

MARITECH ASE Project 2000928

A Shipbuilding and Ship Repair Virtual Resource Center for Crosscut Initiatives

**RESOURCE CENTER FOR CROSSCUT INTITIAIVES
FINAL REPORT**

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Northrop Grumman Ships Systems - Avondale
Bath Iron Works
Cascade General
Electric Boat Corporation
Jeffboat LLC
Todd Pacific Shipyard Corporation
University of Michigan Transportation Research Institute
Advance Research Laboratory, Penn State University

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Introduction

The purpose of this final report is to describe the activities that have taken place in the past three years relative to the development and implementation of a Virtual Resource Center for Crosscut Initiatives.

In March 2000, a two-year contract was awarded by the NSRP ASE program to a team of six U.S. shipyards and one university for the development of a Crosscut Virtual Resource Center. The six shipyards included Northrop Grumman Ships Systems - Avondale, Bath Iron Works, Cascade General, Electric Boat, Jeffboat LLC, and Todd Pacific Shipyards. The university included the industry web site administrator, the University of Michigan Transportation Research Institute (UMTRI). In April 2001, The Applied Research Laboratory, Penn State University replaced UMTRI as the industry web site administrator and the team's university partner. Two project extensions were given in conjunction with this rehosting of the industry site, resulting in project completion in February 2003.

In implementing the Crosscut Resource Center, the project team envisioned that the Center would address the people and organization needs important to the revitalization of the shipbuilding and ship repair industry. People and organization elements and their potential impact were not well understood or accommodated by industry personnel responsible for developing or implementing shipyard technological or process changes. While necessary resources and assistance existed in crosscut areas to help these personnel, they often were not aware of this support. In addition, the supporting resources frequently were not readily available or well organized for use by personnel who were not professionals in crosscut areas.

The crosscut professionals themselves were confronted with limited resources in addressing crosscut needs at a time when meeting these needs was important to the industry's revitalization efforts. There was no organized means within the industry for helping crosscut professionals to easily obtain resources for innovative crosscut solutions or to address common, emerging crosscut problems. In addition, the entire industry was impacted by an inability to efficiently collaborate and communicate with each other and with the extended community of industry partners. The lack of effective communication mechanisms hindered the transfer of new technology and processes across the industry.

The intent of this project was to develop an initial implementation of a crosscut resource center for the U.S. shipbuilding and ship repair industry that would address the aforementioned problems. When the project was complete, the resource center would:

- assist the industry at large, particularly personnel with little or no crosscut background, in addressing crosscut needs (i.e., education and training, organizational change, human resources, and technology transfer);
- support industry crosscut personnel in addressing common crosscut problems;
- enable the industry to team more successfully with one another and with industry partners such as schools and universities;
- enable the industry to improve the transfer of new technologies and processes; and
- establish a specialized resource environment that could serve as a model for other industry initiatives if desired.

Approach and Methodology

In April, 1999, a one year contract was awarded to a team consisting of six of the seven partners involved in the two year project. NASSCO was a participating team member in the 1999 project and was subsequently replaced by Jeffboat LLC in the follow-on contract. The scope of work on the 1999 project included an assessment of the requirements associated with a crosscut resource center, the development of a center architecture, and the completion of both a high level design and general design guidelines for the center. The results of the 1999 project served as a baseline for the development and implementation of the Crosscut Resource Center.

Twelve services were identified in the 1999 project for implementation in the second contract.

