Analysis of the New ASC
Proceedings Web-based Review System

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Sharing ideas and knowledge is an important element of the Associated Schools of Construction's (ASC) Mission. Thus, in an effort to foster the sharing of ideas and knowledge the ASC hosts an international peer-reviewed conference every year. The ASC review process has been very labor intensive, time consuming and open to human errors. The objective of this paper is to present an overview and an analysis of the new automated Web-based system to support the review process of the papers submitted to the ASC conference which is intended to overcome the limitations of the previous manual system. This paper is organized following the timeline of the review process: beginning with the reviewer signing-up, continuing with the submission process and finishing with the outcome of the review process. This new system integrates human interaction and control with an efficient automated process. It is anticipated that the new system will benefit the construction scholar community including authors, reviewers and organizers. The main expected benefit for the authors is the ability of the new system to assign the best possible reviewer to the papers and therefore obtain the most valuable input for the paper. The benefit for the reviewers is to receive more compatible papers based on expertise and interest. Organizers expected benefit is center around the ability of the editor to easily and efficiently assign reviewers, assess paper quality from reviewers input, communicate with authors and reviewers, and document all activities associated with the review process.

Keywords: Proceedings, Process, Review, Automation, Web-based, Programming

Introduction and Background

The Associated Schools of Construction (ASC) mission is the development and advancement of construction education, where the sharing of ideas and knowledge inspires, guides and promotes excellence in curricula, teaching, research and service. The ASC has a long history of promoting the sharing of ideas and knowledge through its Annual International Conference.

In the last three years the number of papers submitted to the ASC International Conference has been steadily increasing, adding additional logistic challenges to authors, reviewers and organizers of the annual conference. Figure 1 shows the number of papers submitted for consideration to the ASC Conferences in the last 3 years

On March 2006, the ASC Webmaster (Kevin Miller) presented to the ASC Proceeding Editor (Tulio Sulbaran) the opportunity to work together to develop and implement a new system to lessen the logistical burden of the conference review process. The Proceeding editor and the Webmaster presented a join proposal to the ASC board of directors, which approved the development of the new system.
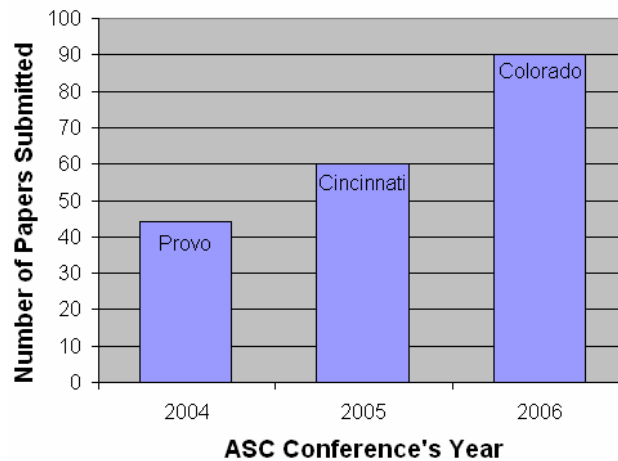
Figure 1. Number of Papers Submitted for Consideration to the ASC Conference (Since 2004) [Sulbaran, 2006]

A Lead Developer (Greg Cummings) was incorporated into the team to develop the new system. The lead developer was task to find an open source software to support the increasing needs of the ASC conference and adapt the software to fit the particular process followed during the proceedings review process.

OpenConf by Zakon Group LLC fit the proceedings review process best, although many new editions and adaptations were necessary. The ASC Proceeding Editor, ASC Webmaster, and Lead Developer meet through online meeting software and discussed the new system and review process over the summer of 2006. The Lead Developer programmed the basic new editions over the summer and adapted the new system to the ASC Proceedings Review process. Many challenges were encountered during the initial programming including but not limited to base paper id setup, security, and communication between reviewers and authors. Beginning the Fall Semester 2006 the ASC Proceeding Editor established an early paper submission to the ASC Conference Proceedings to test and fine-tune/improve the functionally of the new system (with a small sample of authors and reviewers). This process molded the new system to provide the most efficient, helpful and communicative system to streamline the ASC Proceedings Review.

