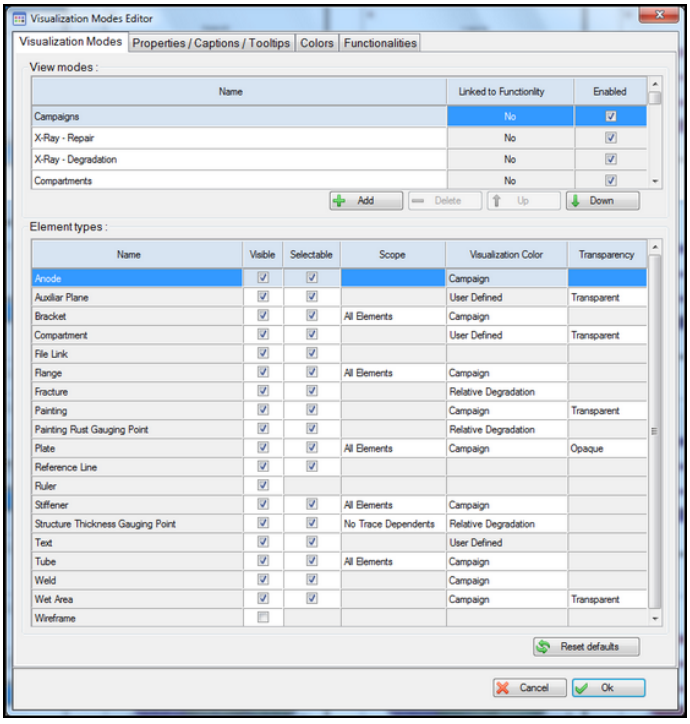

Figure 5. Visualization Modes Editor tool

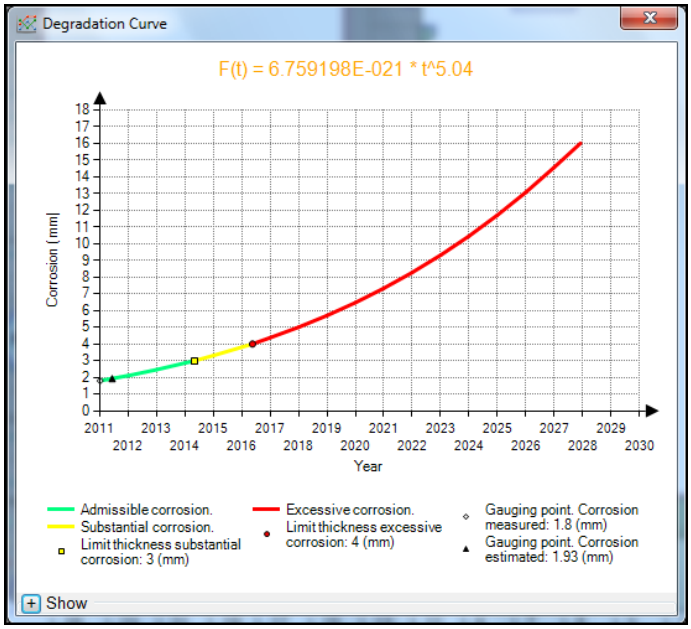

Figure 6. Degradation Curve tool

An example of technical communication on concepts appropriate to the software is the Degradation Curve tool (Figure 6.), on which the manual presents information as follows:

"This tool makes it possible to extrapolate the degradation of structures thickness gauging points over the course of time.

Using the Degradation Curve, it is possible to obtain the precise history and extrapolation of a single point. To do this, simply open a page and click with the left button of the mouse on any thickness gauging point. Next, click the right button of the mouse and select the Degradation Curve option in the Context Menu".

The Degradation Curve has a series of built-in information on the element:

a. Permissible corrosion

b. Substantial corrosion

c. Limit of corrosion of substantial thickness

d. Excessive corrosion

e. Limit of corrosion of excessive thickness

f. Estimated date for the change of status of degradation of the element

g. Measurement point (measured corrosion) – Precise date of the first measurement of thickness carried out at the selected point

h. Measurement point (estimated corrosion) – Corrosion estimated at the time fixed on the Reference Date

For the use of this tool, the manual must also explain all parameters used to calculate the degradation - how many, where and why the gauging points were selected and other technical informations.