- Workforce Development Forum – A yearly forum sponsored by the resource center would enable the industry to identify workforce development requirements and courses needed to support continued workforce development. The forum results would be made available online through the center. The forum itself potentially could be held online through the center.
- Training Course Library - An initial library of existing shipyard courses available for sharing across the industry. The mechanisms and processes required for continued expansion of the library would be incorporated.
- Virtual Workshops or Classes - Two online workshops or classes, identified through the workforce development forum and mechanisms required for online delivery of workshops would be established.
- Industry Positive Image Material - A set of materials directed at projecting a positive image of the industry. The materials would be available online through the resource center.
- Model School/Industry Programs - Best practice models for school-to-work, intern, and co-op programs.
- Webpage for Education - A web page directed at fostering interactions between the industry and the education community and students.
- Crosscut Links – A set of links to sites supporting crosscut topics.
- Crosscut Information Sources – A set of significant and timely crosscut-related abstracts, articles, or reports.
- Crosscut Contacts and Communities – Facilities for contacting crosscut consultants and common interest working groups.
- Virtual Teaming – An initial industry-hosted environment in which users would have access to collaboration capabilities which would allow them to engage in virtual teaming activities.
- Project Results Sharing – A set of easy-to-use templates and structures for capturing and sharing industry project results, including but not limited to, NSRP ASE projects.
- Crosscut Guides – A guide to help proposers understand crosscut issues and concerns and to address them successfully in proposals, and a guide to help managers understand crosscut issues and concerns and to address them successfully in their daily projects and tasks. The guides will help to ensure that transfer of technology is more effective.

The design for the resource center dictated that the site would be a “virtual” center. A minimal infrastructure would exist to house the center information resources and its online applications at a centralized site. A minimal staff would exist to maintain the physical infrastructure and operational software associated with the center. The users of the center would be distributed throughout the country. The design also called for a combination of the best of an online electronic information environment with human interactions and collaborations. The human support advisors and subject experts responsible for the maintenance of the information source content also would be located throughout the country. The crosscut resource center was to exist as a specialized environment aligned with the industry's web site, NSnet. NSnet was characterized by a general set of services useful to the shipbuilding and ship repair community. The crosscut center, on the other hand, was designed to provide users with information and services specifically organized from a crosscut perspective.

The resource center was to be developed using an ongoing implementation and evaluation approach. Each of the twelve center services would be developed, installed in the resource center environment, and tested. When satisfactory testing of each service was completed, the service would be made available online to the shipbuilding and ship repair industry. Each of the team members was to have varying assignments associated with the development and implementation of the resource center. One team was to be assigned to lead each task effort, but other assigned team members would contribute to the completion of the task, and all team members would review key products. The installation of the resource center was to be distributed across the contract to allow the project team to gain experience with the maintenance requirements associated with a portion of the center services. This experience would help the project team to formulate an appropriate operational model for the resource center. A final operational plan was scheduled toward the end of the project to incorporate the lessons learned and to ensure a reasonable plan for transitioning crosscut center responsibilities to the industry.

Project Results and Summary

In the initial months of the resource center development, a Software Development Plan and Preliminary Resource Center Operational Model were developed and a Workforce Development Forum was held. The Software Development Plan was completed in June 2000. It summarized the software development plans, procedures, and software management approach for the Resource Center. The Preliminary Operational Model was completed in July

2000. This document described a scheme for the management and administration of the Crosscut Resource Center during the conduct of the project. The first of two Workforce Development Forums sponsored by the Crosscut Resource Center project was held in August 2000. The purpose of the Forum was to discuss continued workforce development needs with the industry and to identify any training course requirements associated with continued workforce development. Fifty workforce development needs were discussed and prioritized by the participants. Eleven of the highest rated needs were discussed further to establish required content, audiences, delivery methods, resources, developers, and ROI for course work that could address the needs.

During 2000, the development of the Resource Center began. A site homepage and site navigation scheme were created and the first three services went online at the NSnet site. The services and the Workforce Development Forum were evaluated as part of the development effort. A Crosscut Resource Center Services Evaluation Report was submitted in January 2001. The report documented the results of industry reviews of the developed center services. Based upon positive industry reviews, NSRP ASE funded the follow-on year of the contract. Comments and suggestions received as a part of industry review were incorporated for the site homepage and the three services developed during 2000. The site homepage and the three services were placed online for industry use. Four additional services were next developed and placed online for evaluation. The Resource Center also sponsored a second Workforce Development Forum for members of the industry and conducted a Crosscut Workshop via video teleconferencing.

