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Timothy R Schmoyer; Bernard J Jansen
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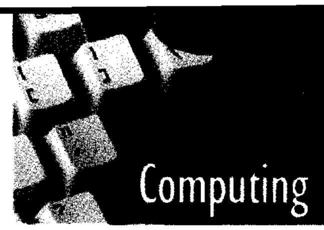


Personalized Computer Interaction Improves Customer Service

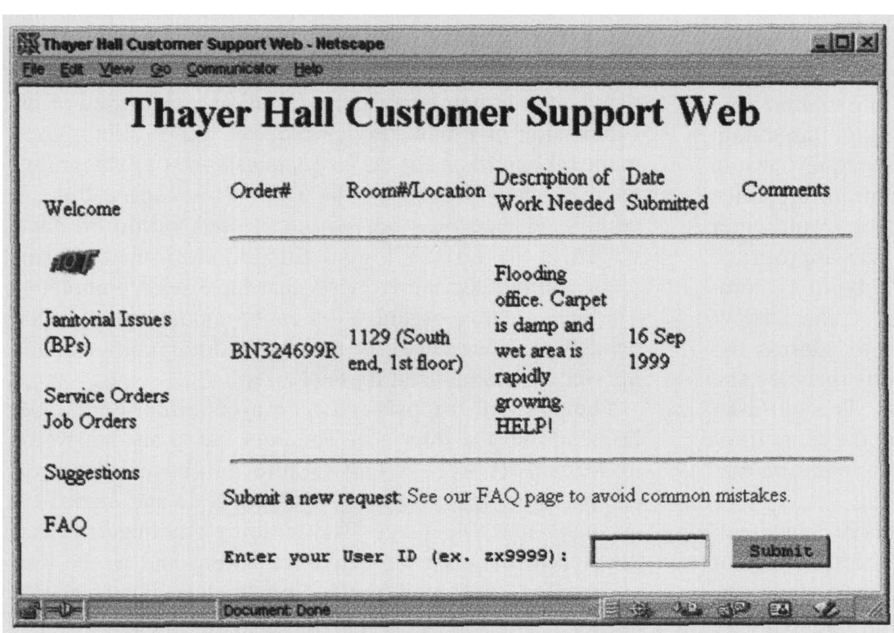
Coordinating service requests saves time, increases accountability.

By Maj. Timothy R. Schmoyer, USA, and Maj. Bernard J. Jansen, USA

An adaptive hypermedia system that streamlines and enhances work-order procedures demonstrates that technology can be profitably employed to achieve an organization's customer support goals. Although the initial deployment of the technology was limited to building maintenance, the software could have far-reaching implications for improved customer relations and effective time utilization.

Organizations that serve customers must interact with clients and track support performance. The degree to which they successfully accomplish these tasks directly affects customer satisfaction, the overall perception of efficiency and ultimately the bottom line. Completeness, accuracy and timeliness of the support are all critical issues. Not only must requests for support be effectively and efficiently addressed, but service must be delivered in a manner that the customer perceives as personal. These factors became the design criteria in the development of the adaptive hypermedia customer support system.

The online system, which was introduced at the U.S. Military Academy, West Point, New York, accepts, checks, submits and confirms building maintenance requests for the tenants of Thayer Hall, an educational, administration and warehouse facility. The system structure can be adapted for other organizations and environments.



