



CS 476 - Team Badgers Requirements Specification

Northern Arizona University

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Accepted as baseline requirements for the project

Client Signature: _____ Date: _____

Client Signature: _____ Date: _____

Team Signature: _____ Date: _____

Overview:

The purpose of this document is to list out all of the requirements we are to fulfill with our product. In the document, we list out what those requirements are, why we need them, and how we plan to implement them. Serving as our “contract”, this document is to be signed off by Team

Badgers and all clients.



Table of Contents

1) Introduction	3
2) Problem Statement	5
3) Solution Vision	6
4) Project Requirements	8
4.1) Functional Requirements	8
4.2) Performance Requirements	15
4.3) Environmental Requirements	16
5) Potential Risks	18
6) Project Plan	21
7) Conclusion	23



1. Introduction

Since the beginning of March 2020, the world has been dealing with the SARS-Cov-2 pandemic, better known as Covid-19 or Coronavirus. The virus has affected many people's lives causing a massive change in work environments. Most people, even those who have not caught the disease themselves, have been impacted. Millions of people have lost their jobs due to the inability to attend work because their business is not considered essential and the state government is requiring the business to be closed. There are not a lot of places that are capable of migrating their employees to a virtual workspace, but even those who can are stumbling upon a new set of issues. The majority of companies that were able to operate virtually are finding that many employees are struggling with motivation, recognition, and many other things that they use to find daily in the office. Since virtual employees are now abruptly working on a laptop in their home “office”, they lack the social interaction that was constantly present in the workplace of old. In most cases productivity is down due to the lack of oversight, depression is up due to the lack of social interaction, and motivation is down due to the lack of recognition.

Our sponsor for this project is State Farm and more specifically Dave Hopfensperger and Glenn Austin who represent the Enterprise Technology Department of State Farm for whom we are to build this product for. In Enterprise Technology there are hundreds of teams and around 6,000 employees that work on a wide variety of things to keep the company running smoothly while also keeping State Farm up to date in this ever growing world of technology. State Farm has always been a great place to work for employees primarily because of the respect and recognition they show their employees. In the office there was constant praise and recognition for everyone who produced the quality work State Farm is known for. This came in the form of



verbal praise, buying your coworker a coffee or donuts, and even sometimes ribbons to be displayed on your desk. Now since the majority of Enterprise Technology is working at home virtually due to the Covid19 Pandemic, it is not possible to award an employee with anything more than an email, or praise on a skype call. With the product that Mr. Hopfensperger and Mr. Austin has proposed that it can solve a lot of the social problems presented by the virtual workspace nature.



2. Problem Statement

The major problems our sponsors need us to solve are how to make employees feel they are recognized in their workplace. This is due to the fact that employees put extensive effort into their work and deserve to be recognized. The following are a list of problems:

- Staff will lose the sense of belonging within a company, and members of project groups will lack trust and responsibility if their efforts get unnoticed.
- Morale in many companies is at an all-time low as employees deal with the stress of the COVID-19 crisis in isolation, slogging through their daily tasks from home and relying on video-conferencing to provide critical communications. They desperately need to be encouraged in some way.
- Some companies have tried mechanisms such as newsletters or a “virtual winner’s board” to provide the missing acknowledgement and feedback, but this is only partially effective. Many will miss the email or neglect to visit the winners board.
- Our client lacks a way that allows their employees to express appreciation for (a) contribution to the team (b) skill in a particular area/technology or (c) engagement with the company between each other.

Due to the many problems stated above, our client has given us the opportunity to create a web application that people in the workplace can use to gain recognition from others or acknowledge somebody, which is beneficial to the developments of both individuals and companies.



3. Solution Vision

Giving acknowledgement to employee skills and talents is one core feature of a successful organization. Besides that, it boosts employees morale and work ethic. Our team is proposing a solution to build a secure, reliable, responsive and easy-to-use fully-functional web application.

- This web application will implement authentication and authorization which are core features of our web app.
- Authentication system will help us to identify and verify State Farm employees. Only employees with State Farm login authentication will have access to protected routes.
- Authorization will play a big factor in designing the web application. Our web app will have three core levels. Those three levels include Admin level, Manager level and Employee level. Those three levels will have different access privileges. In addition to that, they will have different web portals.
 - Admin portal will be the controller of the web app's base code and maintainer of this particular web application. Admin will be responsible for accepting badge requests from managers, adding new badges to the system, and maintaining the functionality of web applications with full-access.
 - Managers portal is for managers/team-leads which they have a power to give a badge.
 - Employee portal is where employees can access theirs and others badges. Badges will be sharable to emails.



