# COMP3850 Project Deliverable Certificate

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|---|---|
| Name of Deliverable | *Deliverable 5, Final Group Reflective Report* |
| Date Submitted | *3/06/21* |
| Project Group Number | *21* |
| Rubric stream being followed for this deliverable (highlight one)<br><br>*Note: the feasibility study has the same rubric for all streams.* | **SOFTWARE Rubric**<br><br>*GAMES Rubric*<br><br>*CYBERSECURITY Rubric*<br><br>*DATA SCIENCE Rubric* |

We, the undersigned members of the above Project Group, collectively and individually certify that the above Project Deliverable, as submitted, **is entirely our own work**, other than where explicitly indicated in the deliverable documentation.

| INITIALS | SURNAME | GIVEN NAME | STUDENT NUMBER | SIGNATURE *(IN-PERSON OR DIGITAL)* |
|---|---|---|---|---|
| FT | Tesoriero | Flynn | 45621365 | Flynn Tesoriero |
| SM | Mishra | Shivansh | 45854319 | S MISHRA |
| IL | Lee | Isaac | 45526249 | LZJ |
| MN | NAQVI | Maham | 45559708 | Maham Naqvi |
| SK | Kamath | Smriti | 44489935 | Smriti Kamath |
| MP | Pavlov | Mikhail | 43659691 | MikhailPavlov |

*NB: please write all details clearly (if handwritten).*

## List of tasks completed for the deliverable and activities since last deliverable certificate with totals for each individual team member and whole team *(copy individual total row for each member and copy pages if more pages needed)*

| Performed by *(Student Names)* | Duration *(hrs)* | Complexity *(L, M, H)* | Name of task | Checked by *(Initials)* |
|---|---|---|---|---|
| Everyone | 1 | H | Met with IBM & Other Teams, discussed project (25th May) | FT |
| Everyone | 5 | H | Worked on presentation | FT |
| Everyone | 2 | M | Practiced presentation | FT |
| Flynn Tesoriero | 1 | L | Added headings, formatted & planned document | SM |
| Everyone | 5 | H | Worked on MVP/Prototype bug fixes & improvements (new dashboard) | FT |
| Maham NAQVI | 1.5 | H | Revised the project delivery over the course of the unit and completed personal reflection. | FT |
| Maham NAQVI | 1.5 | M | Reassessed and worked on the Learning Outcomes of the unit achieved. | FT |
| Flynn Tesoriero | 3 | H | Wrote reflection on the implementation stage of the Agile SDLC | SM |
| Isaac Lee | 3 | M | Wrote reflection on Requirement and Analysis | FT |
| Flynn Tesoriero | 2 | M | Wrote reflection on Design phase | SM |
| Smriti Kamath | 2 | M | Wrote Reflection on Planning | SM |
| Smriti Kamath | 2 | M | Wrote Personal Reflection | SM |
| Isaac Lee | 2 | M | Wrote Personal Reflection | SK |
| Shivansh Mishra | 2 | M | Wrote Personal Reflection | FT |
| Shivansh Mishra | 1 | L | Worked on the introduction | FT |
| Shivansg Mishra | 1 | L | Worked on the conclusion | FT |
| Flynn Tesoriero | 2 | M | Wrote personal reflection | SK |
| Mikhail Pavlov | 1.5 | M | Wrote Personal Reflection | FT |
| | | | | |
| *Isaac Lee Total* | 18 | | | |
| *Shivansh Mishra Total* | 17 | | | |
| *Flynn Tesoriero Total* | 21 | | | |
| *Mikhail Pavlov Total* | 14.5 | | | |
| *Maham Naqvi Total* | 16 | | | |
| *Smriti Kamath Total* | 17 | | | |
| Team Total | 103.5 | | | |