Overview of the ASC Proceedings Review Process

The ASC Proceedings Review process includes five steps; reviewer sign-up, paper submission, reviewer assignment, reviewer comments/vote, and paper assessment. A module has been created for each individual step that includes data storage, data management, and data assessment. Each module relates to the others through identification of reviewer, reviewer assignment and identification of paper. In addition, each module maintains privacy, security, and workability to assist in properly reviewing papers.

All modules have the ability to reserve the right of privacy of the authors and reviewers, through a double blind review. The double blind review means that the systems does not provide the reviewers or authors' information to the other party, minimizing any bias, ill will or favoritism in the review process. All votes are kept independent from each other in order to prevent

groupthink, the Abilene Paradox, and the Halo Effect ("Creating Effective Organizations", David Cherrington) (refer to appendix for definitions of terms). To create a double blind review authors are identified by their paper numbers (i.e. "CERT89002007") and reviewers are identified by their given reviewer id (i.e. 44 or 109). Authors are asked to remove any identification within the paper (i.e. their name or school) that could associate them with a school or organization. Any complaints or discrepancies by either author or reviewer have to go through the Editor, who then would resolve the issue, keeping any reviewer or author free from any vendettas or repercussions.

The first step in the ASC Proceedings Review, **sign-up of reviewers**, focuses on establishing a base of educated construction-related individuals who can properly assess the scholastic reliability, readability and relativity of construction related papers. The ASC Proceedings editor uses the email module in the ASC National Web Site to invite potential reviewers to sign-up. Through using this system only professors at other universities and members of affiliated organizations have the ability to sign-up because the new ASC proceedings site requires a special code to sign-up as a reviewer. Once the potential reviewer have received the special code they are asked to input professional and personal information that used to assign papers for review and to provide appropriate acknowledgement at the end of the review process, An honor code of field expertise is a base assumption and possible are of improvement for the system, because there contains no feasible solution in checking reviewers field expertise to their actual experience in the field. These fields of expertise are called topics within the program and are used to properly align reviewers with papers within their expertise.

The next step, **paper submission**, focuses on submitting papers by authors for review. Any person familiar with the ASC Proceedings Review can submit a paper, as long as they follow the ASC Proceedings Style Guide. Authors are asked to omit any possible relation the paper may have with any individual or organization. Authors submit personal information (i.e. school, contact information, author information), division guidelines, topic areas that best reflect their individual papers with field expertise of reviewers, and abstract of their paper. Microsoft Word (".doc" files) is the only format that users can submit their papers in. A confirmation sent via email alerts the user to proper submission to the ASC Proceedings Review process, as well as confirmation of data input.

Following paper submission, the **reviewer assignment** initiates at the close of paper submission. The ASC Proceedings Editor initiates this process through the automated assign papers module. This module uses an algorithm to best associate reviewers to papers. Only the ASC Proceedings Editor can access this module keeping integrity of the review process at optimum levels. The ASC Proceedings Editor uses the communication module to alert reviewers of their paper assignments.

Reviewer comments/vote concentrates on effectively reviewing the papers by reviewers. The reviewer/author communication module connects the comments of reviewers with authors so that the best possible assessment of the paper submitted can be obtained. Reviewers then give their personal assessments on the paper rating content, topic for construction, analysis, reference, grammar, rating and proceedings recommendation. Votes and comments are recorded in relation to reviewer and author.

