Design And Implementation Issues In Developing An Online Tool Repository

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Abstract

The Center for Friction Stir Processing (CFSP) is a multi-institution Industry/University Co-operative Research Center established with a grant from the National Science Foundation and supported by industry. There are management challenges inherent in any center, but when the participants include multiple universities and industry partners, it becomes essential to have tools in place to handle key issues. A tools repository is currently in development which will allow member sites to use web-based tools, download tools that do not run on the web, add tools to the site that they have developed, and post comments, questions, and reviews[1]. Some of the tools currently in development include a project management system, a personnel management system, a quarterly report management system, an interactive action items tool, and a paper review system. This paper will provide an overview of the tool repository and focus on the development of two particular tools, the paper review system and the action item management tool.

1 Introduction

Managing a multi-institution Industry/University Cooperative Research Center (I/UCRC) requires overcoming numerous challenges. Participating universities need to cooperate both with each other and sponsoring industry members. In order to improve organization and communication, the I/UCRC has developed a structural model containing repetetive tasks and procedures that include managing personnel, projects, quarterly reports, task distribution, and paper reviews. Many of these procedures were prime candidates for automation.

Though these tools are based on set procedures, the automation system needed to be flexible enough to accommodate regular changes. Tools also needed to be modular so updates to a tool preserved data and backwards-compatibility. Having an effective user interface was also a high priority especially when some tools would only be used once a month or less. This infrequent use requires even greater attention to user interface to avoid requiring the user to relearn the tool.

Using PhP, MySQL, and JavaScript hosted on a Linux server, several solutions to these management problems have been developed with more underway. Along with an overview of several tools developed for the Center for Friction Stir Processing (CFSP), two tools that best represent the challenges of this project (the paper review and action item systems) will be discussed in detail.
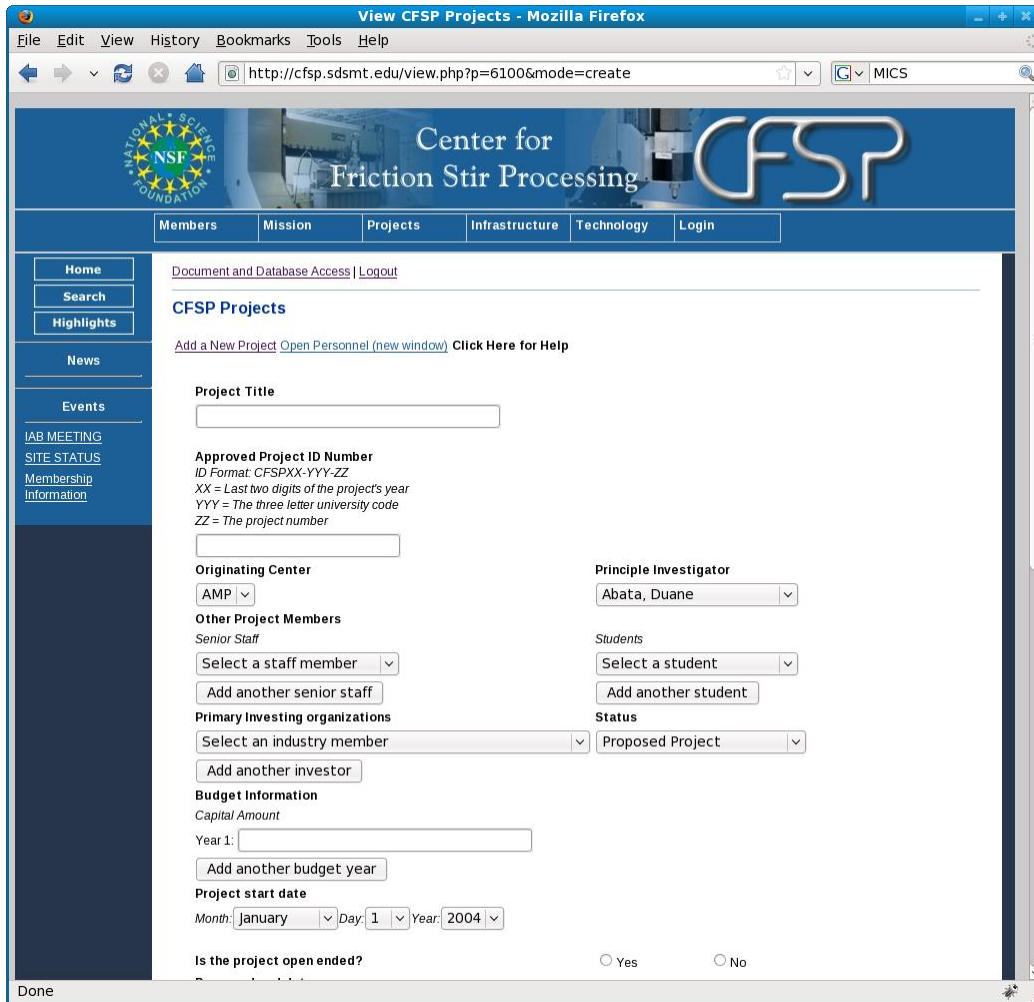
2 System overview

