ENSE 405 Project Report-out & Lessons Learned

Project Name

EngiConnect by Maksim Sharoika

Project Sponsor & Course Facilitator

Dr. Tim Maciag (ENSE 405 professor)

Background / Business Need/ Opportunity

Engineers, Professionals, and Academics are some of the most uniquely skilled and positioned people in our workforce. Not only do they have the ability to imagine new projects, ideas, and frameworks but also the ability to plan and execute each and every step of those solutions. This means these Engineers, Professionals and Academics can create real change but, the biggest issue is that there is nowhere that they can connect with each other, create partnerships or solve problems that others may be experiencing (Which is why EngiConnect is needed). EngiConnect will bridge that gap and help make meaningful progress in all 17 UN SDGs - these SDGs' are the issues that are bringing (or will bring) the most harm, pain, and misery to the people living in this world - and must be focused on.

There are two main business needs that EngiConnect fulfills; both are equally important and are discussed in no specific order.

The first is the facilitation of knowledge sharing and the creation of a collaboration platform. The UN SDGs' in some cases require some complex solutions - with a very diverse skill set. Therefore having a platform where Engineers and other professionals can come together and work on these problems; and share their expertise is invaluable. EngiConnect will also fulfill the need of continuing learning and development in a meaningful way, those on the learning side will be more likely to inspire others to join or start a project to contribute to the community.

The other business need that EngiConnect fulfills is the need for networking and partnership creation between these professionals. Often times engineers work on teams where there may be only one other engineer, so the exposure to the professional network of that specific job role is very low. EngiConnect will not only help connect engineers to others but it will also help those in specialized roles within their field find others who are doing something similar. EngiConnect will not only help users connect across professions but also passions, since the platform is geared towards the UN SDGs' the users can connect over their shared passions. The bonds that the users will form over their shared passions will give them a strong base to either share their knowledge further or take on a project.

Reflections on project planning (3-5 pages)

State and discuss the United Nation's (UN) Sustainable Development Goals (SDGs) selected and your "why" for selecting the one(s) you did

The United Nations SDG #17 is described as "to strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development". In addition, UN target 17.16 is to "Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries". The target is what I focused on for my project, I wanted to incorporate the sharing of knowledge across all of the SDGs as I think knowledge and education, in general, are very important in moving all of the SDGs forward. Not just education alone, it had to come from a variety of worldviews, perspectives, and professions which is why I chose UN SDG #17 - couples with the community of engineers, academics, and professionals.

In general, I focused on SDG #17; this was due to one main reason - in my research, I noticed that all the SDGs' were intertwined in some way - for example; SDG #1 (no poverty) and SDG #2 (zero hunger) are closely intertwined - looking at statistics; if poverty plagues an individual they are unable to afford food and thus go hungry if we were to somehow decrease the rate of poverty we would in turn see a drop in those going hungry another example SDG #11 (sustainable cities) and SDG #13 (climate change). Cities are a very significant pollutant thus making them more sustainable will help combat climate change. For example, if we were to ban cars in cities and strengthen public transport we would see a dramatic drop in the amount of pollution coming from cities and in turn help slow down climate change. Due to all these SDGs' being intertwined coupled with the talk that Roger Petry gave to the class; saying "The best project would be the one that combines as many of these goals as possible" - I decided to focus on SDG #17 (partnerships for the goals) to create an application to support solutions to not only one, two, or three but all SDG's.

I believe the more global partnerships that we create the more individuals will create change in the world and the fewer barriers they will encounter. This is historically supported as we can see trade and human interconnection/globalization have increased our standard of living and technology significantly.

Discuss key findings from your community research and understanding/requirements gathering (Community characteristics and technology configuration inventory)

Discuss your professional opinion of the processes and documentation used in this course for project planning. Did they help/hinder and how?