# Sankofa: A blockchain-based healthcare architecture platform
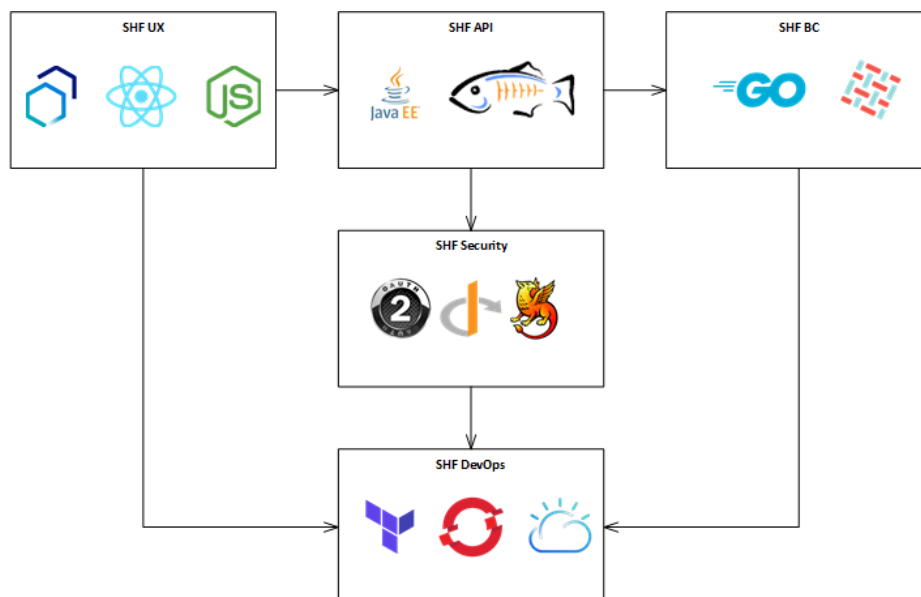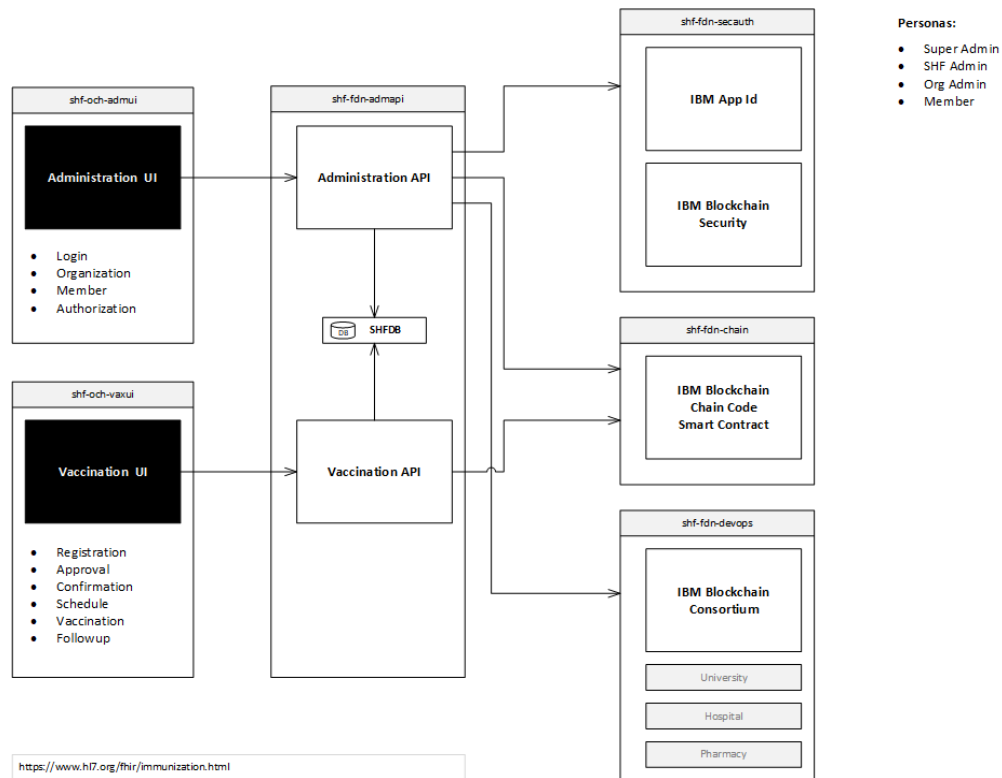
## Final Group Reflective Report

# 1. Introduction

This group reflective report reflects on the experience of the SHF Admin UI team over the course of the unit. The report is structured based on the Agile development methodology, which was the development methodology used by the team. As such, the project planning stage is first reflected on, followed by the requirements & analysis phase. The design phase is then discussed and reflected on, followed by the implementation state. Learning outcomes are then discussed, as well as personal reflections from each of the team members. This group reflection seeks to be holistic, reflecting on all components of the project, including the delivered product, as well as communication such as meetings and weekly reports, as well as the documentation produced. The report seeks to reflect on what was achieved, why decisions were made and what proved to be both successful and unsuccessful.

# 2. Project Planning

Project planning is an integral part of any Project. It is the first step to the software development process, the initiation. As the saying goes, failing to plan is planning to fail. This was more true than ever with the limited time, fast-paced project we worked on with IBM on developing a solution for a problem more relevant than ever considering the circumstances around us. Each stage however small or big required detailed planning and documentation in order to succeed.

The project planning phase was greatly benefited by IBM's clear and concise vision and pre-existing documentation for the project. It was clear what the aim of the system was, as well as the various components, teams and resources that were available to help transform this vision into reality. For example, the below diagrams were provided by IBM, outlining the components of the system, the required functionality for the first iteration, as well as the various frameworks, programming languages and tools that would be used.