2.1 Project management

Figure 1: Project management create page

2.1.1 Reason for development

The I/UCRC model is centered on projects. Therefore, the project management system was needed to serve as the foundation for other tools. This system eliminates a significant portion of manual updates that would be performed in a static system.

2.1.2 Usage

Once the project has been approved by the research members, a site director or center director establishes the project by inputting the necessary data in the project creation page shown in figure 1. Once the project is created, all the features to view, edit, and remove the project is provided.
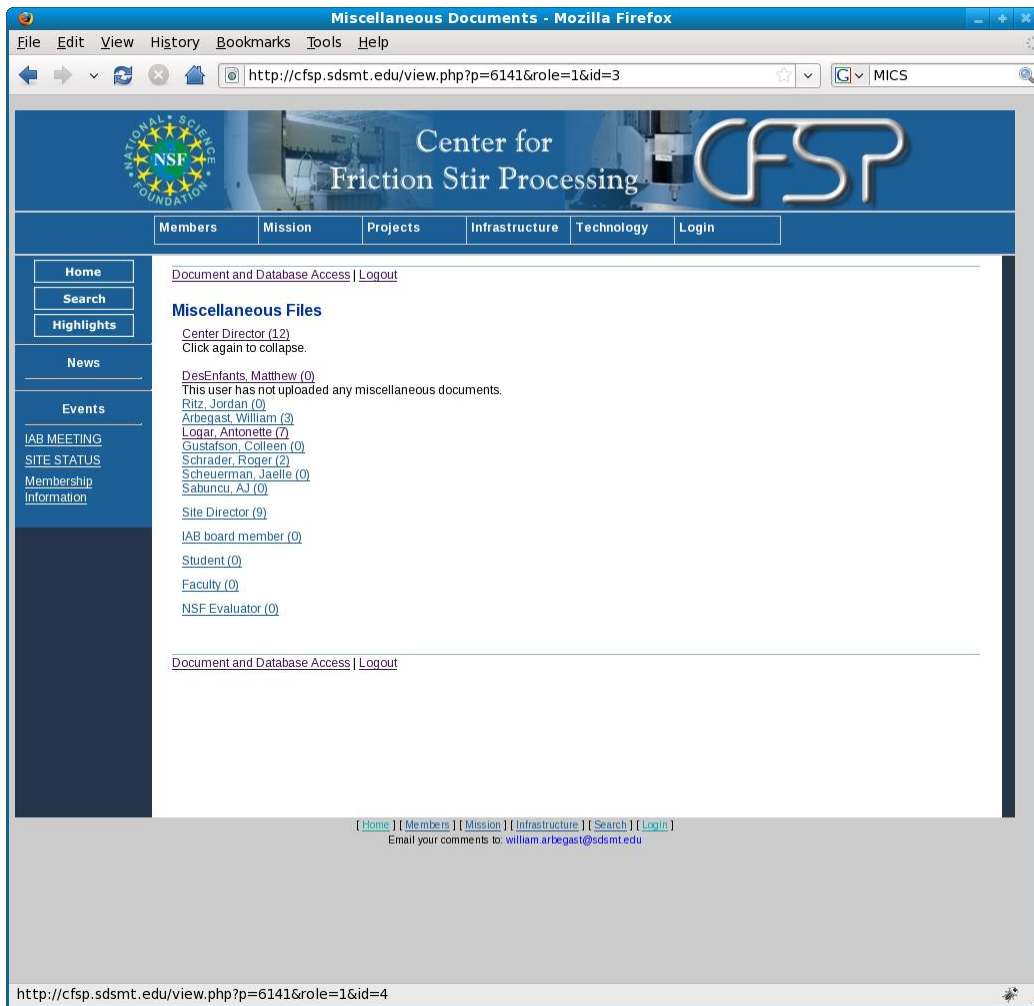
2.2 Documents