In May 2001, the NSRP Executive Control Board awarded a three-year contract to the Applied Research Laboratory (ARL), Penn State University, to host the industry's shipbuilding web site. The Crosscut Resource Center had been designed and developed for implementation on the industry's prior site, Nsnet, at the University of Michigan Transportation Research Institute (UMTRI).

After the award of the web site to ARL, the Crosscut Resource Center Project Team investigated whether or not the Resource Center should move with the next generation industry site to ARL. The project team concluded, for many of same reasons originally used to select UMTRI as the host site, that ARL offered the best hope of making the Crosscut Resource Center site beneficial to the shipbuilding and ship repair community. The centralization of NSRP sites, co-location with industry-wide services, and shared operational efficiencies warranted a move to the ARL site. In addition, the Resource Center project team concluded that the proposed ARL approach to implementing and operating the next generation industry site promised a highly self sufficient, low cost, and forward-looking environment. The Project Team requested (and received) a three-month extension, to June 30, 2002, for the project, at no additional cost, to re-host the Resource Center at ARL.

However, a substantial number of technical changes were required to re-host the Crosscut Resource Center web site at ARL. A reconstruction of the existing services provided through UMTRI was necessary. These changes included a re-hosting of all previously developed web page structures, databases, document files, and linking scripts to accommodate the ARL XML-based architecture and database tool. The changes also included a reassessment of the design of the remaining Resource Center services not yet implemented in the UMTRI environment.

Due to these impending changes, the project team concluded that industry reviews of services developed for the UMTRI site and scheduled for implementation late in 2001 were not warranted. Industry assessment of the value and functions offered by the Resource Center services at the UMTRI site may have been beneficial, but feedback on the physical appearance and operation would not have been relevant to the eventual re-hosting on the new ARL site. Because the re-hosting of the Resource Center to ARL would take place within a year, the project team assumed that it would be preferable to get a single industry review of services after implementation on the new ARL site.

The transition from the UMTRI site to the ARL Penn State site consisted of three major phases. Part one was to complete team evaluations for any previously developed service, to incorporate resulting comments, and to put those services online on NSnet for industry use. By October 31, 2001, seven of the planned services were online on NSnet for industry use. Having the services on NSnet maintained the resource center presence for the industry while the re-hosting to Penn State's usashipbuilding.com site continued. Part two consisted of working with ARL/Penn State to re-host the seven services on the new industry site. The Crosscut Center went live on usashipbuilding.com (available to the shipbuilding industry and the general public) on February 19, 2001. Part three consisted of the development and testing of the remaining services directly in the ARL/Penn State web environment.

The Project team requested two additional project extensions during the development and implementation of the Resource Center. Changes in personnel and scheduling produced manning problems. The first extension requested additional funding as well as a schedule extension. The second requested a schedule extension until February 15, 2003. All services were completed and available to the industry as of February 15, 2003.

Twelve services were originally proposed for implementation in the Resource Center. As detailed design progressed, it was evident to the project team that a more logical organization of the services was in order. One service, Crosscut Contacts and Communities, was split into two services because the functionality and infrastructure requirements of the two elements were different. Three services (Virtual Teaming, Virtual Workshops, Workforce Development Forum) were combined into one online service because their functionality and infrastructure requirements were similar. One service, Project Results Sharing, was moved from the resource center to the industry web site at the request of the NSRP program. The resulting ten services can be found at: <http://crc.usashipbuilding.com/>. The following is a brief description of each of the final services developed and implemented in the Crosscut Resource Center:

- Abstracts and Bibliographies. This service provides industry users with significant and timely resource material culled out by crosscut specialists on topics pertinent to crosscut concerns and issues. This service was originally titled Crosscut Information Sources.
- Crosscut Contacts. This service provides industry users with a means of obtaining the names of industry contacts and vendors willing to help with crosscut topics. This service was originally combined with the Crosscut Discussion service in the service entitled Crosscut Contacts and Communities.
- Crosscut Discussion. This service provides an online “forum” in the form of a discussion board for discussing crosscut-related issues. This service was originally combined with Crosscut Contacts in the service entitled Crosscut Contacts and Communities.
- Crosscut Links. This service provides industry users with connections to good, current web sites with crosscut content.
- Proposers' and Managers' Guide. This service provides NSRP ASE proposers and industry project managers with guides to help them understand crosscut needs and issues, and to address requirements successfully in their proposals and projects.
- Recruiting Materials. This service provides users with a set of public relations material that can be used in meetings, presentations, conferences, and with educational institutions and employment agents to portray the industry in a positive light. This service was originally titled Industry Positive Image Material.
- School/Industry Models. This service provides industry users with best practice models for school-to-work, intern, and co-op programs from shipbuilding. This service was originally titled Model School/Industry Programs.
- Training Course Library. This service provides a means by which users can easily share training courses relative to the shipbuilding and ship repair industry.
- Virtual Teaming and Workshops. This service provides the shipbuilding industry with a mechanism to conduct industry meetings, forums, workshops, or courses virtually on line from distributed locations, and provides a library to house past workshop materials. This service combined the original Virtual Teaming, Virtual Workshops, and Workforce Development Forum services.
- buildships.com. This service provides a means by which the U.S. shipbuilding and ship repair industry can share activities, communicate, and build interest in the industry with educators and students. This service was originally titled Webpage for Education.

Technical and Programmatic Issues

Because of the transition of the Crosscut Resource Center’s host web site, the industry evaluations and ongoing Resource Center operation during the project were not as thorough as intended. Six of the services implemented on NSnet had to be reconstructed on usashipbuilding.com. As a result, these services were not readily available to the industry for prolonged use and feedback. The four services implemented only on usashipbuilding.com were developed late in the contract and received minimal industry evaluation and exposure prior to closure of the project.

The architecture adopted by usashipbuilding.com did enable direct maintenance of many services by the industry, and some experience was gained with maintaining the Resource Center services during the project.

The host site transition specifically impacted the testing and evaluation of the Virtual Teaming and Workshops capability. Funds were no longer available for an extended presence of the Virtual Teaming and Workshop web conferencing tool. As a result, a limited amount of time existed for building potential momentum for tool use. In addition, technical issues associated with presenter downloads and enterprise-wide scheduling information impacted the implementation of the service. A full discussion of the Virtual Teaming & Workshops service is provided in the Final Operational Plan in conjunction with potential future operational requirements.

The restricted funding resulting from the transition also limited the ability of the project team to investigate and implement a solution for on demand video delivery. This capability was not viewed as essential to the current implementation of the resource center, but its absence resulted in a weaker interaction for users when downloading items such as a Recruiting Materials video. This will also impact video content submitted to the Workshop Library or Training Course Library.

During the project, a persistent problem existed with data transfers from the CRC server to testers and users when a Netscape browser was employed at one of the project team shipyards. The problem was sometimes associated with alignment with older Netscape protocols, but was most frequently associated with a network caching method employed by the given project team yard.

Lessons Learned

The ensuing discussion outlines several lessons learned in the completion of this Crosscut Resource Center project.