The broader community of higher education (combining both engineering, STEM, and Academia) knows that they want to work together to solve the SDGs (just like we are in this class) but there is a lack of community connections/technological infrastructure to facilitate this - the community has very different skill sets that together can be combined. For example, a philosopher could decide ethically on the best design/ materials/method to use as a solution as opposed to the usual capitalist profit vs losses approach - such as spending a longer time fixing issues or improving designs in rural Africa since if they break help is very far away. When we look at the current technology configuration inventory we notice that there are various networking platforms and tools that are in the same vein as EngiConnect but lack one important feature - the ability to focus on SDGs'.

A networking application such as LinkedIn could be used for EngiConnects' purpose but it is not - in most cases, it is used for networking to find jobs, and work towards career progression, not SDG solutions. LinkedIn has many useful features such as posts, user connections, organizations, school pages, a place for learning via video lectures, and a place to hunt for jobs. The EngiConnect community finds value in some of the tools provided such as the posts as well as forming connections with other professionals but the other features are not needed for this community, so the configuration in this case was to adapt a solution that contained some of the features used by the group which enabled them to have access to more tools then they may have not had on a different networking platform; and more importantly add restriction to focus conversation on the subject of SDGs.

Another piece of the technology configuration for EngiConnect is Facebook. Facebook fulfills some aspects that other platforms may not one of them being an attempt at group discourse. Facebook offers many tools for the community such as posting, commenting, community groups, direct messaging, group messaging, and friending people. All of these features allow people to form relationships across the platform and also have discussions based on different topics. Facebook is lacking in the way that it is not dedicated to the SGDs, the SDG groups are posting knowledge articles and other resources for self-learning - there is not much community interaction with the content and there is not a place for community members to bring forth the issues they are facing.

In my professional opinion there was a lot of documentation some was not "needed" for a project of the scope we did in the course - but, I agree with keeping it incorporated into the course, in the work force I have been in situations where I have been tasked to create documents that were never used again - in this course our documents had some purpose in helping us "plan out" our application and more importantly drive us towards a goal - its good to have an "idea" of what each document is used for especially since in the corporate landscape they are used - after graduation, if we are looking for positions such as a business analyst having knowledge on this type of documentation is vital.

Overall, I found that the "community orientation" document hindered me a little bit as it forced me to look at the community as a binary; or a white and black. Either it was this orientation or it was not but in reality, communities are much more complicated than that, they change in their orientations over time and different people within the community may perceive the orientation as different based on their role and relation to the community. The "drafting an emerging picture" document helped a lot with determining which features should or should not be included in the project. For example, if the community was meant to be open or closed. EngiConnect is meant to be a semi-open community which is why user accounts are added but it doesn't prevent anyone from signing up and accessing the posts, same with the API side, users can pull post data (just not user data) making the platform semi-open.

State selected north star & carryover customers. Why are these customers important to your project's golden circle (why, how, what)?

Customer is not exactly the term I am using for this application; I would prefer "north star user and carryover user" but I understand the verbiage - Engineers, Professionals and Academics would be considered my north star customers while professional associations, university students, and community members (Tackling SDG Issues) would be considered my carryover customers.

My golden circle is:

Why: Bringing people together to create solutions for issues involving the 17 UN SDGs.

How: Leveraging technology to create a platform that is dedicated to problem-solving; with a focus on SDG development and user experience.

What: A forum platform that focuses on issues that other professionals put forth. Using SDG tags to determine types of issues and using social media platforms and gamification tools to enhance user engagement.

SDGs' are a global issue; all of the customers listed have a very strong inkling toward SDG issues; Engineers, Professionals, and Academics are involved due to a higher education that has (in recent years) started to focus on combatting SDGs - they are needed for their expertise and knowledge to bring the platform - if the platform isn't designed for them then we cannot get any expertise which is the most important part. University students understand the threat that SDGs will pose to them in the future; thus they unite together to support combatting these SDGs - the action we have seen from students in recent years has been huge - lastly, professional associations would be interested due to many of them taking on commitments to support SDG solutions - thus this is a perfect environment for them.