Figure 2: View miscellaneous files

2.2.1 Reason for development

Not all information in research centers is in the form of publishable papers. A document management system allows all users to share information relavent to their work and the center. It also provides a repository for templates, meeting presentations, experimental results, and any other information users may want to share.

2.2.2 Usage

To upload a file, a user selects a document category that determines where the site should display the document. Then the user selects the file to upload and submits the data. The system validates the upload and creates all the necessary locations automatically.
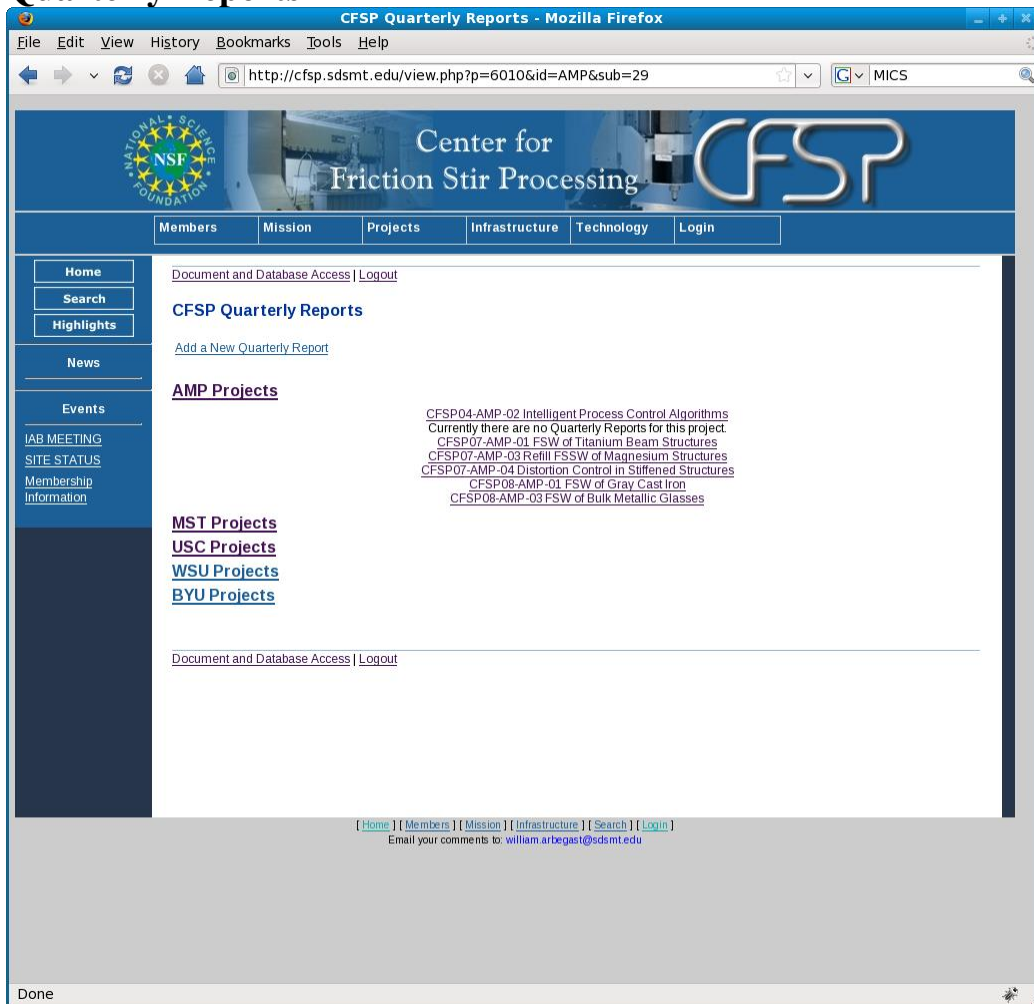
2.3 Quarterly Reports