**shf-och-admui**

Administration UI

- Login
- Organization
- Member
- Authorization

**shf-fdn-admapi**

Administration API

**shf-fdn-secauth**

IBM App Id

IBM Blockchain Security

**Personas:**
- Super Admin
- SHF Admin
- Org Admin
- Member

SHFDB

**shf-och-vaxui**

Vaccination UI

- Registration
- Approval
- Confirmation
- Schedule
- Vaccination
- Followup

Vaccination API

**shf-fdn-chain**

IBM Blockchain Chain Code Smart Contract

**shf-fdn-devops**

IBM Blockchain Consortium

University

Hospital

Pharmacy

https://www.hl7.org/fhir/immunization.html

By IBM providing this guidance, the team was able to rapidly understand the task at hand, which sped up the planning process as we had clear guidelines on regular bases with well set up and relevant examples to follow and improve upon. This is much more than we expected initially. A clear storage of all previous documentation was the basis for our success and gave us a proper understanding of what is expected of us.

Agile was used throughout this project allowing for weekly meetings and improvement that resulted in a holistic easy to follow product. As we brainstormed new ideas every week and got feedback from our sponsor we were better able to plan for the next stage resulting in less time spent on unrealistic ideas or solving problems that have already been solved by other teams. Planning was never ending, always improving the process in our project.

Reflecting back, if project planning wasn't implemented properly we wouldn't have been able to execute the project the way we did. There are some aspects we could've planned for more such as integrating our project better with the API team that works closely with the admin UI in order to make the platform functional. We could have included other teams in our planning process to further streamline the project.

# 3. Requirements and Analysis

The requirements of the system take a lot of time as we face a lot of challenges when it comes to authentication and the level of credentials between an administrator and a member. Before we start developing the SHF platform, we have to discuss with the IBM team to know its requirements and analyse what can be accomplished every week.

Since we are developing the Administrator UI, we have listed out the level of management such as registration/authentication, organisation and member. We are developing this SHF platform under Blockchain architecture. An essential requirement to develop this project is to have software to design and implement the SHF platform such as Visual Studio Code, GitHub, IBM Carbon UI and IBM account credentials. With our understanding of implementation to develop the IBM SHF system to know the purpose use of the system. Implementing the credentials and managing the members' capabilities to access, edit, and create.

During the first few weeks before developing the platform, we analysed how the Carbon UI by IBM works and understood the essential requirements to run the application. In addition, we have to do a carbon tutorial to understand more and develop the SHF system better. It is an important step to develop and understand what the client wants it to be in the system since it's mainly used for hospitals, government sites, universities, pharmacies, laboratories, and clinics.

While developing the project, we had discussion meetings with the IBM team to know what the requirements are. We clarified the requirements with IBM teams which made it clear for us to get the resources needed to get the job done. As we acquired the requirements, we discussed implementing the solutions when developing the SHF system with proper guidelines and techniques given by IBM. We thoroughly went through the documentation and did some research on the solutions to fit the requirements at its best. We analysed the feedback received by the IBM team as we did storyboarding and developing the user interface. In addition, we want to ensure that the system is compatible with all devices with minimal hardware requirements. Furthermore, we have to understand the use of Blockchain architecture.

When we implemented the solution, it applied well to the system we expected with the knowledge of the use of Carbon UI and REACT JS. On the other hand, we discussed with other team members on the API, data structures, and types during our implementation. Finally, we have finalised requirements to develop a solution to make the web application work using Carbon UI and REACT JS, and integrate better with other IBM teams' projects.
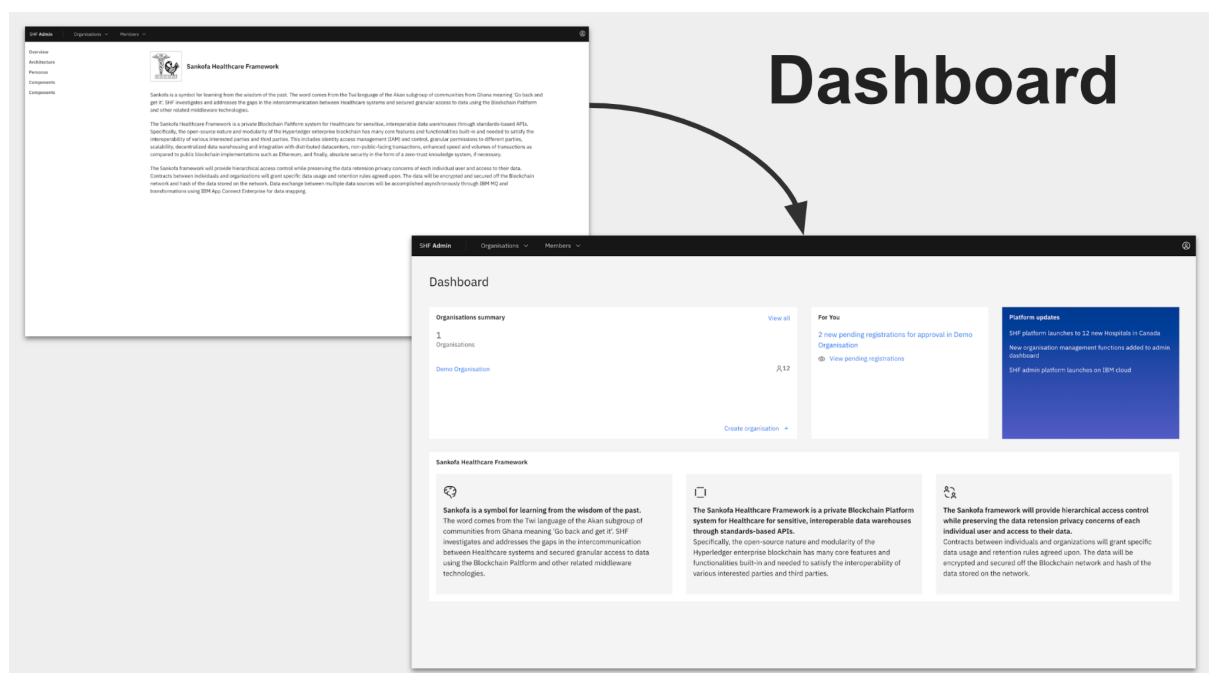
# 4. Design