The **paper assessment** is then done by the ASC Proceedings Editor by retrieving the information given by reviewers and judges the individual papers for final submission for presentation in the ASC Conference and publication in the ASC Proceedings. The paper score module uses a bilateral algorithm to show papers accepted to the conference. This system also allows the ASC Proceeding Editor to make modifications when required. The ASC Proceedings Editor reviews

comments and scores to reassure that papers submitted to the ASC Conference Proceedings comply with the ASC Proceedings requirements.

Elements of the New ASC Proceedings Review System

Elements of the new ASC Proceedings Review system include authors interface, reviewers interface, Editor interface, and programming aspects.

Authors

For authors the new ASC Proceedings Review System provides access to instructions, communication from the Editor, and control of paper submission. Authors' access to instructions is centralized on the home page of the ASC Proceedings Review System. Instructions include topics like:

- Call for Papers and Schedule – notification to authors for paper submission and deadlines
- Accepted Topics – information about division guidelines for papers
- General Requirements – information regarding paper organization, format, name, and style
- Paper Structure – information regarding distinct elements of paper content
- ASC Proceedings Style Guide – information regarding manuscript specifications, format for graphics, format for tables, paper length, and references. ASC Proceedings Style Guide is base off of the *Publication Manual of the American Psychological Association*
- Author Checklist – a comprehensive guide for authors to follow for proper submission
- How to Submit – instructions on how to use the new ASC Proceedings Review web page
- Review Process – information regarding how the review process works step by step

Each addresses an issue needed to be reviewed by the author, to insure proper submission. Educating the author up front on what is expected alleviates problems further in the review process. The new system also takes into account the vitality of communication for authors. In every step of paper submission, review, vote, and paper selection, emails are sent out notifying the author of steps that will be taken and confirming steps that have been taken by the author. Communication ensures authors of proper submission and confirms data input by author. Authors have control of their submissions through the ability to upload papers, re-upload papers, and edit data input (i.e. topics of paper, author personal information) during scheduled dates that they are allowed to input such information. This control helps authors know that they have submitted correct information and allows them to correct any inaccurate information submitted by them.

Reviewers

For reviewers the new ASC Proceedings Review System provides security, ease of access, step by step instructions, and comprehensive feedback on reviews submitted. The ASC Proceedings Editor calls for reviewers using the ASC web site to ensure only professors and industrial advisors can sign-up to be a reviewer. Entry into the system to sign-up as a reviewer requires a "key code", sent out in the call for reviewers email. This helps eliminate any individual trying to sign-up as a reviewer who does not qualify. The reviewer then selects topics that best suit their expertise. Reviewers are assigned only papers that best match their expertise by the Editor. Reviewers then receive emails on different papers that the Editor assigns to them. Reminders of reviewers' password and username are sent with every email. In addition, if a user forgets their

password or username reminder links are available. Reviewers have the ability to sign-in twenty four hours a day seven days a week to complete their review or post comments.

Legend:
- █ (green) Comments and Votes Completed Reviewer will be acknowledged in the proceedings
- █ (yellow) Waiting votes from reviewer after due date
- █ (yellow) Waiting votes from reviewer
- █ (red) Waiting comments from reviewer after due date
- █ (red) Waiting comments from reviewer

Review Status	Paper ID and Title	Paper File	Step 1: Nov 15 – Nov 24 Blind Electronic Discussion between Author and Reviewers	Step 2: Nov 24 – Dec 2 Reviewer Voting
(red)	CPRT95002007 - Prediction of Construction Time for Commercial and Residential Projects in South India	(68KB)	Read and Post Comments	Vote

Figure 2 Sample Reviewer Screen

Reviewers have all necessary links to complete their review available on one page showing the steps and deadlines of the review process. As seen in *Figure 2* a color code helps reviewers know also if they are late, on time, and necessary steps to complete reviews. Reviewers see all papers assigned to them in this view. Step 1 of the review, "Blind Electronic Discussion between Author and Reviewers", gives reviewers the ability to discuss the paper with authors. Both authors and reviewers see each others comments. Through a "split screen" web page the reviewer can read the paper and make comments on the paper simultaneously. Step 2, "Reviewer Voting", reviewers are asked an array of questions regarding content, best paper candidate, and recommendation for publication. Once the reviewer finishes the voting process an email is sent out confirming what the reviewer voted on and their response to questions asked.

