

set or VIEW links, (4) *Timed reference to a contact person* or CONTACT links, and (5) *References to off-line documents* or REFER off-line links.

Some link types may be motivated by unix/DOS system commands. For example REFER is similar to *xloadimage* for bit-mapped pictures in DOCS.

This DHC tool was applied to Low-Visibility Landing and Surface Operations (LVLASO) project at NASA Langley Research Center. The impact on LVLASO is that the DHC tool is applicable to early stages in systems development. Also, brainstorming was easily documented and not lost. It encourages people to be more goal-oriented so that tasks that did not clearly fit in were immediately dropped. Finally, it keeps people up to date with decisions. Future additions may include a CONTACT hyperlink, group Decisions by functional areas, and better GUI. The importance of this project is that it indicates the desirability of having many different types of links for information/people association.

### 3. Software Documentation

Another successful area of application of multimedia technology is in software documentation. By exploiting the nature of hypermedia, powerful multimedia-based program documentation systems can be developed.

#### 3.1. *RST documentation model*

Reliable Software Technologies Documentation Model uses standard C comments with the addition of design documents on the WWW [4]. Standard C Comments are added to program lines whose purpose is not clear, to the beginning of each function or procedure to explain its purpose and the Pre and Post conditions, and to the header function to describe its purpose.

The following information is also maintained:

- CVS revision history.
- Requirements document.
- Relevant research.
- Architecture diagram.
- UML diagrams.

RST documentation web page includes the following information:

- Welcome to the new program web page.
- Short description of the project goals and the specific problem to solve.
- Related links.
- Project design document.
- Project specifications document.
- Architecture document.
- Research Links: Link1, Link2, Link3.

### **3.2. *Linux HQ kernel documentation***

Linux HQ Kernel Documentation provides the following:

- Hypertext transformation of the code.
- Links to function definitions.
- Function search engine.

Similar to CVS file hierarchy with links to associated files, Linux documentation maintains alphabetic listing of file names. It supports a function search engine. Function calls are linked to function definition, and there are links to include header files. However, it still relies on the reader to understand the comments. More information can be found at: <http://www.linuxhq.com>.

### **3.3. *Variorum***

The American Heritage Dictionary (1998) defines “variorum” as follows: “contains notes or comments by many scholars or critics”. The creators of Variorum define it as a “multimedia tool that aids in the documentation of programs. . . . The integration of WWW capabilities is a key aspect of variorum’s usefulness”.

Variorum [10] allows programmers to record the process of “walking through” codes using multimedia technology. Variorum supports hypertext transformation of code and the addition of programmer/author walkthroughs as voice annotations. Variorum modifies the source code to include annotation links. However, its effectiveness depends critically on individual authors’ annotation style. The amount of voice storage can also become excessive. However, in the future audio/visual software documentation systems may overcome the deficiencies of today’s Variorum.

## **4. Design of Multimedia Applications Using Object-Oriented Tools**

From the above survey, it can be concluded that multimedia is useful in software documentation, but whole-hearted incorporation of multimedia in software engineering has not yet happened [16]. There is an ongoing paradigm shift — from business orientation to entertainment orientation [16]. New software process models and paradigms, in particular the object-oriented approach, are needed in multimedia systems design. This section surveys several object-oriented approaches in multimedia systems design.

In what follows, we will discuss:

- DAMSEL — Dynamic Multimedia Specification Language.
- MET++ — Multimedia Application Framework.
- MME — Object-Oriented Multimedia Toolkit.
- PREMO — Presentation Environment for Multimedia Standard.