The design stage of the agile software development life cycle involves designing the various screens of the system and beginning to prototype. It is in this stage that requirements are transformed into functionality and designs that help achieve these requirements. Documentation is produced during this stage, including the Analysis & Design document and System Design Document. These pieces of documentation were essential in the successful implementation of the system.

The Carbon UI framework was essential in the design phase of the project. Carbon UI is a user interface library and design system developed by IBM. It has extensive documentation, as well as examples and common design patterns. When designing, the team was able to look to this documentation and examples to design user interfaces that were not only simple and easy to use, but also in line with the latest standards and practices in the industry. Carbon also integrated with common user interfaces prototyping software, which allowed us to produce illustrative diagrams of how the user interface would work. Examples of this include a diagram of how the login flow works, as well as the menu structure and elements. As such, we were able to mock up how the system would look and feel and test ideas without writing any code. Later in the implementation stage, we were able to take these diagrams and produce a working MVP that closely resembled the mockups produced. As such, Carbon allowed us to rapidly mock up user interfaces in a way that ensured the UI followed common design and usability principles. It further saved time by providing final diagrams that can be rapidly turned into code in the implementation stage. This prevented the team from prototyping in code, which can be time-consuming and hard to do. Utilising Carbon also resulted in less code being written in the implementation stage, as elements can be easily imported without programming the underlying component, which further saved development time. Carbon also provided expansive examples of UI development patterns, such as dashboard and login screens. By using these as a base, the UI could be more easily designed as we were not starting from scratch. This resulted in a high level of visual design quality and an interface that followed best principles.

The design phase of developing the SHF Admin UI was also greatly helped by well-defined requirements and documentation. Sound and well-defined requirements are essential to begin designing a system, as they directly influence which functionality should be included in the system, and the goals users wish to achieve. The team was provided with great clarity around the purpose and goals of the system by IBM at the beginning of the project. IBM then helped the team develop specific requirements for the project through continuous feedback, which greatly aided the development of the system.

The design of the system architecture is also a critical part of the design process. The system architecture refers to the different parts of the system that work together coherently to offer the desired functionality to the user. The system architecture was greatly influenced by IBM, especially by assigning each team a different component of the system to work on. By dividing the system into these logical pieces, each team could focus entirely on their specific component, allowing a greater level of attention and quality to each part of the system.

Although these different aspects of the design phase worked well, there are a number of aspects that we'd do differently in the future. One common system development mistake we made was not spending enough time in the design stage, and instead of moving to the development/implementation stage too quickly. Although we finalised our design mockups before developing them, there were a couple of changes recommended by IBM to these design mockups. By the time this feedback was received, we had already begun implementing these previous designs in code. As such, we've learned that it is better to wait for in-depth feedback on design documentation before progressing to the implementation stage. Although it feels like this process takes longer, it is in fact quicker in the long run, as code can be simply written once and doesn't need to be updated multiple times to incorporate design feedback and changes. The below image demonstrates how the dashboard screen evolved, requiring the code to be updated.



Another learning from the design phase was that despite their power in rapidly developing user interfaces, design frameworks such as Carbon UI can prove restrictive in developing custom interfaces. We ran into this issue a couple of times when we wanted to design a screen that was not included in Carbon UI, meaning we had to build custom components in React. This was more difficult than building these components from scratch, as the components had to be built on top of modified Carbon UI elements. As such, this made things more complicated and difficult than they would have otherwise without using a UI framework. Even so, the value that Carbon UI provided still greatly benefitted the rapid development of the system.

# 5. Implementation

The implementation stage of the software development process is where the software is actually developed. It's also the longest stage, as this is where the bulk of the work is completed. It's where the rubber hits the road, so to speak. As such, it's critical that the previous stages of the software development process were undertaken successfully, as the planning, requirements analysis and design processes are essential to the successful implementation of the system. The implementation process on this project was unique in that many different teams were involved and each was developing various different components of the system.

