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Interactive Online Forms

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A Capstone Project Submitted in Partial Fulfillment of the
Requirements of the Renée Crown University Honors Program at
Syracuse University

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and Renée Crown University Honors

August, 2010

Honors Capstone Project in Information Management & Technology

Capstone Project Advisor: _____
                                                    Michael Fudge

Honors Reader: _____
                                    Lauri Francis

Honors Director:_____
                                    James Spencer, Interim Director

Date: 8/8/2010 _____

Abstract

The use of interactive online forms can improve the efficiency of data management processes in any organization, particularly ones that rely on the collection of large amounts of data. The work of my capstone project sought to leverage technologies available in the open source community to improve the work-flow of one such organization, the Honors program at Syracuse University. As a result, I focused on transforming the often used paper civic engagement form into an autonomous electronic process. By appropriately following the stages of the systems development life cycle, a systematic approach that focused on planning and security conscious execution was employed to achieve the desired result.

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Inception

  The idea for my capstone project came from a discussion I had with Honors adviser Stephen Wright concerning the Honors program website. As a four-year student in the Honors program, I found it odd that the forms necessary for students to document the completion of milestones within the Honors program could be accessed but not completed online. These forms include the documentation of civic engagement hours, and the declaration of an Honors student's capstone project. It was surprising to me that such an integral part of the Honors program relied on an inefficient paper-based system, which essentially involved students filling in the forms by hand, turning the forms into the Honors suite, and a paid student worker or administrative assistant typing the handwritten data into the Honors program electronic database for record keeping. I found brainstorming possible solutions to the current system intriguing. Clearly allowing students to enter data directly into the Honors database would expedite the record keeping process, but what security implications would this change incur, and how would this affect the work-flow of the Honors staff.

  Another reason this capstone project sparked my keen interest is because it presented a hands-on opportunity to be a project manager and software developer within the sandbox of the university. Much of the curriculum in my degree program has involved theoretical analysis, severely lacking on the application side of learning. As a result, throughout my time at Syracuse I sought opportunities to

utilize the knowledge learned in the classroom, so it was important to me that my capstone include a tangible component.

My primary goal for this capstone project was to have a positive impact on the work flow of the Honors staff, regarding the processing of one of the Honors documentation forms. I chose to transform the civic engagement process into an interactive online form because of its high visibility among all Honors students, and the large number of civic engagement forms submitted daily to the Honors program. As an Honors student, I frequently used the civic engagement form during my four years at Syracuse, experiencing first hand the cumbersome process for getting civic engagement experiences approved. For example, while abroad in Madrid, Spain, I performed volunteer work, assisting elementary age students learning English. In order to credit this experience towards the requirements of the Honors program, I had to print and fill out the civic engagement form at a local computer lab, bring the form to the school I volunteered at for my supervisor's signature confirmation, and then keep this form "safe" for the four month break before turning it in to the Honors program in August. A more efficient approval process would have resulted had I been able to fill out the form online, and have my supervisor approve the information digitally. After speaking with Honors students during the planning stages for my capstone, I found many students with similar experiences.

Planning

The success of my honors capstone project depended on my ability to satisfy the needs of my clients. As a result, I knew a proper planning stage would be necessary to identify the key components of a successful completion of the project from the perspective of the Honors staff. As noted in the article *Pragmatic Web Project Planning* by Sam Barnes:

> Consistent and thorough web project planning generally results in a more consistent success rate with web projects, because before production begins, you are able to identify, define, and thus manage the critical parts of any project (Barnes).

For my capstone, appropriate planning, which occurred over the period of a month, aligned me with the resources to complete my project, setup the proper communication channels between the project stakeholders, notified the project stakeholders that a project intending to affect their work-flow was in development, and defined the scope of the project. My first course of action involved seeking advice from faculty that could appropriately advise my capstone project, and would be familiar with the technical challenges of the endeavor. This included asking Michael Fudge, a full-time database instructor and IT professional within the information systems school, to be my capstone adviser, as well as asking Lauri Francis, the developer and person responsible for maintenance of the Honors program website to be my capstone reader. Initial meetings with the Honors program identified the following list of key stakeholders in the project, who were kept abreast of project decisions and

changing requirements: capstone reader Lauri Francis; Deputy Director of the Honors program Eric Holzwarth; Assistant Director of advising, information systems, and data management Carolyn Ostrander, who is responsible for the integrity of the database the Honors program uses for record keeping; and Data Manager/Recorder Victoria Bickel who is responsible for submitting the paper data into the Honors electronic database.