Summarize assumptions made and constraints uncovered, re: drafting an emerging picture

An important assumption/constraint that I would like to discuss is the validation of credentials in EngiConnect; since I was building a "simple" minimum viable product (MVP); I automated the validation process - thus removing any "true validation" for the MVP any photo that is provided to the application would verify a user's credentials - in reality, this would be set up with a web-based "admin portal" that an administrator could log into to manually review credential before verification - in the future an AI model could be adopted to verify legitimate credential versus those of bad actors.

Discuss initial & the evolution of your technology stack selection, drafted prototypes, and initial Minimum Viable Products (MVP)

We can discuss the evolution of the project MVP's by breaking it down into stages:

Initial Project idea: The initial project Idea was to create an app only for engineers and select people to participate in EngiConnect; a much shallower North Star customer which was just limited to engineers.

First Scrum: After the scrum and the feedback, I received I expanded my customer to include professionals in general and the platform would also be open to academics and students. In general, the scope was widened to include anyone who could help solve the problems posted on EngiConnect or those who needed support on issues. For example, there could be a university student who is partaking in some research related to clean energy but is stuck on the fabrication part of the research previously they would have to go through research papers or fabrication manuals, but, with EngiConnect they would be able to ask people who work in that field for guidance to speed up the process.

Second Scrum: After the second scrum there wasn't much evolution, I continued to implement things from my 3rd MVP such as live chat and started to clean up my code. Features included favouriting a post as well

as implementing a live chat; in addition, an "interactions" table was added with an IsRead check to keep a ledger of what a user has viewed in the application as a form of IP (intellectual property) protection.

Final Project: From the final project feedback I got some ideas on how to expand/implement my project but those will not be implemented during the course since I am focusing on final documents and my co-op report.

The technology stack has stayed pretty consistent throughout the project with React Native, Node, and MongoDB, but there were some changes - such as the addition of Socket IO for the live chat component. I chose React Native because it is one of the most popular frameworks for mobile application development, and is reliable for IOS and Android development. Overall the few changes were related to the camera function the library I was using I could not integrate with my code so I transitioned to a library that just explored your camera roll, instead of prompting for a live photo for the verification picture upload feature.

For the prototypes the only changes made over the course of the project were the addition of the post and reply option, the ability to favorite posts, and the live chat which were the "major stages" within the project.

Reflections on project results (4-5 pages)

Discuss what you created. Provide key images/screenshots illustrating core functionality

EngiConnect is the social platform for SDGs and professionals from various fields such as engineering, computer science, and the humanities. EngiConnect unites skilled individuals to collaborate on SDG challenges. EngiConnect offers a unique tag system for users to filter by interest, letting them customize their experience based on their passion. SDG tags frame discussions as issues and solutions and maintain a focus on meaningful change, from which hopefully many projects that move the SDG forward will stem. Some of the main features (with images below) include:

1. Login: This is a login page for the user, it provides authentication and error handling of invalid credentials.

2. Signup: This is the signup page; it allows a user to register an "unverified account" and then be redirected to the login page.

3. SDG Tag Filter: This screen allows for SDG filtering; this will filter issues onto the issues page to narrow down issues presented to the user.

4. Issues: This is a page with a list of issues; it will also order issues first by favourited status; and afterwards by date.

5. Posting an Issue: This modal allows for posting an issue with a subject, body, and up to two SDG tags.

6. Posting a Solution: This screen allows users to post solutions to issues; alongside the ability to like or dislike a post.

7. Account Management: This is the screen that allows for users to change personal information; along with credential photo uploading to create a "verified account".