ASC Proceedings Editor

The ASC Organizers and Proceedings Editor benefit the most from the new ASC Proceedings Review web page. The new system organizes data input, controls sign-up and helps with the communication processes. The new site organizes new information for the Editor to help better assess paper assignments and paper acceptance. Algorithms created by the lead programmer assist through automatically assigning reviewers (explanation of this process can be found in this paper under the sub-heading "Reviewer Assignment Module") and giving a base line for acceptance of papers (explanation of this process can be found in this paper under the sub-heading "Paper Score Module"). This extensively relieves the tedious task of reviewing each reviewer's vote for all papers. However, the Proceedings Editor evaluates comments and individual votes for papers on the edge of acceptance and rejection to make certain that proper papers are submitted to the ASC Annual Proceedings. Control of sign-up of new papers and reviewers helps the Editor regulate deadlines. The Proceedings Editor enforces all deadlines through this control. Topics of the ASC Proceedings are also regulated through the new system. The Editor can enter and delete topics between proceedings reviews with a click of a button, which communicates to the authors and reviewers what topics are accepted. Generated reports, such as number of papers, number of reviews completed, number of papers per topic, and number of reviewers, contributes to the assessment by the Editor of the proceedings process. Communication to authors and reviewers is done through the communication module. Query statements and templates aid the Editor in competently communicating with authors and reviewers with little effort (explanation of this process can be found in this paper under the sub-heading "Communication Module/E-Mail).

Programming Aspects

The new ASC Proceedings Review web page contains complicated algorithms and programming. The new web page consists of programming in five different languages, including:

- HTML (Hypertext Markup Language) – is the key ingredient for all web programming. All subsequent languages manipulate HTML code only. Web browsers (i.e. Microsoft Internet Explorer, Fire Fox, and Opera) read HTML code and displays the code in a user friendly format ("HTML for the World Wide Web", Elizabeth Castro).
- PHP (Hypertext Preprocessor, originally stood for Personal Home Page) – "is an HTML embedded scripting language. This means that PHP "is designed to do something only after an event occurs." It is a server side language which means that the language runs on the server and the user never sees the language in use. In essence it dynamically creates HTML code for the user to see ("PHP for the World Wide Web", Larry Ullman).
- SQL (Structured Query Language) – "is the most popular computer language used to create, modify, retrieve and manipulate data from relational database management systems." SQL communicates with databases to retrieve previously inputted data such as papers, reviewers, and paper scores ("http://en.wikipedia.org/wiki/SQL").
- JavaScript – is a user-side language which allows "executable content to be included in web pages" and allows programmers to "interact with the user, control the browser, and dynamically create HTML content." ("JavaScript: The Definitive Guide", David Flanagan)
- CSS (Cascading Style-Sheet) – "give[s] designers the strength they want without stripping HTML of its universality and flexibility" ("HTML for the World Wide Web", Elizabeth Castro). This means that programmers can redesign the aesthetics of the web page without destroying the functionality.

Each language provides an essential purpose in programming. HTML is needed for all web-based programming, which means that the web page cannot exist without the use of HTML. PHP is used as opposed to ASP, JSP, or CGI (which are other programming languages which accomplish the same programming aspects as does PHP) because it is free (meaning there is no fee for using or running the script), it resembles C++ (the bases for most modern computer programming) syntax and is cross-platform friendly (meaning that UNIX, Macintosh and Microsoft users can view the web page). SQL is needed because it is the basic language for all database communication. The database management system used is MySql. MySql is a free, open source software used to manage data. MySql has been used as opposed to ORACLE, Microsoft Access, and other database management software because of ease of functionality as well as no cost to the ASC. JavaScript is used for the Editor assignments of new users. JavaScript reduces lag and provides an efficient means to produce reports that otherwise used with PHP would cause a considerable lag time. CSS helps future programmers adapt the usability of the new system without affecting the functionality of the system.