From the perspective of the Honors program staff, an intuitive online form that allowed students to securely enter data into the Honors database constituted a successful conclusion to the project. As a project manager my goal was to accomplish this in a timely manner, while exceeding the expectations of my clients. During this process, I discovered that understanding the way in which my clients currently worked was paramount to achieving a favorable project outcome. As a corollary to this principle, Michael C. Nollet, a MBA with over fifteen years of project management experience notes the following in his white paper *Effective Project Management Efforts Have Business Goals Attached*:

> An IT project should be a solution to a business problem. The technology deliverables may only be a partial solution, requiring other changes within the organization to be successful (Nollet).

Further meetings with the project stakeholders proved Nollet's point to be true. As a student user of the system, my initial understanding of the civic engagement approval process was naive. Once the data had been input to the Honors database,

and providing the student had received the necessary signature from the supervisor of the activity, I imagined an automatic approval process. Therefore, I viewed a supervisor's confirmation that the volunteer activity had been performed as the only roadblock to complete efficiency of the approval process. As a result, I proposed creating a system that would automate a supervisor's confirmation. In reality, there is actually a lengthy approval process; after students submit the paper form to the Honors Suite, a background check is performed to ensure that the indicated activity meets the requirements for an Honors civic engagement experience. The background check process may include calling the supervisor of the documented experience, which falls outside of the bounds of my technical solution, but had to be addressed by the staff of the Honors program before moving forward. One way I was able to partially solve this problem is by proposing that the online process clearly notify students that a supervisor's approval of their civic engagement hours did not automatically guarantee the hours would be credited towards their Honors degree.

Technical Solution

Using the notes from the planning stage and numerous meetings with the Honors staff, I envisioned the civic engagement form transforming into a three-step process, with a status check:

1. An Honors student fills out the Online Civic Engagement Documentation Form on the Honors website (Appendix A).

2. Using the email address indicated by the student, an email is generated to the supervisor of the activity, requesting that the supervisor take a few minutes to approve the information submitted by the student (Appendix B).

3. The supervisor clicks the link included in the email, allowing the supervisor form to be opened in their web browser. In this form, the supervisor indicates whether the student completed the specified hours of the activity (Appendix C).

Status Check Screen: This allows students to view a summary of all civic engagement experiences submitted. The summary information includes the date the form was submitted, the organization where the student volunteered, and one of the following status indicators:a green check mark if the supervisor approved the hours, a yellow caution sign if the supervisor did not approve the hours, or a "Pending" if the supervisor has yet to respond (Appendix D).

Although web sites can be made to look identical to their print media counterparts, as a user experience designer, my goal is to leverage the strengths of the medium in order to produce an intuitive and interactive interface. In relation to the Web, this involved focusing on user-centered design, creating something that was inviting with its color, typefaces, and tone of text. After creating the three-

step process, I realized there were two different interests I had to keep in mind while designing the interface, the Honors student user and the Honors staff client. In short, my users preferred a short and simple form, the result of filling out many forms and being able to recite the directions from memory. In contrast, my clients wanted to maintain the verbosity of the original civic engagement form; a logical request since they would be supporting its use after my departure. With these differing ideologies in mind, I sought research on the general guidelines and principles of excellent form design. CXPartners, a premiere user centered design agency based in the UK recently conducted an eye-tracking study with the following purpose:

> to observe how people react to different form designs, to find out where users look when they are presented with a big list of text boxes, to determine the optimal way to design and lay out a form, to ensure that users understand what they have to fill in, to ensure users focus on their primary task when filling in the form, and to provide a list of form guidelines with supportive data that can help designers design better forms (Tan).

The Yahoo! Mail signup web form received high praise during the CXPartners study for implementing many of the design philosophy best practices. This included using right-aligned horizontal labels, not using asterisks to indicate optional fields, and grouping different sections of the web form using colored headers and numbers. Praise was also given to the Yahoo! form for attempting to

relate to individuals on a personal level, through its choice of wording. As a result, I chose to go minimalist in my design, abstracting the help text whenever possible; the results of this can be seen in Appendix E, where for example, the help text is hidden by default. Final mockups of all major screens were created before development began, and are included in the following Appendices: A, F, G, and H.