As the Administration UI team, our job was to develop the interface used to manage the system on a high level. It was the job of other teams to develop components such as the data API, the blockchain backend, and the user-facing frontend user interface. With these many different teams, the successful implementation of the system came down to the ability of these teams to collaborate and share information. The various IBM teams met each week to share progress on each of the components of the system, as well as collaborate and share ideas on how each part of the system could be improved or integrated. This allowed the teams to work rapidly and efficiently to combine their various components into a single system. For example, we were able to work together with the DevOps team to automate the build process and automatically push each new Git commit live onto the production web server each time a change was made. Further, we were able to work together with the API team to begin implementing the Admin UI with the API, so that data from the API would appear in the Admin UI instead of the temporary data currently being displayed. Future iterations of the Admin UI will integrate fully with the API, as the current iteration still displays demo data.

The client, IBM, played a critical role in the implementation process. Through our weekly meetings with IBM, they would provide feedback which would then be implemented. This constant feedback enabled the system to be shaped throughout the development process. This avoids the issue associated with more traditional development processes, whereby the client only provides feedback on the system at the end of development. This leads to issues where requirements may have been misunderstood and the system does not meet the needs of the client. As such, by using the agile methodology and constant feedback, we were able to avoid such issues and ultimately produce a system that more closely resembles what the client imagined, better meeting their needs.

The documentation that was produced previously was critically important in implementing the system. The quality manual provided a basis for the minimum level of quality that the system must achieve. For example, how quickly the system must respond, as well as how the system should be developed. These standards and requirements ensure that everyone could collaborate and contribute to the project, such as using Git to track changes to the code and how the code should be tested and reviewed. In the future, it would be good to write automated tests sooner in the development process, to ensure that subsequent changes to the code did not affect other parts of the system not initially considered. Due to time constraints, the team did not have a chance to develop any unit tests, so this is one area that we would do differently.

The system design document was also greatly helpful in developing the SHF system. This document helped record why certain decisions were made and the rationale behind them. This made it easier to collaborate as knowledge was recorded in a way that everyone could digest. Further, the document also served as a means to track changes to the system, as requirements became cleared and feedback was gained from the client. The document also provided the necessary diagrams detailing the structure and functionality of the system, which formed a great reference point when developing the various screens of the Admin UI. A suggestion for the future development of the system would be to use a shared document where notes could be jotted down. Although the Slack and GitLab collaboration and project management tools were critical to the success of the project, it was often easy to miss important pieces of information, especially if they were buried deep in lots of conversational messages. As such, it would have been good to have a single document of notes and important information, so everyone could get up to scratch quickly without spending lots of time going through Slack messages or GitLab history.

The implementation process was also greatly assisted by IBM, with the knowledge and information they provided at the beginning of the project. As IBM already had a clear idea of how they envisioned the system, as well as which components were needed to make it work, it greatly assisted our team in implementing this vision. Having a clear idea of what was required and how it should be achieved allowed the team to work with greater clarity, which resulted in a productive team and less time spent trying to figure out and formulate requirements and a basic understanding of the client's needs.

In summary, the implementation process of the Agile SDLC was smoothly carried out by the team. Many factors were involved in making this process smooth, such as the rich information provided by the client, as well as the clear documentation produced by the team. There were some things that could have been improved though, such as a different way of organising notes and important information, as well the development of unit tests earlier in the development of the system.

# 6. Learning Outcomes

Classified as a 3000 level unit, COMP3850 links together learning from all previous units to train students for industry experience via connecting them with a partnered organisation. During this unit, the students are awarded an opportunity to work in close collaboration with a business project sponsor, either national or international, that provides them with a specific project definition and some assignments or tasks to be completed in order to pass the unit. The learning outcomes of this unit are truly industry-focused and therefore require students to be well trained and competent in their required field, so they are ready to embark on their careers as entry-level graduates with flying colours. As part of this unit, students work in self-managed teams where they deliver increments of their work at each deadline and in partnership work together to develop the project plan, scoping, requirements document and the specific software product or system needed to be developed. At the end of this unit, students are expected to be skilled in solving a given problem with high proficiency and aptitude and delivering high-quality artifact and its supporting project documentation that meets the expectations and requirements of the sponsor.

As promised, there were a lot of learning outcomes achieved from this unit for every student undertaking it. Coming closer to working on and delivering the final deliverable for the unit, our team communicated with each other to discuss the learning curve for each member of the team and list out all the learning outcomes they stood by. These learning outcomes are listed as below:

- Each of the team members agreed that by the end of this unit, they were able to critically analyse and evaluate a client's concern and provide an effective solution to it by applying different standards, principles, processes and technologies learnt as part of the unit.
- Each of the team members agreed that by the end of this unit, they were able to distinguish the different stages of the project development and management life cycle and demonstrate a deep understanding of it.
- Each of the team members agreed that by the end of this unit, they were able to apply the fundamental standards of the project management practices and work effectively with a large group of team and the client's organisation to deliver high-quality customer-focused products and services.
- Each of the team members agreed that by the end of this unit, they were able to effectively communicate the outcomes of the project (both written and oral) and address and rectify any potential concerns raised by the client during the course of the design, development and delivery of the project.
- Each of the team members agreed that by the end of this unit, they were able to recognise and quickly address any moral issues when they occurred through the comprehensive understanding of professional work ethics.