Figure 3: Quarterly report selection screen

2.3.1 Reason for development

The CFSP uses quarterly reports to track and report progress to their industry members. With this system the users have a central location to find any reports created for each project.

2.3.2 Usage

To create a report, the site director, center director, or the project's principle investigator selects the project from a drop-down menu. Then the appropriate information in the project management system is preloaded into the quarterly report creation form. The user then fills out the remaining fields such as objectives, methods, and achievements.
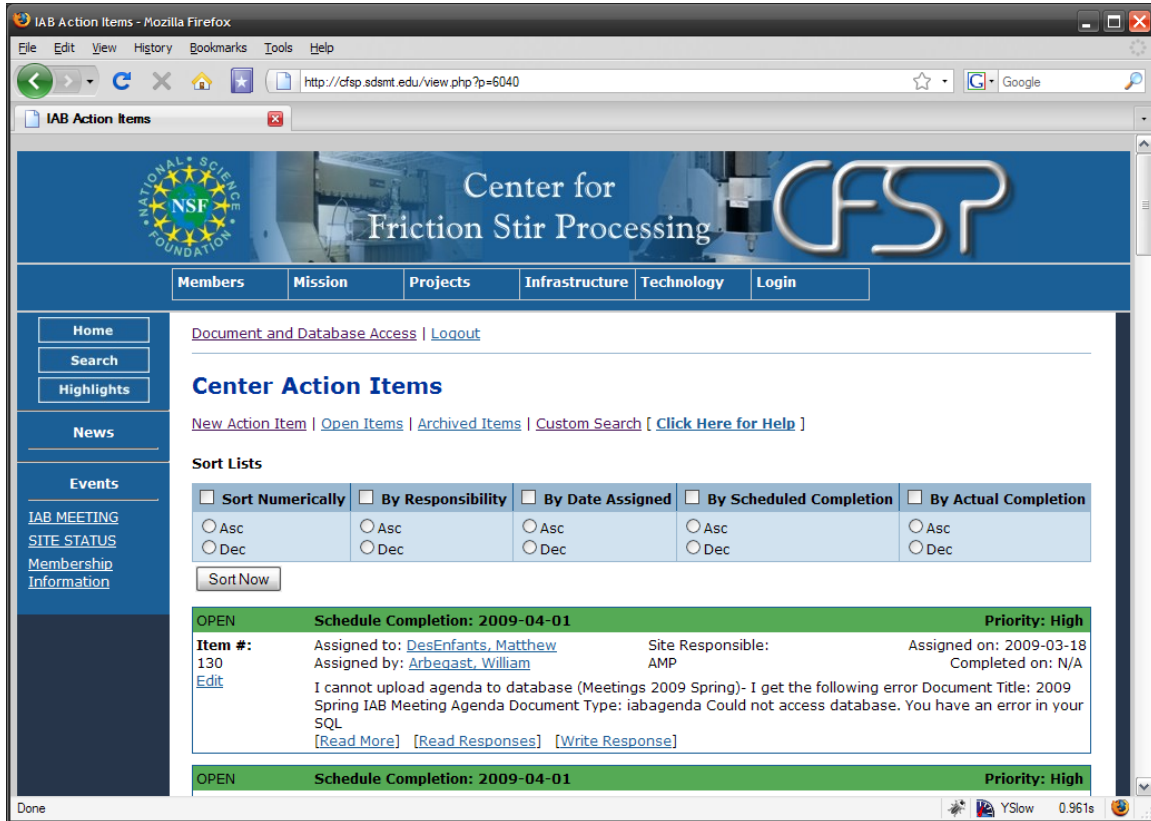
3 Major tools

