

RPI ITWS Capstone Project: A Tale of Two Teams

Marie Joan Kristine T. Gloria
Tetherless World Constellation
Rensselaer Polytechnic Institute
glorim@rpi.edu

John S. Erickson
Tetherless World Constellation
Rensselaer Polytechnic Institute
erickj4@rpi.edu

ABSTRACT

The Information Technology and Web Science (ITWS) discipline at Rensselaer Polytechnic Institute (RPI) strives to offer students a broad interdisciplinary education. Students are encouraged to think critically about the interplay between the social, scientific, and technical issues underlying the Web. In this paper, we present the ITWS Capstone project, which challenges upperclassmen to design innovative ITWS solutions for a specific problem. Specifically, we outline two different pedagogical methods facilitated by the Web Science Research Center (WSRC) at RPI to encourage a more Web Science approach in creating and designing the student projects. We also discuss the opportunities and challenges for each method.

Author Keywords

Information Technology; Web Science; Web Science Education

ACM Classification Keywords

K.3.2. Computer and Information Science Education

General Terms

Human Factors; Web Science; Web Science Education

INTRODUCTION

Introduced in 1998, RPI's ITWS department offers students an interdisciplinary curriculum centered around an understanding of the interplay between the social, scientific, and the technical issues underlying the Web [1]. The Capstone Project, which is offered to both upperclassmen (4100) and to Master's students (6800), is situated as the culmination of an ITWS education. Students in this class are tasked to collaborate on projects that address specific problems within a student's field. They are expected to propose, design and prototype their solution, leveraging "best practices for IT project management, communication and user-center design" [2].

Over the past two-years, the RPI Web Science Research Center (RPI WSRC) has worked with the Capstone classes to integrate a Web Science perspective. For example, once a semester, a guest lecture is presented by a WSRC

member to the class. Entitled, "Engineering the Semantic Web", the presentation reviews both the technology as well as key concepts that may be useful in industry. Additionally, once a year, the WSRC sponsors one capstone team project. The following presents two different projects that reflect two very different pedagogical styles.

APP FOR SOCIAL CHANGE

In Fall 2013, a Capstone student team engaged with the WSRC to develop an "App for Social Change". The original call (drafted by the WSRC) asked teams to utilize open government data to create mobile apps that may promote positive social change by helping solve a local, community problem. Teams were required to identify a local issue and develop a strategy to address it using not just open government data but also apply Semantic Web technologies. The project expectations included a sound and well thought-out design, visualization (or prototype) and integration of linked data practices. Students were first required to pitch their ideas to the WSRC. The WSRC received three proposals from which the idea of "Urban Sprawl" was chosen.

The team consisted of two web developers, one business manager and a team leader. The team was chosen based on their proposed idea and varied skills sets. During the first several weeks, meetings with the WSRC consisted of further research on the social problem, understanding similar mobile apps, identifying potential data sources and developing use cases for the application. For this project, the WSRC encouraged students to critically understand and investigate the local problem then to think of potential technical solutions. Only after a set of research questions were developed did the team begin to explore potential datasets and system architectures. To better help scope the project and manage timelines, the team was asked to develop a prototype based on a specific user scenario.

The final product, the Urban Sprawl Assessment Portal, is a dynamic web application for reviewing factors contributing to urban sprawl geared towards legislative aides. The

primary challenges for this approach can be summed up in the following:

- *Question development:* Given the open nature of the project call, the team had initial difficulty in trying to formulate a research question. The role of the WSRC mentors was to guide them through this questioning process.
- *Data sourcing:* The project required the use of open government data, which the team found difficult to source. It required several weeks of research and domain learning to fully understand what data would be useful for the project. In the end, the team leveraged New York State Open Government dataset to generate proxies for “urban sprawl”.
- *Technical skills:* The team comprised of two web developers who had introductory knowledge of Semantic Web technologies. Despite the steep learning curve, the team quickly adapted and was able to create a working prototype by the end of the semester. This required quite a bit of mentoring from the WSRC members on aspects such as Virtuoso, SPARQL queries, visualizations, etc.
- *Timing:* In hindsight, the project call and expectations were quite ambitious for one semester. From identifying a problem, to question formation, to design and execution, both the team and WSRC mentors dedicated a number of hours to this one project.

While the project was well received, there were quite a few lessons learned. In addition to those listed above, integrating business components into a non-profit like project created an extra challenge for the student team. Keeping these experiences in mind, the next section reviews a different approach.

JEFFERSON PROJECT ENVIRONMENTAL DATA USE CASE DEVELOPMENT AND EXPLORATION

Once again, the WSRC sponsored a Capstone Team project in the fall of 2014. This time, the approach was slightly different than the open-ended social good challenge. For this Capstone, the WSRC wanted a team who could develop a consultancy report (slides) detailing a set of scientific use cases informed by environmental data gathered by the Jefferson Project from the Lake George region. The expectations for the deliverable included a well-formed use case, wireframes of proposed applications/user interfaces, and sample queries leading to solutions

Learning from the first Capstone, the WSRC tightly scoped the Jefferson project in order to better align to the class requirements and to be mindful of time constraints. The resulting product included four detailed, actionable use cases based on vetted scientific questions. The student team worked with various WSRC members on the larger Jefferson Project¹ in order to better understand the data. Like the first project, there were still numerous challenges for this approach are:

- *Data Sourcing:* Similar to the first Capstone team, searching and acquiring the correct data proved to be quite difficult. Unlike the open government data, the Jefferson data is proprietary; thus, access is very limited. To circumvent the inaccessibility, the WSRC and student team generated scenarios and outlined data requirements.
- *Business Component:* Again, integrating business components, such as budget assessments, into the Jefferson project required creativity. To fulfill this requirement, the team developed a cost-benefit analysis that covered the potential application development.

CONCLUSION

In this contribution, we presented two approaches to managing student Capstone Projects in the ITWS department at RPI. We offer both examples as potential approaches to integrating Web Science into a more application-focused class. We discussed key wins and challenges for each approach, highlighting that in both instances teams were successful. Our hope is that such examples can be used to inform the development of other similar programs and classes.

ACKNOWLEDGMENTS

Our thanks to all of the researchers, faculty, and staff of the Tetherless World Constellation at RPI.

REFERENCES

1. “Information Technology and Web Sciences”. Rensselaer Polytechnic Institute Website. n.d. <<https://www.rpi.edu/dept/IT/index.html>>
2. “ITWS 4100 - ITEC Capstone Experience”. Rensselaer Polytechnic Institute Website. n.d. http://catalog.rpi.edu/preview_course_nopop.php?catoid=9&coid=15227

¹ For more information on the Jefferson Project, see <http://tw.rpi.edu/web/project/JeffersonProjectAtLakeGeorge>