# 7. Personal Reflections

## Smriti

This has been one of the most challenging yet rewarding units I have personally done at university. COMP3850 was a much-awaited unit as the idea of being able to complete an internship with a company in your field in a safe academic environment is extremely exciting. Working with IBM was that and so much more. We got the opportunity to solve an extremely relevant problem. The reason we've been social distancing and have to do our units online became a catalyst to working with senior managers at IBM from Chicago, Ottawa, Austin, etc without paying much attention to the now welcomed distance. We worked on making the documentation and verification of the solution for the COVID-19 Pandemic - Vaccines more streamlined and secure.

In terms of technical skills, I was given the opportunity to sharpen my knowledge from previous units and learn about new programs such as React JS and Carbon UI. Familiarizing myself with complex and new technologies such as blockchain for security in an open-source real project has brought to life all the buzzwords I've only read about to strengthen my beliefs further that this is what I would like to work on in the future.

This unit gave me the opportunity to put all my theory to practice. As a commerce student with a major in Business Information Systems and Marketing, I suppose my experience is very unique as I saw the role of extremely different units come into play in a fairly technical project. The importance of communication and integration came to light as not just my 6 group members had to collaborate but the 6 teams needed to collaborate in order to ensure a smooth transition for a whole other set of teams to continue working on this extensive platform. Clear documentation of our progress is extremely integral to this project as the success of the project hinges on the understanding audience of our document.

On the other side of this project, I have such a strong sense of accomplishment, being able to coordinate and work with such diverse teams without too many problems at all because of clean execution of: planning, requirements analysis, design, implementation and testing. We were able to successfully communicate with everyone on a weekly basis and submit tasks on a fortnightly basis which looked close to impossible at the beginning of this semester to only adapt and level up in such a short period of time.

The experience was absolutely serene and unforgettable. One I will continue to boast of and reflect upon for years to come. Setting up a communication channel with a team in group projects in units in my first year at university seemed like such a challenge and here I am today a part 1 of 6 teams working on a hopefully one-day worldwide app, managed by team members scattered around North America across over 6 time zones without blinking my eyes and the absurdity of the whole situation reinstates my confidence that I will leave MQU an evolved student that can take any college that is thrown her way .

## Isaac

This is a very challenging year, and an amazing opportunity to do this unit during the time of pandemic and the time difference when having meetings with the IBM team from Chicago, USA. It taught me how to manage my time and be able to complete the documentation on time. It was a great experience and privilege to work with the IBM team as I chose as my first preference. Getting to know the IBM team and learning from their experience gave me better aspects and working experience with my team members and other IBM teams. I'm happy to learn new key elements to develop this project such as learning the carbon tutorials, other resources and receiving critical feedback to meet the client's objectives.

Throughout the semester, my team and I always submit the deliverables on time and begin to understand what we want to implement and improve the system. I have picked the technical and communication skills to improve my work efficiency very well as I previously developed a project during my internship with Plexus Manufacturing company based in the USA. With my previous experience, I am able to strengthen my technical skills such as learning new languages, Carbon UI and React JS. Implementing Carbon UI and REACT JS to develop Web applications under Blockchain infrastructure. The project aim is to keep track of medical records during this pandemic period, which can be an important project to strive for and fulfil the client's objective.

Developing the project with minor incremental changes week by week is always a challenge and one step closer to meet the requirements. As we developed the project, I have learned the essential of documentation and having the user guides on interacting with the user interface and giving the fundamentals of understanding like how you transfer the knowledge to someone who is entirely familiar with. It's like learning a new language.

I'm happy to have this opportunity to collaborate with other IBM teams, especially the IBM Officials that make it happen. It's a sense of accomplishment that the project is a success. Learning that doing the project as a team, anything is possible to accomplish the objective professionally.

This COMP3850 PACE unit gave me the opportunity and skills to comprehend, and adapt to new working life situations. This is the tip of the iceberg working in an industry environment, especially working with IBM which has given me the opportunity to obtain the knowledge. I am honored and privileged to be working with IBM sponsors and other IBM teams to make the project possible.

## Shivansh

Reflecting on the project now makes me proud of the product we have created and the skills I have honed from it. The semester hasn't been easy on us but COMP3850 made it rewarding and acted as motivation. I was excited for the PACE unit because I could gain industry experience and be mentored by professionals who have been working in the field for quite some time. It has been an absolute pleasure working with a corporation as big as IBM. My team and I got a chance to work on one of the most relevant and needed technologies at this time. Amidst a pandemic, we got a chance to work on a vaccine tracking framework which would be used by others in order to verify if someone has been vaccinated or not. The online delivery of this unit was a reason we got the chance to work and be mentored by senior managers at IBM.