3.1 Action Items

Figure 4: View action items

3.1.1 Reason for development

Maintaining email contact lists between center directors, industry sponsors, and personnel is a tedious process. Many users expressed a need to separate Center information from other emails to minimize inbox clutter. Furthermore, assigned and completed tasks needed to be documented for reports and other administrative duties.
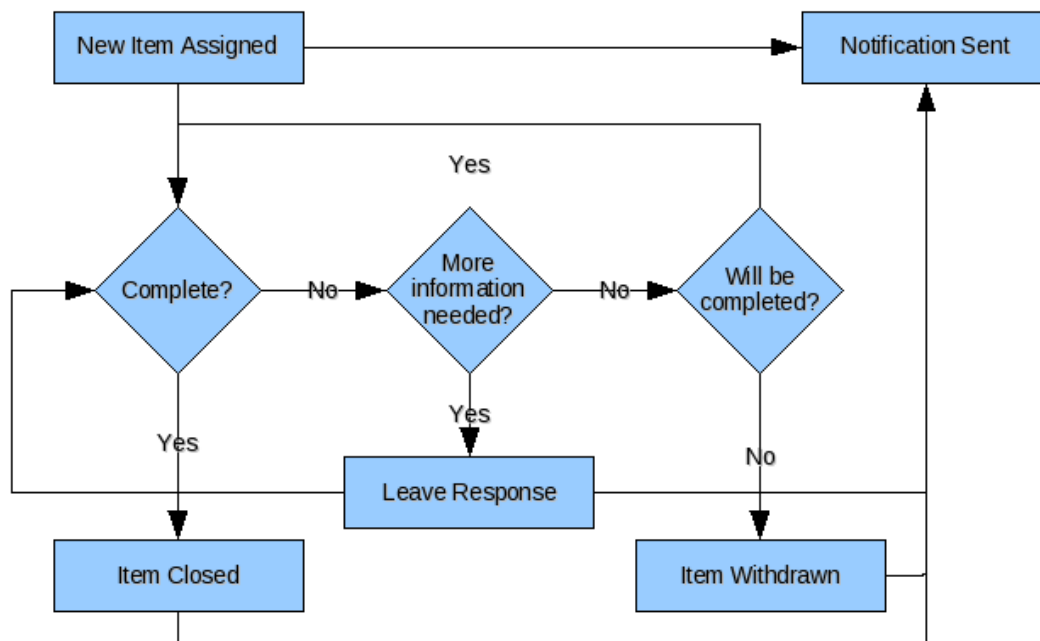
3.1.2 Usage

Figure 5: Action item flow

3.1.3 Features

Visually, the action item system consists of a color-coded table listing tasks to be completed. Each item contains an identification number, a description, names and contact information of the person's responsible, the assigned date, and the completion date. Also, to expedite communication between users, there is a place to write and read responses for each item.

Users are notified when a new action item is assigned, overdue, or changed with an automatic email notification system that is used throughout the toolset. This notification system sends out an email that, to reduce email clutter, can be deleted without fear of losing vital information about the item.

Because some members were expected to receive many action items, we determined that a keyword search feature would be beneficial. With the search, a user can filter items by names, item number, and keyword phrases. The keyword search uses the Porter stemmer algorithm to give more flexible results.

3.1.4 Specific Challenges

Some of the initial technical challenges came in enabling the system to assign items to multiple users or people that did not have accounts with the system. Because the user

database was not capable of holding anything other than individual users, the system could not use predetermined contact lists. In order to accommodate this, a formatted string is processed by the system to determine whether one or more users need notifications.

Another major challenge was determining how to design the user interface. In order for this tool to be effective, it had to portray all necessary information without being overwhelming. To allow users to quickly determine the status of an item, a red, green, and blue color scheme was adopted representing open, overdue, and closed, respectively. Additionally, JavaScript components were added to let users show and hide additional information as needed.