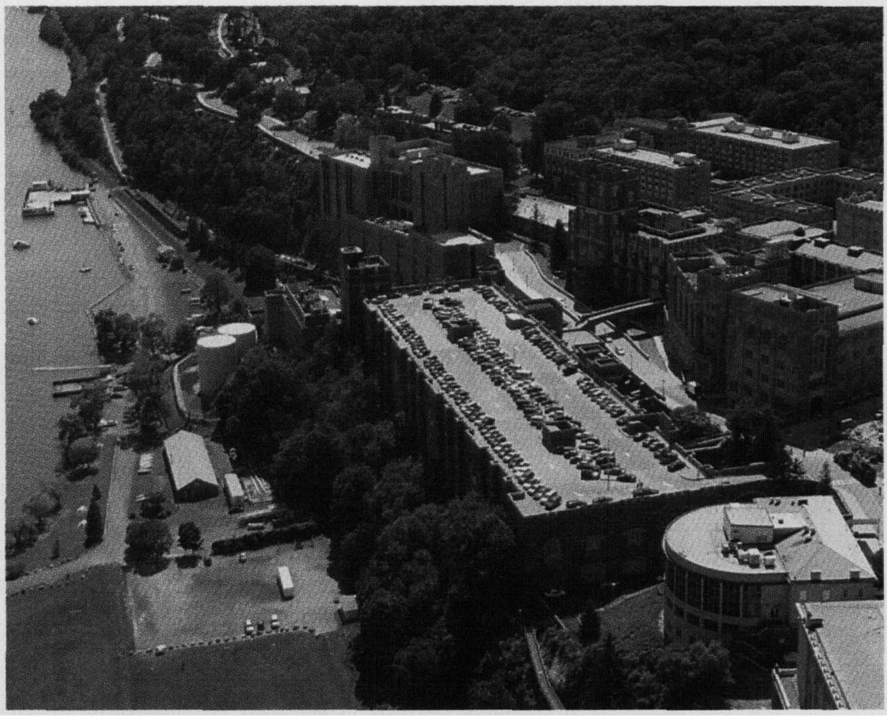
The adaptive hypermedia customer support system service-request-entry page shows both previous and open service requests.

The technology is integrated with the maintenance service's legacy standard Army multicommand management information system to process the maintenance requests. The personalization that the system offers fosters continued use by recognizing the customer upon log-in and adapting the information presented. This data includes name recognition, contact information, automatic e-mail dialogue and presentation of historical data, along with error checking of customer submissions. As a result of the adoption of this system, customer satisfaction, knowledge management and building maintenance at Thayer Hall have improved.

Adaptability is the system's unique feature. In hypermedia, adaptive capabilities enable the flexible delivery of information, especially through a World Wide Web-based interface. Adaptive hypermedia can overcome the limitations of traditional computer systems by tailoring applications to meet specific user requirements and anticipating the needs and desires of the user.

To do this effectively, the application design must be based on a user model that can be represented by a set of pairs—for example (c, v), where c is a concept and v is a value. The concept is an idea, subject, preference, submission or topic, while the value is a measure that associates the user to that concept.

Prior to this system, service order submission was a laborious, inefficient and, in the view of many tenants, fruitless process. Thayer Hall was built as a riding stable in the 1930s. In the 1950s, it was refurbished and converted to accommodate college classrooms, offices, laboratories, shops, commercial retail space and an indoor ballistic range. Over the years, numerous other renovations, modifications and additions were made to the building, including a local area network. At the time the adaptive hypermedia system was implemented, more than 200 individuals from 17 separate agencies and 1,000 temporary residents were tenants in the building.



The U.S. Military Academy, West Point, New York, campus features a number of historical buildings that require coordinated upkeep. The adaptive hypermedia customer support system helps facilitate service at Thayer Hall, a building that was constructed in the 1930s as a riding stable and now houses classrooms, offices and other facilities.

The building commandant is responsible for the upkeep and overall maintenance of the building as well as customer service support to the tenants. The resources available include a small staff and external maintenance support provided by the Department of Housing and Public Works (DHPW). This department provides all maintenance, repair and utilities at the location. It is a maintenance construct that parallels many other governmental and nongovernmental building arrangements where upkeep is outsourced.

Before adopting the adaptive hypermedia support system, a tenant would contact the building commandant with a maintenance problem. The service request would then be recorded and reported by telephone to a service clerk at the DHPW. The department's clerk would enter the request into a database, assign it to the appropriate shop and provide a tracking number to the building commandant. Upon receiving the work request, the DHPW shop would dispatch maintenance teams to address the issue, responding within a few hours for emergencies and within a few weeks for routine requests. The building commandant monitored the progress of these maintenance requests and worked with the DHPW to ensure that the work was completed.