8. Live Chat: This is a screen that supports a "live chat" via a socket connection using Socket IO infrastructure.
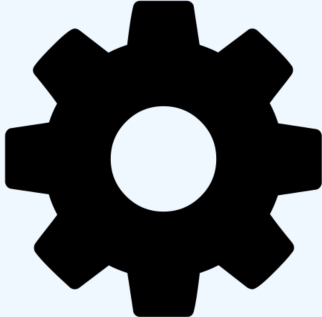
University of Regina

FACULTY OF ENGINEERING & APPLIED SCIENCE

1

11:30

EngiConnect Login

Email

Password

Login

Sign Up

2

11:44

EngiConnect Sign Up

Email

First Name | Last Name

Password

Confirm Password

Sign Up

Back to Login

3

11:30

Aryan Chandra

SDG 1: No Poverty

SDG 2: Zero Hunger

SDG 3: Good Health and Well-being

SDG 4: Quality Education

SDG 5: Gender Equality

SDG 6: Clean Water and Sanitation

SDG 7: Affordable and Clean Energy

SDG 8: Decent Work and Economic Growth

SDG 9: Industry, Innovation, and Infrastructure

SDG 10: Reduced Inequality

SDG 11: Sustainable Cities and Communities

SDG 12: Responsible Consumption and Production

SDG 13: Climate Action

SDG 14: Life Below Water

4

11:31

Aryan Chandra

I have problem

It is big!

SDG 8: Decent Work and Economic Growth

SDG 14: Life Below Water

Unfavorite

Social Equity

Promoting community-supported agriculture (CSA) and fair trade practices fosters social equity in th...

SDG 1: No Poverty   SDG 10: Reduced Inequality

Unfavorite

Adding a post!

How will we solve global warming?

SDG 7: Affordable and Clean Energy

SDG 13: Climate Action

Favorite

What is earth?

Can someone explain to me where we are?

SDG 15: Life on Land   SDG 14: Life Below Water

Favorite

Food Waste Reduction

...supply chain tec... based monitoring systems, can signifi...

Chat   Post

5

11:41

Subject:

Enter subject

Body:

Enter body

Select SDGs:

Select SDGs...

Back | Post

6

11:42

Adding a post!

By: 5 Fiver

How will we solve global warming?

Thanks for the help!
By: 5 Fiver

Likes: 1 | Dislikes: 0

Add a reply... | Add Reply

Like | Dislike | Back

7

11:31

Aryan Chandra

First Name

Aryan

Last Name

Chandra

Degree Level

University

Degree Type

Law

Email

Aryan@gmail.com

Password

12345678

Verified ✅

Edit | Logout

8

11:31

Type a message... | Send

Back

Review your initial "Planning and initialization" video created for the first deliverable. How close did you come to realizing the solution/product you initially envisioned?

I would say I came pretty close, I have compared it against all of my initial documents and my prototype is pretty close to what I have implemented right now. My prototype contained most of what I have in my app right now minus the post button and some smaller features that were implemented after the fact. My north star customer also changed to a broader group of people which in turn made my features more generic, for example, I would have made the verification more specific towards engineering disciplines rather than in general - I would also like to mention I did not continue with the layered reply approach where a user can reply to a reply due to this causing exponentially increasing complexity.

Summarize software design activities and findings. Ensure you discuss how you either linked or envision links to design ideas back to topics discussed in class lectures

In terms of the software design activities we had:

Selecting My Community: I chose my community based on UN SDG #17 and how I could best support partnerships was through helping middleman problems. In terms of class concepts, I kept with the idea that you can't force a community to establish itself so it was my goal to find a community that already existed. I also was inspired by Dr Roger Petry's presentation and the idea that one of the best solutions would be a solution that combines as many SDGs as possible.

Community Orientation Document: From the community orientations I gathered that my community's top orientations were "access to expertise" and "open-ended conversations" which fits my community with the fact that they are looking to solve their issues but also form partnerships over open-ended conversations. The community orientation document was something that was a part of the planning process that was directly from lecture concepts, I tried to use the metrics from the lecture to gauge what orientations fit better than others for my community.

Technology Inventory: For the technology inventory I surveyed the current digital habitat of my community and my community currently uses a mix of different platforms such as Facebook, LinkedIn, mailing lists, and UN SDG websites - it is quite spread out.