- It will be reliable. It will be accessible at all times from anywhere. Any updates on any badges are accessible instantly.
- Badges will be designed in consideration of State Farm location and state. Badges will be easier to recognize employees' work location and skills. Badges will be easier to print. Badges will be visible and accessible for the public.
- Kudos will be used as a social currency where they can be rewarded based on completion or achievement of an assessment or an assigned task. Kudos can also be given to other users and spent by users for rewards.



4. Project Requirements

Developing a Skills/Knowledge badging web based application will require our team to develop with the following requirements:

1. Interesting and Responsive GUI
2. Account System with Access Restrictions
3. Badge Delivery System (Send/Receive/Remove)
4. Badge printing
5. Internal Social Currency (Kudos)
6. Email Signature Integration

First, the project's functional requirements will be the primary function of the software; These requirements will be fully integrated while developing the Skills/Knowledge Badging system. Following that will be the performance requirements which will cover the expected performance for functional requirements. Finally, we evaluate the environmental requirements that will detail the software limitations and capabilities.

4.1 Functional Requirements

Team Badgers will focus on six functional requirements that will be the foundation of operations for this internal social media. Each one of these requirements will play a role in the overall goal in this software's creation, recapturing a social environment. An interesting and responsive GUI will provide the user with an interface to visually interpret badges and other acknowledgement elements alongside giving the user the ability to carry out functions on the application. The account system will provide users with a personalized experience specific to



their assigned employee roles in State Farm. The badge delivery system is the backbone of the application allowing users to send and receive badges. Coupled with badge delivery is badge printing, giving the users the ability to physically distribute rewarded badges. The social currency requirements will prove to be a way to pay Kudos to other users and use it as a way to barter within the social media. Finally, the requirements of email signature functionality will allow for badges to be displayed on all email platforms.

I.) Interesting and Responsive GUI

The front end of this application will serve as a middle man for communication with the user and their desired task. Having a responsive GUI is necessary for optimal navigation and function carryouts. Specifically the following requirements will serve to make a necessary and sufficient GUI:

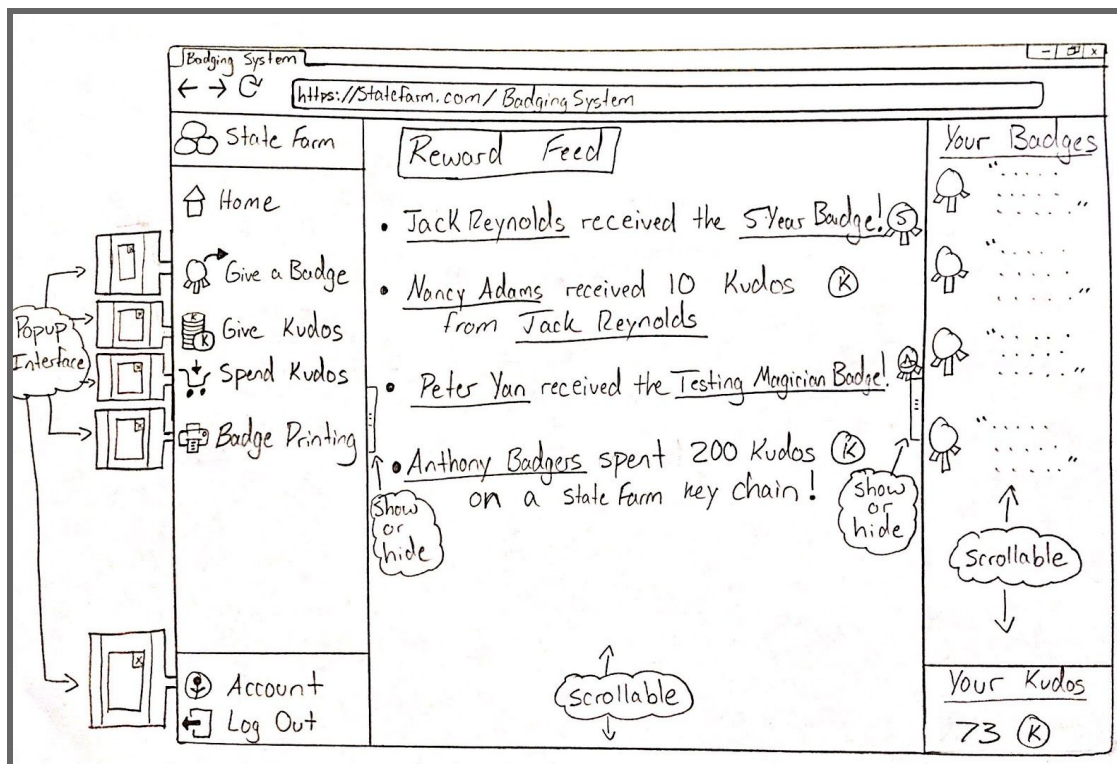


Figure 1: GUI prototype sketch; Showing main interface after user has logged in.



The project must be a single page application, removing the need to display successive pages. This is the most important visual aspect of the project, providing a dynamic presentation of front-end functionality. Users should be able to access all information on a single page within the application. This means incorporating the use of popup windows, mini interfaces, and drop-down navigation to fully optimize the implementation of a single page.

The style must follow a waterfall feed, similar to other popular social media platforms. This provides the user with the ability to see all previous and incoming badge/social currency delivery. Coupled with being a single page application, the user will be able to scroll through the entire feed of previous activity. Major content (the feed itself) will by default be previewed in the center of the page where navigation and minor content will spread across the sides of the application.

Users will be able to see a collection of their rewarded badges, badges in progress, and other user's badges. In turn, profiles will be accessible to all users for all users. Being able to click on a user's display name will provide further navigation to that profile. When a user's name is clicked in the system it will display their first and last name, their team, email address, Kudos amount, and their most significant badge earned.

II.) Account System

The account system will serve to identify users, secure and store their information, alongside providing a personalized experience in the application. Implementing this system will require the following specifications:

An account system will require the use of a unique username and a password to secure the account. A regex will be set on both credentials for security purposes. Using these credentials, users will be required to log into the system giving them access to the application.



All user information will be stored in the database. Forgotten passwords or usernames will be recoverable through the use of further identification (email verification). This will prompt the user to change their password inline with the secure regex.

The account system will also have a built in hierarchy with user restrictions and privileges. At the top of the hierarchy will be administrators, which inherit all privileges of lower roles. They will have developer access to the application, which provides manual manipulation of badges and user information. Lower in the hierarchy are managers followed by normal employees. Both these roles have the base access with respect to the badge delivery system, but managers will be given the ability to assign specific badges unique to their group or leadership position. They will also be given the ability to modify their team/group by adding and removing members. Additionally, all roles will be able to give social currency (kudos) to other users and spend it respectively.

III.) Badge Delivery System

The badge delivery system will send and award a user or team members conveniently within context to fully recognize that user or all team members about their achievements. In other words, badges let others have an idea about the members' experience in a good looking way. Executing the badge delivery system will need the accompanying determinations:

The badge delivery will request the system to verify that the user qualifies for the badge being received, for example if a user is about to receive the five year anniversary badge, the system will make sure they have actually worked at State Farm by checking their profile. A few examples of the types of badges the system can award a user are if the user is an expert in Java, Node, React or for a ten year anniversary.



Also, the badge delivery system supports notifications for receiving a badge. Once the badge is sent and awarded by the system, manager, or coworker, depending on who is actually giving the badge to the user, recipients are notified about the awarded badge they got through the application and the user's email address. All badges will be saved or stored in the database system.

Moreover, the system administrator has the ability to remove a badge from the system which in turn removes it from all the users who have that badge. This is because if the admin considers a badge to no longer be relevant or appropriate for its case, it can safely be removed from the entire system and users.

Each badge in the system must have data inside it, such as badge name, URL (description), badge image, the issuer and issue date, alignment (standards), recipient and tags. That will help to define the difference between each badge in the system. The badge provides the expertise pathway and the badge details can be viewed by simply tagging the badge recipient or receiver in his/her profile.

IV.) Badge Printing

Badge printing system offers a convenient way to print the users badges that they have earned. For the badge printing system to work it will require a specific integrated function:

For badge earners the user will first need to log in to their account in the application system. After logging in the user will have to select one of the badges or more that the user wants to be printed and it will provide formatting options to design the certificate. Please note that while the user can choose how the badge or this information will look, only the system administrator of the badges will have the authority to make changes or update the badge award itself. This ability to change the badge or the certificate information is only exclusive to the



administrator because they are the only ones that will be able to verify that this information is correct.

