The Virtual Research Center: An Experimental Intranet

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In any typical project, decisions made during the conceptual design stage constitute 75 percent of a product's cost.[1] Many of these decisions are made by teams spread over disparate locations. An Intranet facilitates communication among team members by applying Internet technologies to the management of project information.

MSFC is integrating an experimental Intranet known as the Virtual Research Center (VRC) for geographically distributed concept development teams. The VRC provides an integrated set of tools for collecting, archiving, disseminating, and discussing project-related information. Users gain access to the VRC through a World Wide Web (WWW) browser.

Using the motif of a lunar colony, the VRC Graphical User Interface (GUI) displays a lobby with entrances to a central complex and several project wings. The central complex comprises a museum, library, and auditorium. Each project wing includes a conference room, library, mail station, and laboratory. Rooms within the VRC contain information in a format consistent with that room. For example, the library contains documentation, the laboratory contains analytical files such as spreadsheets, and the auditorium contains multimedia files.

The Advanced Concepts Office at NASA Headquarters established an agencywide team in February of 1995 with members at Johnson Space Center (JSC), Ames Research Center (ARC), Jet Propulsion Laboratory (JPL) and MSFC. The initial prototype integrated public domain software and served as a model for developing requirements. International Space Systems Incorporated (ISSI) supported the integration of the first prototype.

Figure 191.—The VRC home page.

In 1996, products appeared on the market that incorporated many of the functions and features embodied in the public domain Internet programs. The VRC team integrated these new products with support from Auburn University and the University of Alabama in Huntsville. Deployment of the demonstration system began in August of 1996 with the implementation of project wings for the Advanced Concepts Office and the Highly Reusable Space Transportation (HRST) programs.

The VRC organizes information through a spatial reference system. Information of different formats are stored in a room that is appropriate for that format. Each room contains tools for storing, retrieving, or exchanging files. The following paragraphs identify the rooms and the associated tools.

The library provides tools for online publishing, searching, and collecting project-related data.

- Online Publishing—The library provides utilities for converting Postscript files into the Portable Data Format (PDF). Users can view the documents with the free Acrobat reader software from Adobe.

- Document Archiving—Users may read brief descriptions and select a document for viewing from a list of available PDF files.

- Search Engine—A search engine from Verity, Inc., enables users to search through online documents and data bases for key words.

- Project Data Base—An Oracle 7 data base provides a means of collecting project-related data and creating reports.

- Mail Station—Functions in the Mail Station include a file server, e-mail list manager, and a bulletin board.

- File Exchange—Through the mail station, team members may exchange files. An embedded File Transfer Protocol (FTP) program provides a consistent look and feel across heterogeneous platforms.

- Discussion Forum—The mail station also provides a discussion forum or bulletin board. Users can create topics for discussion and other people can write comments about that topic.

Conference Room

Tools within the conference room augment team telecons. Functions include action tracking, scheduling, and desktop video conferencing.

- Action Tracking System—As teams conduct meetings, they can assign action items and record them in the action item tracking system.

- Scheduler—This tool includes a calendar of events. Within the calendar, events appear as a hypertext link that users can select to obtain more information about that event. In addition, the scheduler contains a fill-in form for the NASA Teleconference Center (NTC). The system will generate the form and automatically fax it to NTC.

Figure 192.—A view of the VRC lobby.

- Meeting Minutes—Teams can capture the important points of a meeting with both text and graphics for later review by the individuals.

- Desktop Video Conferencing—The VRC server includes a CUSeeMe reflector for desktop conferencing. Team members can view one another during telecons.

- White Board—CUSeeMe also provides a white board capability. Users can display images on the white board and all participants can see and mark up the image.

Laboratory

Teams often develop analytical programs, simulations, and spreadsheets to support concept development. The laboratory provides a file management system so people can archive analytical files.

Auditorium

Multimedia presentations on project or organization subject matter will be available in the auditorium of the central complex.

System Administration

Behind the scenes, the VRC provides tools for system administration and multiple levels of security.

- Wing Construction Kit—Creating project wings requires considerable work if done manually. The VRC includes Unix shell scripts that automate the process. A system administrator can simply type in the name of the new project wing, and the script performs the following actions:
  - Creates directories;
  - Copies HyperText Markup Language (HTML) pages into those directories;
  - Changes pathnames embedded in the HTML pages;
  - Creates project data base; and
  - Copies "glueware" that integrates the HTML pages and databases.

- Multiple Security Levels—To ensure a safe environment for information exchange, the VRC offers a multilayer security system. This security system includes password protection, access rights at the operating system level, access rights for the project data base, and data encryption.

Future Plans

To deploy a VRC server for the Space Transportation Research Center (STRC) to support the Advanced Space Transportation Program (ASTP) at MSFC.

Additional Information

All commercial products mentioned in this report are trademarked and copyrighted by their respective companies.

[1]Machlis, S.: "Management Changes Key to Concurrent Engineering." *Design News*, September 17, 1990, pp.36–37.

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