4. USABILITY

The evaluation of the usability must take into account:
1. Ease of utilization of the manual
2. Speed of finding answers
3. Facility in learning how to use the software
4. Efficacy and efficiency in the execution of the task and/or procedure
5. User satisfaction

This leads to the end product that must comply with the following objectives: if the manual is easy to use, users achieve higher productivity, in other words they know the interface better and learn more quickly to use the software, memorize the operations and commit less errors.

According to Rosenfeld & Morville (1998), the lack of structure of a technical document may cause problems in the communication and impair the final result, leading to problems such as:

1. Periods spent on a daily basis in the search of existing but unclear information that may prejudice the performance and frustrate the users.
2. The impossibility to locate relevant information and this may result in inappropriate decisions and duplication of efforts in the execution of a task.
3. An increase in training time and this may be reduced upon its simplification with information presented in a coherent manner.

5. INFORMATION ARCHITECTURE

Good information architecture presupposes a clear definition of the logical path that the user must follow to find information easily and efficiently.

In the case of C4D, it is necessary to know the logical path of the phases of maintenance of assets and this is already an integral part of the software interface and, within these phases, it is necessary to subdivide them into procedures and tasks so as to facilitate the route followed by the user to reach the evaluation sought. As an example, we have the Painting Rust Images Analysis tool (Figure 7.) that makes available many options of analysis and that must be included in detail in the manual, as these procedures are exclusive of same.

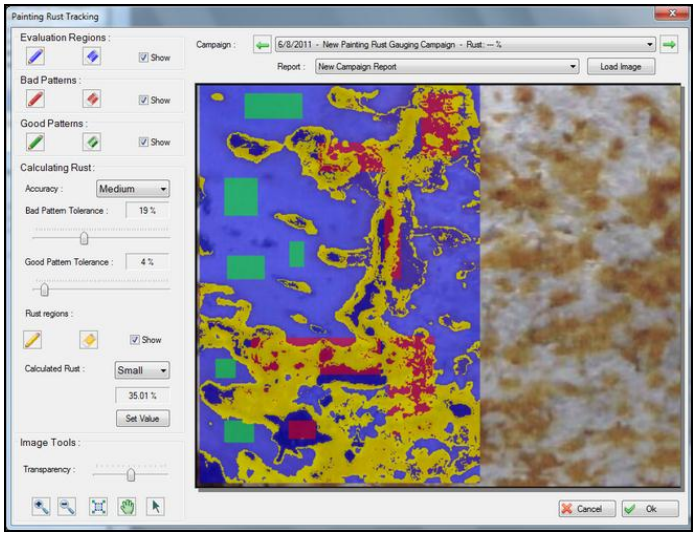

Figure 7. Images Analysis - Painting Rust Tracking tool

In the above-mentioned example of the Image Analysis - Painting Rust Tracking tool (Figure 7.), in addition to the route to be followed for the execution of the analysis, it is necessary to explain the operation of each control as demonstrated in the example herein below, with some of these controls:

Define Evaluation Regions – it makes it possible to define the region in which one wishes to apply the evaluation calculations. The region will be highlighted in blue.

Define Bad Standards - it makes it possible to define the region deemed to be with an undesired level of painting rust. The region will be highlighted in red.

Define Good Standards - it makes it possible to define the region deemed to have an acceptable level of painting rust. The region will be highlighted in green.

Define Corrosion Regions - it makes it possible to define a region with undesirable wear, on a manual basis, so that it may be included in the analyses of image. The region will be highlighted in yellow.

6. INFORMATION DESIGN

According to Professor Carla Spinillo, "the information design is an area of the graphic design that seeks to equate the syntactic, semantic and pragmatic aspects that involve information systems through the contextualization, planning, production and graphic interface of information. Its basic principle is to optimize the process of acquisition of the

information included in the analogical and digital communication systems".

In the preparation of the manual, the main issue raised that involves these aspects is to select the best way to transmit information: text or illustrations? In this case, since the software interface features both aspects, with visual controls to obtain the information that may be made available in the form of reports or images, it was decided to mix the two forms as seen in Figure 8, showing how to proceed in both ways to use the Degradation Curve tool.