- For financial and reporting purposes, the project was set up as a Prime and Subcontractor arrangement. For all other purposes the project was operated as a collaborative effort. That is, by agreement of the team, decisions regarding general planning, scheduling, issue resolution, task methodology, deliverable content, etc. were made by consensus of the team. The resulting project arrangement was a hybrid of a Prime and Subcontractor, and collaborative methodology.
 - The hybrid approach required a tremendous amount of consensus building, coordination and communication. Often, due to other commitments, not all team members were able to participate in discussions, thus requiring additional coordination to ensure all were “up to speed”. The team learned that while the collaborative approach is conceptually workable, it is difficult to implement and manage.
 - In addition, toward the end of the project the remaining work required a specific skill set (XML related programming) which not all of the participating shipyards possessed. The skill set was needed as a result of the re-hosting decision. This caused a disproportionate distribution of work when compared against the original cost proposal. The team learned that more detailed contingency planning for “critical” path skill sets would have alleviated one shipyard bearing the brunt of the development effort.
- The chosen method of conducting team business was through teleconferences. In part, this method was chosen as a cost and time savings approach since the team members are physically located on all three U.S. coasts and in the mid west and because the web conferencing application was not available until the end of the project. Conducting team meetings, for example, required tremendous coordination to find convenient dates and time for meetings. In addition, material, which was to be the subject of discussion, needed to be emailed. Team members were not able to “see” live markups, etc. The team learned that more efficient means of communications are necessary for a large widely dispersed group to conduct business. The situation may have been alleviated somewhat if the Virtual Teaming service had been available earlier in the project.
- The level of commitment on the part of shipyards was well intentioned but when conflicts with ongoing work arise, NSRP ASE efforts don’t get priority over regular shipyard requirements. Shipyard personnel are often called away or provided unanticipated shipyard assignments. One result is that project tasks were not always completed on time.

- The length of the project and changes to shipyard personnel assignments contributed to a number of changes to project team members. This had some affect to the continuity of project assignments. Some amount of time was lost acquainting new individuals with the project. Redistributing project responsibilities did help in lessening the impact of personnel changes. For example, new team members accepted the role of internal review agents versus content providers. This provided the team with helpful insights to produce a better product.
- A relatively complex procedure was used on the project to define needs that converted into specific services in the Resource Center. In spite of the procedure, the needs were not driven to a detailed enough level prior to being converted into possible services by the industry participants. It would have been beneficial to perform a deeper analysis of high ranking needs very early in the project.
- It was often difficult during the project to find a broad base of industry users to help evaluate services. In seeking evaluators outside of the project team and in promoting services as they came online, it was clear that there was a lack of engagement of a broad spectrum of users within shipyards and the industry as a whole. It would have been beneficial to identify more specific methods for directly engaging a deeper portion of the industry in the evaluation of the Resource Center services.

CONCLUSIONS

The Crosscut Resource Center implementation has met the overall goals identified for the project. Two services have been implemented which specifically support personnel who are not professionals in crosscut areas. These services include Crosscut Contacts and the Proposers and Managers Guide. Five services have been implemented which specifically support the industry's crosscut professionals. These services include Abstracts and Bibliographies, Crosscut Discussion, Crosscut Links, School/Industry Models, and the Training Course Library. Personnel who are not professionals in crosscut areas also could benefit from these services. Three services have been implemented which specifically address collaboration and communication across the industry, and support the transfer of new technologies and teaming among industry members and partners such as schools. These services include Recruiting Materials, Virtual Teaming & Workshops, and buildships.com. The Resource Center also has successfully provided online information sources while facilitating needed human collaboration (e.g., Abstracts & Bibliographies and Crosscut Contacts). In addition, a specialized online resource environment has been produced that could serve as a model for other industry initiatives.

The Resource Center did not have an adequate period of time online for all of the services before the project closed. However, initial reactions to the Resource Center have been good. Numerous industry members have taken advantage of the available Recruiting Materials and the opportunity to evaluate the virtual web conferencing tool. Positive time-savings reports have surfaced in conjunction with the Abstracts & Bibliographies service. The News and Events provided through the Resource Center homepage have become an accepted source of Crosscut information for industry members.

An operation plan exists which will allow the Resource Center to continue without a great financial burden to the industry. This is due in great part to the hosting relationship with the usashipbuilding.com site, and to the ability of industry members to conduct content maintenance through volunteer efforts. The online maintenance capability afforded by the usashipbuilding.com architecture has worked well to date.

Finally, the Resource Center resides on the industry site, usashipbuilding.com. Within usashipbuilding.com is a documentation center where users may find deliverables from both the Resource Center one-year design contract and the development and implementation contract. These include Resource Center design requirements, architecture, and guidelines documents used in the development of the center as well as various project reports required by the contracts.