At the beginning of the semester, I was disappointed because the sponsors were in the USA and our team was here in Australia. After the first meeting with the sponsors, I got the reassurance that they are going to be available as much as possible.

This unit has been a great opportunity for me to hone my technical skills and use my knowledge from previous experiences and pick up new skills like Carbon UI. Being mentored by experts made me understand more about the "in-demand" technologies like blockchain and clearing all the doubts about the aforementioned technologies. COMP3850 has helped me find the department I would like to work in, after graduating from university.

COMP3850 helped me put my previous knowledge into practice. Everything I learnt from semester one all the way up to this semester came in handy. Being a computing student I realised this project will look great on my resume and help me build interpersonal skills on top of the technical skills

Working with a group and implementing the agile methodology for this project helped us deliver and develop a perfect product as per the sponsor's needs. It also encouraged the team to work in sprints and deliver updates quicker. This also helped in establishing great communication between the team members and sponsors.

Throughout the project, I have felt stress, excitement, confusion but most importantly triumph. The experience has been surreal and unforgettable with some bumps in the road. I am proud that I was able to complete this project and I am honoured to have worked with a great team of like-spirited people.

## Maham

Now, looking back at when I initially began my degree back in 2019, I still remember how excited I was to learn about how our university was giving a personalised university internship experience in the final year to the students as opposed to many other universities. It was probably since then that I was counting days to undertaking this unit and was excited enough that I enrolled in the unit as soon as I reached my final year. I believe where theories and formulas do play an important role in our world, practical experience counts as much as anything else and for myself personally, I have realised over the course of my degree in IT, that I tend to learn much better when I am given exposure to the practical aspects of things.

As soon as I was able to successfully enrol in the COMP3850 PACE program, I was thrilled to be given the opportunity to set my preferences over what projects I wanted to work on. Seeing IBM on the list was like a dream come true and there was nothing more than I wanted to be a part of. Fortunately, my lucky charms worked in my favour, and I was endowed with this amazing once in a lifetime opportunity to experience what it was like working with a huge team and IBM sponsors on the IBM Sankofa Healthcare Software Development project as my first industry experience.

The journey of this learning experience was smooth from day one. I was delighted to have an amazing and talented team at my end which made working on the project much easier. We were able to keep effective communication feasible across all grounds with not only each other but also with all other teams associated with the SHF projects, IBM sponsors and even our Unit Convenor through multiple communication channels like group chats, slack, Zoom meetings etc. Throughout the 14 weeks semester program, I was able to pick up a plethora of skills (both technical and transferable) which I am sure I will be able to implement in all walks of life in the future.

For the technical aspect, the IBM SHF project helped me learn about the two most sought after and popular in-demand technologies in the industry today; REACT & Carbon Design System. The SHF project was focused on developing a web infrastructure based on REACT & Carbon technology to keep track of health records related to the COVID-19 vaccine across health organisations and government agencies. Under this regard, we were supplied with comprehensive tutorials and training online to complete at our own convenience as well as weekly meetings with the sponsors to ensure everyone stayed on the right track, bringing us closer each day to meeting our client's requirements at the end of the project. The way the IBM SHF PACE program was run was similar, in my personal opinion, to how projects following Agile and Scrum methodologies work. Weekly meetings were essentially a taste of how sprints are run in industry whereas working closely with the sponsors and delivering small increments of working code each week made it clear why Agile methodology has become so popular. Over the course of this project, I developed not only coding skills but also learnt how important and useful software documentation comes in project management. Almost fortnightly, our team was given the objective to deliver both working blocks of code as well as supporting documentation to put together our thoughts into words and understand deeply the know-how of the project requirements. We delivered a variety of documents throughout this project beginning from "Feasibility Report" to analyse the feasibility of the project ; Project Plan and SRS to efficiently lay out the proposed plan and elicit all functional and non-functional requirements ; Increment 1 and 2 to build on our previously achieved

slices of work designs and incorporate any clients and UI feedback ; and finally the Final Report to link together everything and officially stamp the seal to our project.

For the transferrable skills aspect, IBM SHF allowed me to build effective communication skills and teamwork across all boards as I worked in collaboration with five other team members and the administrative staff to complete the project. I learnt time management skills from meeting weekly to fortnightly deliverable deadlines as well as critical thinking and analytical reasoning when it came to carefully analyzing the customers' side of perspective in order to meet their requirements. Being a people person, working on the UI / UX side was an absolute treat as it allowed me to work closely with the client, understand their needs, and experience building the user's end interface.

In conclusion, the COMP3850 Computing Industry Project instilled in me a variety of valuable skills to cherish for and effectively apply in all modes of life in future. It gave me the early entry-level industry experience with the world's most famous and reputable organisation IBM which has given me an edge with the knowledgeable experience and competencies gained to set my foot in the IT industry. Last but not the least, working on developing a web infrastructure to help the world battle against the deadly COVID-19 will forever be a moment of pride for me and I am grateful to have been awarded this opportunity by my university.