3.2 Paper review system

Figure 6: Paper review administrator tools

3.2.1 Reason for development

The dissemination of research results is a primary focus of I/UCRCs. Most of the I/UCRCs require review by their industry partners. This review process allows the industry members to protect their intellectual property. For the CFSP this system replaces the previous method which was primarily done with email.
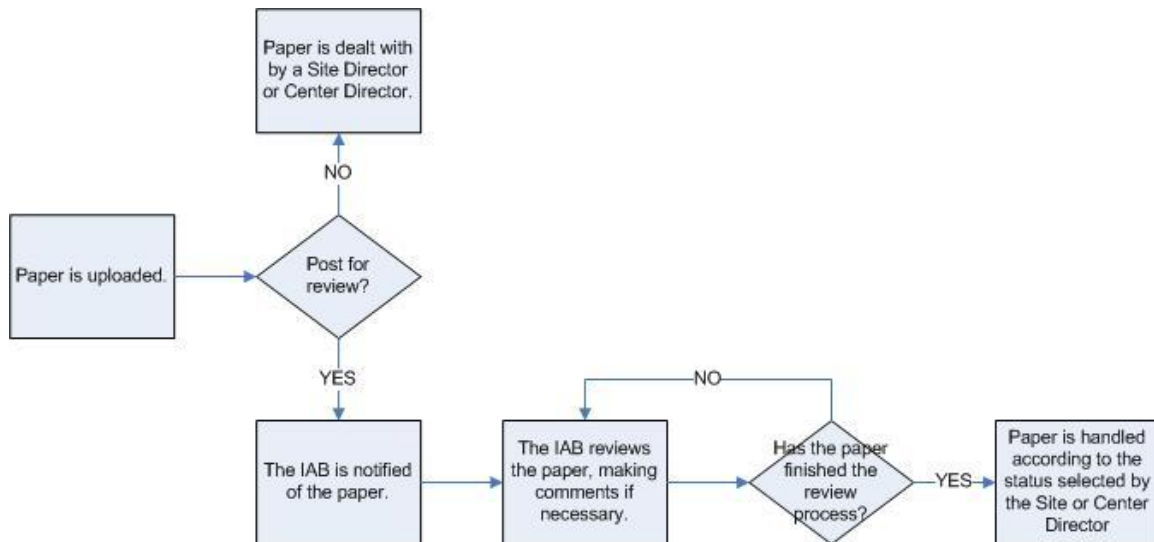
3.2.2 Usage

Figure 7: Paper review flow diagram

Once the paper is posted an administrator is given a chance to review the paper looking for obvious errors. If no errors are found the paper is posted for review by the industry members. An automatic notification is sent out to industry members when the paper is posted. The industry members are allowed to comment on the paper before submitting a final review. Once all the industry members or the review deadline is reached the administrator selects the final status. The system automatically handles the paper once this final status is set.

3.2.3 Features

Communication between users is a priority in the paper review process. The industry members are allowed to leave comments on papers and the corresponding author can view and respond to those comments. The comments may be either plain text or a file upload. When a comment or response is made an automatic email is sent to the author or reviewer, respectively. The administrators are allowed to view these comments and responses as well.

A system to track the review progress was put into place to help authors and administrators monitor the review process. The system tallies the decisions of the reviewers and displays them. The author or administrator can also see who made these

decisions. Then decisions indicating a change to the paper should be made can be discussed with the reviewer.

Security of these papers was a major concern. Any emails sent out about a paper contain enough information about the paper to identify it, but is void of any results in the paper. Additionally only the author of the paper can upload revisions of the paper. Only administrators can select the final status of the paper, including removal.

3.2.4 Specific challenges

Though there is often a paper under review in the CFSP, a particular user may not use the system for months. This extended period between uses may lead a user to forget any idiosyncrasies in the system. The paper review system is a little more verbose about what a field requires for input than other systems. This helps users perform necessary tasks without having to refer to a manual or help file repeatedly. Some field descriptions had their words chosen very carefully to help the user intuitively know what to do with the system.

4 Conclusion

The online management solutions have received positive feedback from the I/UCRC. Through fine-tuning and communication with the CFSP user base, the tools have been custom-fitted for the needs of the CFSP while maintaining the universal usefulness and modularity required for future distribution. By using a common database and communicating modules, the platform provides a simple environment for expansion as new features are added. More aspects of I/UCRC management are expected to be added in the future.