Development Challenges

During the software development phase, where I focused on implementing the technology outlined in the mockups and technical specification, I faced unforeseen technical challenges. Capstone reader Lauri Francis, who continued to provide invaluable insight on the capabilities of the infrastructure technology available for my use, immediately setup a remote testing environment for my capstone. This allowed me to develop in the environment the project would eventually exist on, which is referred to as a production environment. In the software development life-cycle, the development phase is preferentially conducted in a testing environment, that allows the developer to prototype the project and then rapidly iterate (Kay). Although the space setup for me would have satisfied my technical testing needs, because of the necessity of rapid iteration, I chose to develop in a configuration local to my personal computer. This allowed me to avoid having to upload files to the production environment in order to test a new feature or line of code, but created an additional challenge. My local server is a MAMP, which stands for Mac, Apache, MySQL, and PHP, and

refers to the configuration of the technology environment: Mac is the operating system, Apache the web server, MySQL the database, and PHP is the scripting language used to manipulate data. The production environment, however, runs on Internet Information Services (IIS), a Microsoft branded web server. This could have presented a larger problem, but in reality represented a small change made to the PHP configuration of the production environment to allow for a smooth transition when project files were moved from testing to production.

Another technical challenge faced involved generating an email to the supervisor of the activity, a necessity in my three-step process. In my proposed technology solution, after students submit the civic engagement form to the database, an email is immediately sent to the indicated supervisor asking for confirmation of the information the student has submitted. Because this email was in part a representation of the Honors program, this email needed to come from an official source, and had to support the ability to send a message to addresses outside of the Syracuse network, essentially addresses that do not end in @syr.edu. Email is sent over a protocol named Simple Mail Transfer Protocol (SMTP). As a security feature, and to prevent against spam, Syracuse University Information Technology Services requires SMTP authentication in order to allow email to be sent to addresses outside of its domain (@syr.edu). I turned to capstone reader Lauri Francis for help with this issue, which resulted in her securing the email address e-hnrforms@ad.syr.edu for use by the Honors program. This move exceeded my needs and expectations, allowing, if necessary,

granular management into the automatic emails generated on behalf of the Honors program.

As a security conscious developer, everything from the technologies I chose to work with, to my use of simple best practices have been put in place to safeguard against access to the database of stored student information, protect against spammers, and prevent malicious data exploits. After students initially fill out the civic engagement form, basic personal information such as their name, phone number, and address are stored. Most importantly, and for cross-reference identification purposes, a student's netid is requested as well, which must be protected because of its frequent use within the Syracuse University community. PHP, the scripting language used to manipulate data for entry into the database, is as secure as any other open source standard language (Dimov). Because the language is open source, a large community of developers volunteer time and resources for the betterment of the language. One of the easiest ways to prevent against security exploits will be continuously updating PHP as updates are released by this community. In deciding how to process data on the form, I employed the security best practices as identified by the PHP Security Consortium, "an international group of PHP experts dedicated to promoting secure programming practices within the PHP community" (Shiflett 2). For example, the access credentials used by the web sever to talk to the database are not exposed, avoiding the "potential problems that occur when this file is included somewhere within the document root" (Shiflett 22). I also used simple measures

that protect against malicious code injection, which would spoil the integrity of the data. These measures include filtering the data entered into the form, and applying proper formatting to ready it for storage inside the database (Shiflett 23). Furthermore, the entire system will be placed behind a lookup to the active directory. In practice, this means that in order to be able to fill in a form on the Honors program website, a student must first enter their netid and password. These credentials will then be checked against the list of all users within the Syracuse University community to ensure that the person entering information into the database is actually a member of the Syracuse University community.

Future Benefit

Beyond the sense of accomplishment I feel as a result of completing my capstone project, I gained an immense amount of self confidence in my ability to lead a technical endeavor. Most of the technologies I proposed to the Honors program, for use in the project, were tools I was familiar with, but had never implemented. As a result, I frequently had to "learn on the fly," or quickly research a technical issue in order to move forward with development. The experiences I faced in the development of this project are very similar to what I will experience in my career as a technologist. In this case, the cliché holds true; the simple fact that I am graduating college does not indicate that my days of learning are over. Technologies quickly become outdated and the tools in use now will frequently change over the course of my career. Of the many lessons I learned working on this project, I will always remember not to make assumptions

during the planning stage and to instead focus on thoroughly learning the "business," which will bring necessary relevance and clarity to my technical solution.

For the Honors staff, it is my hope that the benefits of this project to the organization and stakeholders will occur in the future, allowing the staff to recoup precious cycles that would have been used on mundane data entry. I desire this project to be the first of many tested use cases, each proving the benefits, and in particular efficiency, of having online interactive forms. The potential upside for the Honors organization is immense, with the possibility for students to log their own milestones, background checking to be conducted automatically, and the results to be posted to the Honors database immediately.