Programming Modules

The new ASC Proceedings Review web site incorporates different modules to produce the desire outcome of an efficient, accurate, and labor unobtrusive system. Each module addresses a need for authors, reviewers and the Editor.

Reviewers Sign-Up Module

The "Reviewers Sign-Up Module" coordinates new reviewers to enter data relating to their personal information and field expertise. Personal information helps the Editor know reviewers contact information for use in troubleshooting the review process and sending out thank you letters. Checks are in place for email and password to reassure proper data input. If the email field does not match the reentered email field then an error is generated and data is not recorded in the database (the password field follows the same process). The essential purpose of the module is for the reviewer to check their field expertise (topics). As stated in the program, selecting more areas of interest does not imply that reviewers will be reviewing more papers than normal.

When the reviewer submits the information the program assigns the user a unique reviewer id. The program uses the reviewer id for all relationship purposes (i.e. which papers are assigned to the reviewer) and assist with keeping the review process a double blind process. In addition, the reviewer id is used as opposed to the username to allow users to alter their personal information, username, and password without affecting the system knowledge of who the reviewer is. A table in the database is reserved for reviewers' personal information.

Topics are assigned a unique number also and a table stores the relationship of the unique number and the name of the topic (i.e. the topic "Construction Law" is assigned the number 56). This allows the ASC Proceeding Editor to rename a topic without affecting the reviewer to topic or author to topic relationships (i.e. if the topic "Construction Law" changes to "Legal Topics" the unique number remains the same and the relationships stay intact). Reviewer to topic relationships is stored in a separate table, using the reviewer id number for the reviewer and topic id number for the topic name.

The date when the reviewer signs up is also inputted into the reviewer personal information table to assist the ASC Proceeding Editor in knowing which reviewers are active. The ASC Proceedings Editor can remove inactive reviewers through this information. This date is updated every time the reviewer submits new personal information or submits a vote for a paper.

Paper Submission Module

The "Paper Submission Module" allows any author to submit to the ASC Proceedings Review process. Authors fill out general information, author information (for all authors), contact information, accepted topics, topic areas, abstract, and comments to the chair. Authors also upload the paper on the same page. Checks for data input reflect those of the "Reviewer Sign-Up Module." Since the review process is double blinded each paper is assigned a unique paper id. The paper id is constructed through four parts. The first is the accepted topics abbreviation (explained in the next paragraph), followed by a number representing the order the paper was submitted (i.e. if there are already 50 papers and a author submits a new paper the number assigned to the new paper will be 51), followed by a spacer of "00" and then the proceedings review year of submission appended to the end. The final paper id will look like "CERT51002007."

Accepted topics, also called the division guidelines, for the annual proceedings categorize papers into six divisions which helps reviewers understand the authors focus (refer to appendix for division guidelines and acronyms). The module uses an abbreviated four letter acronym for each division and the acronym becomes part of the paper title.

Topic areas give authors the opportunity to relate their paper to appropriate field expertise of reviewers. Author to topic relationships are stored in a separate table with the paper id for the author and topic id number for the topic name.

Authors have the ability to leave comments to the Editor at the end of the web page. This allows closed communication with the Editor, so that any issues can be resolved without interaction with reviewers.

Reviewer Assignment Module

The "Reviewer Assignment Module" relieves the tedious task of assigning each paper reviewers that best fit. The algorithm automatically finds the best match, but this does not exclude all human interaction with paper assignments. Before the algorithm runs the module finds conflicts between authors and reviewers. If an author's and reviewer's organization matches or email matches the program sets a conflict between the two and the reviewer cannot assess the author's paper. In addition, the Editor can manually set conflicts between papers and reviewers.