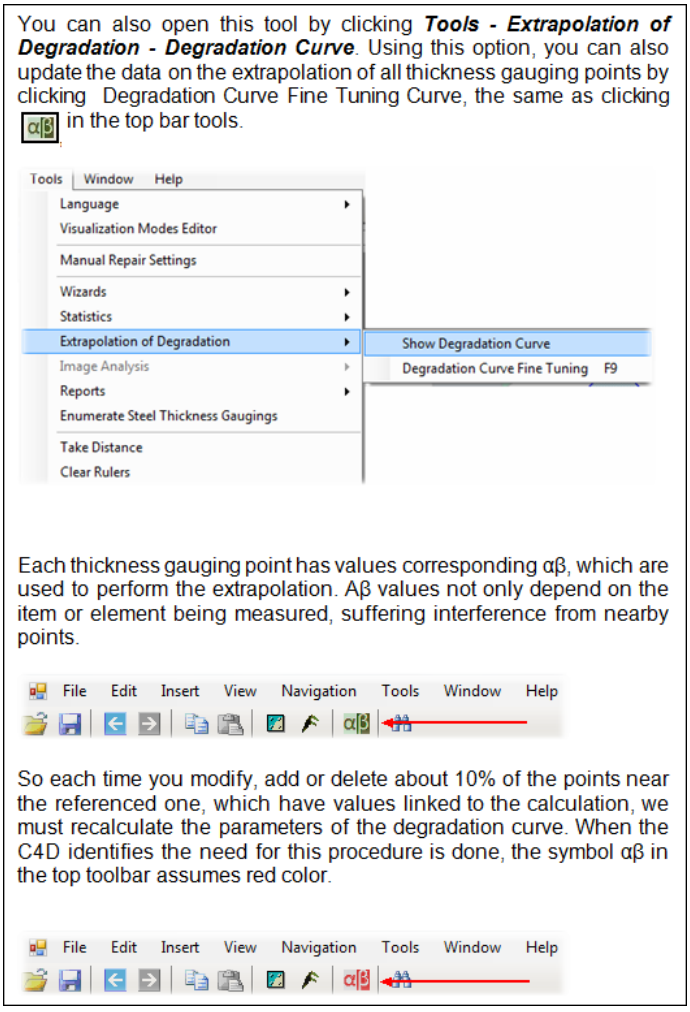

Figure 8. Example of manual page with text and illustration

7. TESTS

The tests were conducted in three phases:

1. Checking the technical information.
2. Usability tests with developers, modelers and users.
3. Tests of information architecture with developers, modelers and users.

At each phase, people with different levels of knowledge both as regards the management of assets maintenance and the use of software were selected, and the following points were evaluated:

1. Time estimated for the execution of a procedure, after reading the manual.
2. Signs that it is clear to the user that some steps must be taken to carry out the procedure.
3. Indication of error and suggestions for correction.

8. FINAL CONSIDERATIONS

At the end of the whole process of preparation of the software manual, what is expected is that the user feels secure when consulting the document and clearly perceives the potential benefits achieved with use of the software.

ACKNOWLEDGMENTS

Duperron Marangon Ribeiro, PhDsoft's CEO, for his trust.
Walter Herrera, PhDsoft's Head of Development, for his support.

REFERENCES

1) BARKER, T.T. Writing Software Documentation – A Task-Oriented Approach. Longman, 2002.
2) CARLA SPINILLO, in www.sbdi.org.br, 2010.
3) NORI L. Jr., in www.portaldomarketing.com.br, 2007. ROBINSON, P. A., ETTER, R. Writing and Designing Manuals. CRC Press, 2000.
4) ROGER, E., Diffusion of Innovations. Paperback, 1995. ROSENFELD, L., MORVILLE, P., Information Architecture for the World Wide Web. O´Really&Associates, 1998.
5) SANDRA M. R. DE SOUZA, MARIA REGINA L. SCHMID, O Tratamento de Informação no Design de Catálogos Técnicos Impressos *(The Treatment of Information in the Design of Printed Technical Catalogues)*, InDesign – Revista Brasileira de Design da Informação *(Brazilian Journal of Information Design)*, 2009.