Without the support of the wonderful Honors staff, and my capstone reader and adviser completing this project would not have been possible. In particular, credit and thanks are due to Honors program adviser Stephen Wright for taking an immediate interest in my idea, and helping to foster its growth.

The technical solution can be viewed at http://hnrforms2.syr.edu/.

Appendix A

Appendix B

Civic Engagement Approval Request   Inbox | X   🖶 Print all

from ● **Honors Civic Engagement**   hide details Nov 10 (1 day ago)   ↩ Reply ▼
reply-to ● e-hnrforms@ad.syr.edu
to   Jen Jones <test_supervisor@gmail.com>
date   Tue, Nov 10, 2009 at 6:02 PM
subject   Civic Engagement Approval Request
mailed-by   gmail.com

Hello,

Martha Vineyard, a student in the Honors Program at Syracuse University has listed you as the supervisor of their civic engagement activity. This activity was performed at Food Pantry at Temple Concord, between March 2, 2010 and March 2, 2010.

One of the requirements for being an Honors student at Syracuse University involves the completion and documentation of a minimum of 50 hours of civic engagement experiences, done over several semesters. Activities can take place on or off campus, in Syracuse or elsewhere. We ask students to reflect on how each activity has contributed to their understanding of the meaning of civic engagement, and to note their specific roles and responsibilities.

As part of the verification process, students must also list a supervisor that was present during the activity, a person who can speak to the relevance of the activity towards the Civic Engagement requirement, and assess the student's performance.

To start the verification process on our end, we simply need you to fill out the brief form at the link below to confirm Martha's participation hours. Most of the input fields will be filled in with information Martha has already submitted, and a couple faded fields cannot be edited, but change anything you feel is incorrect. Of particular importance, are the two checkboxes in the form. The first, confirms Martha's participation hours, while the second is a request to be contacted by the Honors staff.

http://hnrforms2.syr.edu/supervisor.php?id=2&pgenid=7z9sodWkKN15

Thank You,

Stephen H. Wright
Assistant Director, Advising, Civic Engagement and
Scholarship Preparation
Renée Crown University Honors Program
Syracuse University
306 Bowne Hall
Syracuse, New York 13244
(315) 443-2759
http://honors.syr.edu/

Appendix C

Hours to be approved...

	Month	Day	Year		Month	Day	Year
Start Date	Janua ▼	1 ▼	2009 ▼	End Date	Janua ▼	1 ▼	2009 ▼

Total Hours   [40]

☐ By checking this box, I confirm that the above student has completed 40 hours of community service between the above start and end dates at Food Pantry at Temple Concord.

☐ Please contact me regarding the information submitted on this form.

My Assessment...

Please type your name in the box below.
This will serve as your signature.

Date   [11/12/09]   [   ]

[Reset]   [Submit]

Appendix D

THE RENÉE CROWN
University Honors Program
SYRACUSE UNIVERSITY

HOME   STUDENTS   JOIN HONORS   FACULTY   ALUMNI

Civic Engagement Status Check

Please note that civic engagement hours approved by the supervisor must still be reviewed by Honors staff before being added to your file.

Need Help? ?

Date Submitted	Organization	Hours	Supervisor Approved?
4-29-2010	Food Pantry at Temple Concord	23	✔
4-29-2010	Krick Estates	14	Pending
4-29-2010	Krick Estates	25	✔
4-29-2010	Kopolow Food Bank	32	✔
4-29-2010	Kopolow Food Bank	25	✔
4-29-2010	Kopolow Food Bank	12	Pending
4-29-2010	Krick Estates	15	⚠
4-29-2010	Kopolow Food Bank	30	Pending
4-29-2010	Kopolow Food Bank	30	⚠
3-24-2010	Food Pantry at Temple Concord	23	Pending
3-2-2010	Food Pantry at Temple Concord	12	Pending
3-2-2010	Food Pantry at Temple Concord	1	Pending

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Appendix E

Appendix F

THE RENÉE CROWN
University Honors Program
SYRACUSE UNIVERSITY

HOME   STUDENTS   JOIN HONORS   FACULTY   ALUMNI   Forms

Need Help? ?

Supervisor's Name   Supervisor's Title

Email   Phone

4. Tell us about your responsibilities...

5. Tell us about your experience...

How did this experience contribute to your understanding of civic engagement?
Has that understanding evolved because of this experience? What will you look
for in subsequent experiences?

6. Number of hours completed...

☐ By checking this box, I confirm that I have complied with any
and all confidentiality policies in place at this organization.

Reset   Submit

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Appendix G

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