The algorithm selects users on a three tier sort. The first tier sorts all reviewers by the number of topics the reviewer has selected for their individual field of expertise ranking the lower number of selected topics at the top. The assumption of users selecting a lower number of topics is that they have a greater expertise in the individual topics selected than those who selected many topics. The second tier sorts the number of papers the reviewer already has assigned to them. The lower number of papers assigned to the reviewer rank higher on the list. The Editor keeps the number of papers assigned to reviewers at a minimal level (usually 3 papers per reviewer), to receive the best possible feedback for each paper. The third tier sorts the number of topic matches between reviewer and author, putting the most number of matches at the top. The highest possible number for matches is three (3), because authors are only allowed to select three topics per paper. The top five individuals, after the three tier sort, are then selected to review the paper.

Results of Three Tier Sort for Paper ID CERT51002007

Reviewer ID	Number of Topics Selected (Tier 1)	Number of Papers Assigned (Tier 2)	Number of Topic Matches (Tier 3)
66	1	0	1
15	3	0	3
37	3	0	2
98	3	1	3
105	11	0	2
89	11	1	2
13	11	1	1
7	20	3	3
55	26	2	3

Figure 2

In *Figure 2* reviewers 66, 15, 37, 98, and 105 are assigned to paper id CERT51002007 after the three tier sort. The ASC Proceeding Editor can change the number of reviewers selected from five (5) depending on number of reviewers and the number of papers. The ASC Proceeding Editor reviews those selected by the algorithm to make certain the greatest correlation of authors and reviewers topics. Once the Editor finalizes assignments notifications are sent via email informing reviewers of the individual papers assigned to them.

Reviewer Comments/Vote Module

The "Reviewer Comments/Vote Module" supports author and reviewer communication and it lets reviewers submit their assessment of papers. Comments are shown in the split screen view where reviewers make their personal comments. Authors have the ability to leave comments as well. To maintain a double blind review authors are recognized by their paper id and reviewers by their reviewer id. Comments are stored in a table with relationships based on author id or reviewer id and their comments.

After discussion between reviewers and authors, reviewers then vote on different aspects of papers. Below is a list of what papers are graded on:
- Significance of Topic for Construction Education
- Readability
- Grammar and Spelling
- Tables and Figures
- References
- Review of Literature
- Research Design and Methodology
- Statistical Analysis and Support Data
- Conclusions and Recommendations
- Overall Rating of the Paper

All aspects, except overall rating of the paper, can have a rating of N/A, poor, weak, adequate, good, or excellent. Votes are stored in numeric format depending on rating with a range of one to five (one representing poor and five representing excellent); N/A receives a value of zero and is ignored by the program. Overall rating of the paper can receive a rating of below average, average, above average, or exceptional. Overall rating receives a numeric value ranging from zero to three (zero representing below average and three representing excellent). Ratings are converted into numbers to report averages to the Editor. An email to the reviewer confirms voting occurred without error and confirms data input. The module also updates the reviewer's profile letting the program know the reviewer is active.

Paper Score Module

The "Paper Score Module" reports averages of votes and allows the ASC Proceedings Editor to establish a baseline score for acceptance and rejection of papers. A simple algorithm takes all votes, adds them together and divides by the number of reviews. Overall rating and suggested submission to the ASC Annual Proceedings are added together to create a combined score. The combine score is the bases of acceptance. The ASC Proceedings Editor then establishes a baseline score, through experience, for the combine score and the module automatically accepts papers above the score and rejects papers below the baseline score. The ASC Proceedings Editor then reviews votes for papers on the edge of the baseline score. The ASC Proceedings Editor reviews comments and votes on the different aspects for papers on the edge of the baseline score. After careful assessment the Editor then decides if the paper qualifies for the ASC Annual Proceedings. The program does very little automation during this process because human interaction is indispensable for proper consideration of papers. The ASC Proceedings Editor informs authors of their acceptance or rejection through email, informing them of steps to take before the conference if accepted and votes submitted by authors if rejected.