There were several deficiencies with this arrangement. First, the information the tenants provided often was not specific enough to identify the maintenance issue. Second, communicating first with the building commandant created a built-in delay in establishing the maintenance issue, which, in turn caused a delay in the service request delivery to the maintenance organization. This systemic delay caused some tenants to bypass the building commandant and call the maintenance organization directly. Consequently, the building commandant would lose both the oversight of these maintenance requests and the historical information that, with the proper analysis, could be the harbinger of future larger problems.

These issues motivated the development of the hypermedia system, designed with several characteristics. Customers use the system to submit new service requests and check the status of previously submitted requests. Users receive immediate confirmation, and the building commandant and maintenance organization are notified of the submission of a new service request. The building commandant can track the service requests in four categories: awaiting acceptance by the DHPW; accepted but not completed; accepted but not completed within 30 days, which is the DHPW's goal for completion of routine requests; and service requests that have been completed. The maintenance organization can communicate simultaneously with the customer and the building commandant. Service is personalized for each user.

The system comprises two major components: the backend and the interface. The backend is an integration of Microsoft Access and Oracle databases. The two databases are linked via Visual Basic code and embedded standard query language. The building commandant uses the Access database for request tracking and as the data source for customer queries on the status of service requests. The DHPW employs the Oracle database for its internal management of service requests.

Cold Fusion acts as the development application program interface for the system's interface. It provides a standard mechanism for developing both dynamic Web pages and the database-query mechanism. The resulting system interface is displayed in the customer's browser as hypertext markup language and JavaScript.

The first time a customer submits a service request, the system queries for some personal data, such as name, office number and e-mail address. This information is used to identify the customer on subsequent visits, allowing the system to tailor or adapt the information provided to that customer and also providing the building commandant with the necessary information for customer relations.

The location field must be completed for each service request because this information indicates whether an order has already been submitted. Once the customer enters the location information—usually a room number—the system displays a list of all previously submitted service requests for that location for which work is incomplete. This feature significantly improves efficiency by reducing the number of duplicate service requests being submitted.

If the problem is not on the "already submitted" list, the process continues and the system prompts the customer for the necessary information. If any of the required information is missing, the system prompts the customer for the data. Only when all of the information is entered correctly will the system submit the service order to the maintenance organization. The system e-mails a confirmation message to the customer, the building commandant and a point of contact at the maintenance organization.

The system also handles many other functions needed for building maintenance, such as checking the status of previously submitted service requests and tracking all requests submitted by a particular customer. Using the system, the building commandant can track trends in service requests to isolate problem locations and customers who experience recurring problems. An area titled "Frequently Asked Questions" offers direct e-mail to points of contact within the building for many of the major tenant organizations. An e-mail contact to the building commandant is also available. As an example of the adaptive aspects of the system, these features factor in previous actions of the user.

During the service request process, the system queries the customer by name. This technique, along with individualized e-mail responses, personalizes the system for the customers. In a 6-month sample of more than 1,000 exchanges between the customers and the system, 126 entries indicated that the customers interacted with the system as if it were a person. Queries contained terms or phrases that would be expected in a conversation, such as "thank you," "please" and "I would appreciate."

The system is currently undergoing expansion to encompass other buildings nearby, with further nationwide expansion expected in the initial stage.

Three aspects are currently under investigation for improvement: expanding the system's adaptability, introducing a software agent into the system and integrating voice recognition technology with the existing Web and database components. In the area of adaptability, the system may be enhanced using push technology to prompt the customer for expanded information on building locations or previously submitted service requests.

Software agents offer numerous potential productivity improvements. The customer could be immediately notified via e-mail on the day a maintenance team is dispatched to work on a service request. This capability would address a productivity shortfall that exists under both the old and new systems because considerable time is lost during attempts to locate the customer for room access or additional information.

Voice recognition technology, specifically computer-telephony integration, is another potential enhancement. In computer-telephony integration, a network server integrates interactive voice response (IVR) with the backend databases. Engineers are examining a small key system unit (KSU) that is IVR capable. The KSU would be integrated with the network server by scripting the system prompts to provide order-entry information to the database through the standard database language.

These enhancements would improve customer support by addressing the individual customer's needs, improving the long-term management and maintenance upkeep and increasing the options available for customer support.

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