

XML took us to interactive 3D

Ulf Jansson

AerotechTelub Information and Media Växjö Sweden

ulf.jansson@ aerotechtelub.se

Introduction

At the R&D department at AerotechTelub Information and Media, we have carried out a study on new ways to search and present information to different user categories. The result of this study was a browser with a new interface - a new XML browser. The project originated in developing the next generation of spare parts catalogues for the Swedish Defence Materiel Administration (DMA). The solution presented was based on a new user interface comprising a mixture of presenting structure, interactive 3D and text information on the same screen. The 3D-technique that just recently was available only to those with big money and a state of the art computer is now available to anyone with standard equipment. On the way we realised that this way of presenting information gave a clear and easy-to-understand view of the objects described and opened up for a phase 2 of the study. In this second phase the user interface was further developed to allow fast access to all document types (repair manuals, functional descriptions, spare parts catalogues etc) using the structure and interactive 3D for "vertical navigation" and filters for the different document types for "horizontal navigation".

Scenarios

The information volumes increase dramatically and will continue to do so in times to come. The objects/functions being described have become more complex. It is getting more difficult to understand and to find the information needed. This is the scenario for the user.

The producers owning the problem to feed the users with adequate and efficient information also have been facing extensive costs involved in licences needed in the distribution process. The evolution of XML and the low cost XML tools have provided the space to move the focus from minimising distribution cost to maximising information availability. This is the scenario for the management.

The Basic Question

Is there a car that anyone can drive? Or the same question seen from another perspective – Is it possible to create an information product that for any given situation can provide any/every user with the necessary information (and nothing more)?

The question to be answered contains a large number of variables that need to be defined. To set the stage, the first thing to define is “information product”. In this paper we define an information product as an interactive electronic technical publication (IETP) often also referred to as an Interactive Electronic Interactive Manual (IETM). The term IETP/IETM is interpreted as:

Interactive	User controlled information with role-based access.
Electronic	Electronically accessible information stored in the computer, on a mass memory (e.g. CD, DVD), accessed over a network or in any combination thereof.
Technical	The word technical imposes a limitation on the interactive electronic information and suggests it to be a concern in technical contexts only. In this paper we would like to extend the understanding of "technical" to embrace any kind of information of the same degree of complexity as for modern technical systems and products. In fact, we would argue that very many types of information carry that property.
Publication / Manual	The word publication / manual is a reminiscence and used as a conclusive term for manual, book, catalogue, instruction and so on. Actually publication / manual is used as a substitute for a word to be invented and understood as the information that up to now is found in different types of printed material. In the new applications emerging, a number of possibilities like sound, animations, videos and other possibilities are added.

Along the way a number of more or less intricate standards have been written to catch the properties of an IETM/IETP, like the US DoD MIL-M-87268 and MIL-D-87269. With the development of computers and techniques around the computers the so far developed IETP standards tend to become obsolete quite fast. It is also a fact that since information is provided electronically in an

increasing number of applications, new demands arise and previously adopted techniques become out-aged. Therefore, instead of leaning towards any existing standard, it seems more relevant and prosperous to base an IETP on the principles which could be derived from the properties of human perception.

Who is the user?

In the Basic Question we set the user to be anyone! Thus we include the specialist and trainee, the teacher and student, the marketing manager, the designer and service technician and so on. There are people grown up with the computer as well as the ones that still are afraid of a computer. Increasingly often the information should preferably be presented to people with different cultural backgrounds and references. The one thing they all have in common is the need for information to be able to perform their job.

Depending on who the user is we need to provide him/her with a battery of possibilities to be used to search, present and to make information easy to access and assimilate.

In order to make the role-accessed information possible the key words are structure, intuitive interaction and selective presentation. But this is not enough, we also need to put cognition theories into practice. Among the cognitive enhancers available, visualisation is the most powerful. (In the future we most likely will be able to tickle all our senses with the computer. Or are there already today latent techniques that could be adopted in today's computers?).

Information Structuring

Large quantities of information is created at different parts of a company, or even across companies, and stored in databases. When it comes to technical information its validity time may in many cases span several decades. This calls for a number of factors to take into consideration like possibilities to transfer information into new computer systems, reuse of information and for cost effective updating to mention a few.

The structure and granularity of the information define the possibilities as well as the limitations in later use of the information in different ways. The modern mark-up languages like SGML and XML have brought along means to focus on the basic properties of the textual information in an efficient way, and this without jeopardising flexibility and future information reuse. They form an important part of the foundation needed to provide user- and situation adapted information on a long-term basis.

The textual information is vital and will remain important in times to come. However, there are many problems associated with this type of information. Any textual information is local in the respect that it is written in a language

that only can be understood in a part of the world. Individuals with a limited set of references do the authoring, and when translated to another language there is always a risk for misinterpretation of the information.

Illustrations in 2D is a bridge between languages and often also between cultures. With the use of 3D further clarity is achieved and when used in animations even difficult procedures can be unambiguously explained with a minimum of additional words. Of course the same is true for a video sequence. In the use of 3D animations it is possible to generate sequences based on construction drawings (CAD). In many cases it is essential to show a function before it is produced in the factory.

A new browser concept

Our experiences indicate that browsing information can be considerably simplified if the information structure is visualised in graphics. Therefore we suggest that the screen is divided into three flexible windows to allow simultaneous presentation of interactive 3D, hierarchical structure of the equipment and the information associated with part shown. (The information window is used to display text in various data formats as well as animations or an online web page). This way, a number of the so called cognitive enhancers are activated to aid the user. Moreover, the way to navigate is made efficient and simple. In the development process we have balanced between the sophisticated and the easy-to-use and have gone for what is believed to be the most efficient for the user, taking into consideration that "the user" actually is plural! The user can be the trainee or the specialist, the salesman or the teacher.

As opposed to the traditional browser the new and XML-aware browser makes use of the interactive 3D representation as a quick path to reach the information needed. In addition filters are used to select the type of information to be presented. In the browser we also make use of an "electronic gear-shift" that e.g. allows the user to present an exploded view in 3D of an object or to take a step upwards in hierarchy. The approach has proven to provide an unprecedented way for the user to navigate and to reach information with intuitive means.

A topic when new technical advancements are considered and introduced is to make them fit into an existing environment. Usually, it is better to evolve than revolve. So the question has been, how to achieve the benefits of the efficient 3D-based presentation, without having to throw overboard the existing solutions, already proven functional and effective.

Today the DMA has implemented a versatile system to handle the digital materiel related information that is acquired and produced on the behalf of the Swedish Defence. The corresponding situation is true for most information intensive organisations and operations. Usually there are already platforms in place to house a variety of data formats, including Word, PDF and HTML

documents, not to mention SGML. These platforms are established to handle information efficiently and safely in their specific contextual situation. Mostly they represent considerable investments that must pay off.

The browser concept that we have developed is specifically formed to allow that 3D-presentation can be added to the existing "legacy" of information, may that concern maintenance, operations or marketing. The 3D structural information can be derived from existing parts information and CAD drawings. By reuse of the structures inherent in the available SGML information, with the trivial transition from SGML to XML and with a 3D tool based on standard XML-components we found the path which smoothly takes us from a present good world in 2D to an even better one in 3D. We believe that this can be done in a variety of situations where information has to be conveyed to a heterogeneous user community. We're convinced that applying the principles of the new browser concept provides the answer to our initial basic question: Yes, it is possible!