The "Communication Module/Email" allows the Editor to communicate with reviewers and authors via email. The module also allows the editor to use standardize templates for ease. It also uses embedded variables to let the Editor personalize each email.
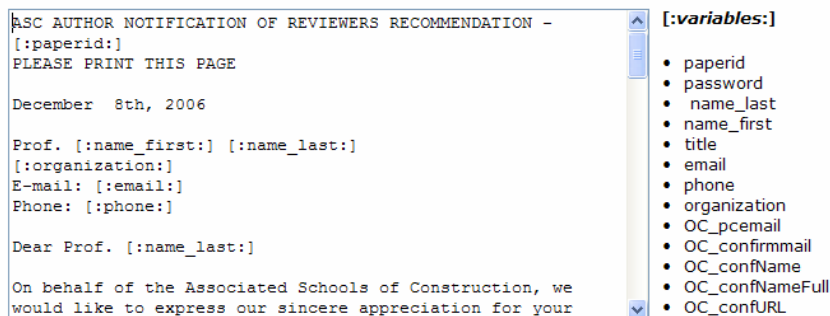

Figure 3

As seen in *Figure 3* embedded variables are represented by the characters "[: :]" with the field of data desired in between. A SQL statement and PHP code recognizes these variables and replaces them with the proper data. Emails can be sent to all users or specified users such as authors with no comments or reviewers who have not submitted reviews.

Expected Benefits of the New System

The expected benefits of the new ASC Proceedings Review web page includes quicker assessments, better reviews, easier organization of data, better communication, and extensive reduction in tedious task by the ASC Proceedings Editor. Votes are reviewed quicker because the program compiles and assess the data within seconds. Authors receive better reviews because they are assigned reviewers best suited for their paper by the three tiered sort process. Reports of data, such as number of papers who have received reviews, are generated with ease and accuracy. Tedious task that the ASC Proceedings Editor had to accomplish have mostly been eliminated through innovative programming. Communication process has been streamlined through templates and focused emails. Overall the new system reduces tedious task that had to previously be performed and helps improve the overall usability of the ASC Proceedings Review process for the authors and reviewers. In addition, all communication, votes, comments, and papers are recorded in case of any future discrepancies.

Summary and Limitations

The new ASC Proceedings Review web page modernizes the review process. Multiple modules address different issues with the review process and supply an adequate solution in resolving problems with the review process. Reviewers, authors, and the Editor benefit from the new system. Overall initial reactions to the new system have been positive. The new system also allows for a greater number of papers to be reviewed.

Limitations include the number of reviewers, assumption of honesty amongst reviewers, and the ability of the Editor to properly assess papers. The number of reviewers should be resolved through greater participation by members and users of the ASC. The other two assumptions cannot be adequately resolved through algorithms nor programming, but instead are resolved by the honesty of individuals selected to review papers.

Appendices

Appendix A

Groupthink - occurs in highly cohesive groups when group pressures lead to reduced mental effort, poor testing of reality, and careless moral judgments. It includes:
- Illusion of invulnerability.
- Rationalization.
- Illusion of morality.
- Shared stereotypes.
- Pressure for conformity.
- Illusion of unanimity.
- Mind guards.

The Abilene Paradox - occurs in organizations when members fail to communicate their true ideas and desires because they think it is better to be agreeable.
The Halo Effect - refers to the tendency to allow one personality trait to influence our perceptions of other traits.
("Creating Effective Organizations", David Cherrington)

Appendix B

- CERT - Construction Education – Research
- CEGE - Construction Education - Graduate Education
- CEUE - Construction Education - Undergraduate Education
- CEGT - Construction Education - General Topics
- CPRT - Construction Practice - Research
- CPGT - Construction Practice - General Topics

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