## Mikhail

I Initially approached the COMP3850 project with a bit of apprehension as I believed it would be quite a challenge to complete a project of this size/complexity entirely online without having face-to-face sessions with the group and IBM team, exacerbated even further by the IBM team being based in the US. However after beginning work with the team these apprehensions were unfounded as we managed to collaborate effectively across chat apps, zoom meetings and shared documents. The IBM team also facilitated easy documentation sharing and knowledge transfer with access to shared drives and video conferencing to answer questions and perform demonstrations - much easier than having to complete the work via email chains.

It was rewarding to work with relevant technologies such as Carbon UI and React JS on the implementation of this project, unlike some previous units where it felt like we were not working with tech that was at the forefront of industry. These technologies were new to us as a team however the SMEs at IBM were extremely helpful in ensuring that we able to come up to speed quickly and begin iterating on our project.

I believe the nature of the PACE Unit being completely online, with a distributed team has offered us a realistic experience of what entering the workforce will be like in the future with many organisations now having majority WFH employees and inability to conduct face-to-face meetings with clients due to the impacts that COVID has had on the way organisations conduct work today.

## Flynn

Reflecting on the experience of this project, I have found it to be greatly beneficial, insightful and enjoyable. I feel I have learned and honed a number of skills that will be helpful for my career. Perhaps the most important skill that I was able to develop over the course of the unit was communication. Working in a team on such a large project made effective communication essential in order to progress the project. Communication difficulties internal to the team were overcome through using a group chat, allowing all team members to communicate simultaneously. Using a group chat also ensured that everyone was on the same page. It was clear that everyone in the group had different schedules and commitments, which meant meeting over Zoom was difficult to organise. As such, collaboration tools such as Git and Google Drive made it easier to work at different times.

Another skill I was able to learn was how to use React JS and Carbon UI. I had only previously used React JS in a small capacity in another unit, so the opportunity to use it on this project was very rewarding. Similarly, using Carbon UI was new to me, and I now feel confident to use the UI library on other projects in the future. Using Carbon UI definitely made the development process easier and smoother, and produced a better looking product, as each UI element was already developed. There was also great documentation on how to structure and lay out the user interface within Carbon UI, which made using it much easier.

The excellent documentation of Carbon UI and React made it obvious to me the importance of good documentation for software development. Not only does good documentation make it easier for a team of developers to have an understanding of the project, it also makes it much easier for future developers to meaningfully contribute to the software project. As such, I appreciated the importance of the documentation that had to be completed for the SHF system, such as the feasibility study, scoping document and quality manual. By producing this documentation, I feel it will be easy to understand why certain decisions were made, the expectations and processes around the development of the system, as well as how to use the system. It is my hope that future developers will be able to interpret this documentation to further develop the system.

I was presented with a number of challenges working on the project. One such challenge was working on a large project, with a large number of teams each working on different components, within a large company. This experience was new to me, as my previous experiences have involved working on smaller teams and even solo. Working on such a large scale necessitates effective communication, collaboration and documentation to ensure that the project moves forward. With each team working on isolated, but connected components, it is difficult to coordinate and bring these components together to form a coherent system. Systems such as Git enabled collaboration, as well as weekly meetings, which kept everyone on the same page. I also found working to the multiple increment deadlines, as well as the volume of documentation work challenging. I was not used to producing this volume of work, but I am pleased with the standard of work that the team and I produced. There were also challenges around the differing time zones between Sydney and the United States. We were able to overcome these challenges by finding meeting times that worked for everyone in their respective time zone. Slack was also greatly helpful, as it allowed us to communicate when it suited us, even if replies were given the following day.

Working on this project I feel I have been able to apply the skills I have learned throughout my time at University, from both technical skills to collaborative abilities. I have found the project enjoyable and I feel better prepared for my career with the skills I've learned through the project.

## 8. Conclusion

In conclusion, we, SHF Admin UI Team are satisfied with the project component we have made for IBM throughout the course of 13 weeks. Our team is confident that the Admin UI component we have built for IBM's SHF project using Carbon Design Systems can be built upon in the future by different teams and will assist IBM to release the product into the market. We have achieved most of the functionalities for the Admin UI component and we believe that future development teams can pick up from the point where we have left and build an even better framework that fits the SHF project.

Following the agile methodology proved out to be an effective and efficient way of allowing code sprints and development cycles. It also made the progress feel great and increased involvement. We can agree having team meetings every week helped us understand the sponsor's needs more and the feedback given to us after the progress pointed us in the right direction. This also helped in establishing great communication between the team members and sponsors. Since we were one of the multiple teams working together on the same project, these meetings also acted as a platform for us to see the work of other teams.

Every member of the team gained something from this project, be it technical skills, or interpersonal skills, and we have come a long way since the beginning of the semester. We are proud of the product we have made with a team of like-spirited people.