Business Case Document: For my business case I considered what is out there and what different things I would be offering in comparison, I tried to keep in mind lurkers and the level of difficulty to contribute to the platform - making it important to force a focus on "SDG Solutions".

Stakeholder Analysis: For my stakeholder analysis document I took the current community I found and translated them to my stakeholders, this group changed over the course of the project from Engineers to Engineers, Professionals, and Academics in general so that the platform could have more reach and therefore impact.

Drafting an Emerging Picture: I found the "drafting the emerging picture" document the most helpful in determining what kind of features I would need to implement to best support my community; what was important to include in the MVP and what could be ignored until further releases.

Architectural Diagrams: The architectural diagrams didn't have much relation with the class concepts, but, they did help in the project execution, I did have a table where I stored all user interaction so I could keep track of which user has seen a post or not - this was along with database design principles to follow the idea of "single source of truth" from the knowledge management portion of the course.

Prototype: This is where I tried to implement the most concepts from class as the prototype is where I could visualize and conceptualize the implementation of the features that would make it into the app; this included ideas such as gamification from the course, progressive learning methodologies for the users', metadata for analysis and linkage, and lastly the interactive approach. The iterative approach was instrumental in my project - this helped improve the user experience significantly through testing.

Summarize how you felt about this project (likes/dislikes), from your experiences with the technology stack selected, translating prototypes into real solutions, and the creation/realization of your MVPs

One of the main things that I liked was being able to dictate my own tech stack I think choosing ReactNative was a good opportunity for me and the experience learning it was seamless, although I disliked how it caused some issues with the camera functionality. I liked having a high-fidelity prototype to work off of it let me focus on the code during implementation rather than having to worry about the UI design. I liked that we were encouraged to complete more than one MVP of our designs, I feel like if I had only completed one then the application would have felt like it was lacking, or I may have been tempted to squeeze in work from MVP #2 and just call it MVP #1 which wouldn't have been correct. Overall, I really enjoyed creating this project.

Summarize what went well during the project / what would you do the same on future projects?

Time management, I was always in the "green" with the project progressing well and allowing for a lot of refinement; along with that the chosen tech stack was perfect for the functionality I needed - and allowed for a very efficient way to achieve it - I would continue to do the same for future projects by researching the

technology stacks and planning it out for the features I want and continue to finish work ahead of time.

Summarize what not went well during the project / what would you do differently on future projects?

Testing, there was no testing plan - so for testing, I was randomly doing activities within the application and looking for bugs; I should have created a simple test plan that is able to cover the majority of the functionality so I do not have a lot of repetition. - this would be incorporated into future projects by focusing on the main functionality from start to finish and highlighting the major pain points that need to be best tested.

Discuss opportunities and design ideas for future work

I would like to talk to the Conexus Cultivator people about my project, I want this to potentially become a live app that people can utilize; I am sure it would require a lot more features and polish before anything such as that is considered.

General reflections on the class & project (3-5 pages)

Before taking ENSE 405, were you aware of the UN SDGs?

No, I was not aware of the UN SDGs before this class - I had heard about similar ideas in the past just in general such as the various topics supported by the UN SDGs, we hear a lot about climate change but not usually in a UN SDG context. I also know that there's a UN peacekeeping force from a historical perspective related to UN SDG #16 - in addition, a portion of this SDG is mine removal - the place I grew up in Israel was mined fully by the Syrian army and I understood the evils of mines; thankfully majority was demined by the time I grew up by Israeli engineers - we could argue those engineers were some of the first ones supporting SDG #16 - before the SDGs were a thing.

Typically, before taking this class, when you engineered software solutions, were you concerned with areas encompassing the UN SDGs?

No, I have not explicitly geared any of my past software solutions to the SDGs but some of the projects I have completed could be used to help support the SDG's a few examples are:

ShroomBase: in ENSE 374, I did a project where we did a mushroom information project where the users could identify if the mushroom they had picked was safe to eat or not; this could be related to SDG #2 (no hunger) by supporting foraging in locations with poor nutritional supply.

ArtillarySimaultor: in ENSE 375; I had a project where we created a howitzer simulator; this could be repurposed to simulate the trajectory of a projectile and support anti-air systems to save civilians - similar to the way the Iron Dome in Israel is able to estimate trajectory and shoot down thousands of rockets per day - this would support UN SDG #3 - good health by avoiding human losses.

Did learning about the UN SDG(s) help you understand better your role and responsibility as an engineer to society?

Yes, it is the reason that I chose my project topic as well. Understanding that engineers are some of the most valuable professionals in the world; and their important in the design of the world around us. Engineers work together to solve problems by bringing their expertise from various fields and experiences - we as Engineers can create some significant change to the UN SDGs. There is always something we can do to help move the UN SDGs forward no matter what project or solution we are working on.

What was your experience(s) in engineering your specific software solution to address the UN SDG(s) selected?

The main focus of EngiConnect is facilitating collaboration and knowledge exchange; these are two key aspects of UN SDG #17 (the one I am targeting) in my application. The SDG I selected also calls for concrete action and EngiConnect can facilitate the creation of novel projects or ideas and the formation of a partnership that leads to a project. And since the platform is open to any professional it is an inclusive platform which meets another aspect of the 17th goal. My experience was definitely new, I have never created a solution specifically geared towards the UN SDGS there were a lot of things I thought about that I would not have normally considered when creating a software solution such as would this project actually makes an impact or if it would be the best way to support my users for them to make an impact.

As a future engineer, what are your thoughts on the UN SDGs as a whole? Do you think they can help or hinder our work as software engineers?

I think it's a mix of both in terms of the actual work. I think the details where you take the time to actually consider whether or not the solution supports SDGs are additional work that not all employers will support. In terms of software product quality, they help improve the quality if you consider your features then the overall user experience will be better and it will help you find bugs earlier than if you had not.

Should we use the UN SDGs to guide our work or is our work dependent on customer requests, regardless of the UN SDGs?

Both, we as Engineers owe to society to consider the implications of our work and designs on the world; this includes the 17 SDGs that we studied in the course; but, we are also employees our job is to design according to the requirements that are given to us - we need to use the ethical judgment that we have learned during our education to always look out for "red flags" and if we see them bring them forward - there is a reason that whistle-blower laws exist in democracies.

Will you use your understanding of the UN SDGs in engineering solutions in the future?

Yes, I will try to consider how my future projects will impact the UN SDGs and try to always incorporate features that may help in some way. I will try to focus on one of the UN SDGs for my capstone if I get the chance to as well. - if I am going to spend time creating a solution to a problem; why not attempt to address an SDG during that design process. Will your experience learning about the UN SDGs inform your career path decisions in the future?

Yes, but not directly - regardless of what career I choose I will now understand the biggest "problems" that are going to occur in the next 100 years and use them for the benefit of myself, the organization I am working for, and the general society I am serving as an Engineer.

My career is still more focused on technical and entrepreneurial pursuits since I am more inclined towards the "absolutes" in programming such as efficiency; good logic, and working product instead of the more flexible side of it such as business analysis and the documents we created in the course.

Provide any other comments on the project

In relation to the question you posed on the last day regarding making the course a 2-semester project; I would want to point out two suggestions for that to work well.

Openness: If the project is going to be treated as something long-term; I assume with marketability - I think it would benefit students a lot more to avoid the forcing of SDG-specific applications - instead allowing for a choice of any type of application that is marketable - this allows for work with the cultivator as well.

Timeframe: If the project is two semesters long; it would need to be a third-year course; not a fourth-year course otherwise it will make students feel like they are doing 2 capstones at the same time; this could be treated as a capstone trial run for third-year students - that would be very beneficial to those who wants to learn the entire development process ahead of time.

In general, I enjoyed the course - it was a large workload but that is always expected with a 400-level course; in addition, I found all the lectures complex and well done - I enjoyed that each lecture stayed on topic and brought a new idea to the table each time