The certificate that the user will print will be displaying the badges metadata. That includes the badge name, URL (description), badge image, the issuer and issue date, alignment (standards), recipient and tags.

Once the user is pleased with the look of his or her certificate they want, the user should be able to select the Print Badge option in the application menu to send to the printer that is nearest to that user. The user has the ability to print the badge or the certificate multiple times.

The system tool will be able to integrate multiple different formats for a file type that will be determined by the user. For example, the user can set it as PNG, JPEG, PDF, or any other format that is available.

V.) Social Currency

In addition to badges, State Farm has asked us to include some form of social currency that users can send, barter, and spend. We have decided that this currency will be called Kudos and when users earn enough they can redeem them for some form of reward. The purpose of Kudos is to provide another form of appreciation that can be given out more often and in higher numbers than badges. Kudos will be given out for the smaller things whereas badges are reserved for the larger milestones.

The following are examples of how Kudos might be distributed.

1. You did an excellent job presenting at your daily standup. (+300 Kudos).
2. You helped a coworker solve a bug (+500 Kudos).
3. You did a great job on your task at hand (+100 Kudos).



We would also like to implement a Kudos bank that contains an X amount of Kudos each user can give out and attach their own personal message. This bank will reset every week/month and more Kudos will be available to hand out.

After a user has earned a certain amount of Kudos, we would like them to be able to exchange their Kudos for some form of reward. These rewards can not be something along the lines of “a day's worth of paid time off”. We plan on creating a few default rewards that will be available for all employees on every team. Here are a few examples of some base rewards a user can redeem with Kudos.

1. 5,000 Kudos - Specialized shoutout for you/coworker in the next quarterly meeting.
2. 10,000 Kudos - Get a double sized bank for the next week.
3. 50,000 Kudos - Get an extra 15 minutes for lunch (when applicable).

These are just a few examples of some of the base rewards that a user can redeem with Kudos. There will also be a way that a manager can set rewards for their team. For example, a manager could set a 20,000 Kudos reward for a free donut. We want to leave a lot of the Kudos rewards for the managers to set as we do not want to force an unwilling manager to spend their own money or time on something they do not wish to. Limits may also be set on certain rewards so a user is not redeeming 10 shoutouts at once.

VI.) Email Signature Integration

Badges and Kudos will be integrated into email through some sort of generated signature. We would like to give the user full flexibility on what they would like to include in their email signature. When creating a signature, a user can type their desired text and then select up to 3 of their badges and/or their Kudos total to be displayed under the signature. Doing this will allow an employee to show off their accomplishments outside of the badging application.



4.2 Performance Requirements

This section will cover the performance requirements with respect to functional requirements. Metrics will be determined based on speed, error margin, and accessibility. The expected outcome of performance follows:

I.) GUI Performance

The GUI must prove to be easily navigated and accessible to all users. When developing our GUI we must take into account that some users may have impairments such as color blindness, blindness, and other impairments. Therefore we need to make sure our GUI is friendly to all types of impairments and their web assistants. All main sources of information can be accessed by default or within 1-2 clicks. This promotes the idea of a single page application. All elements should load in less than 1 second, giving the user a perception of instant loading times. Using the GUI for a first time user will result in 5-10 minutes of understanding full layout composition. Experienced users will be able to navigate through the application accessing any instance of the GUI in under 5 seconds.

II.) Accounts Performance

The account system will be highly functional and user friendly allowing for fast login times and little to no hassle with application access. With regards to speed, first time users will take 20-30 seconds to log in. Second time users will minimize login time to 10-15 seconds, and experienced users will be able to log in within 5-10 seconds. This time is user dependent; application loading times will be constant in that logging in to the application will take less than 2-3 seconds.



III.) Badges Performance

The Badge system will display the badges as images in high resolution so users can note the difference between each badge and what distinguishes it from the other badges. Also users will be able to see the badge information in a clear way that is easy to read and understand the value of what that badge is for. The badge name will be clear to read and easy to find, and the user would be able to find the issuer name of that badge alongside the date issued.

IV.) Social Currency Performance

The social currency (Kudos) system and store will be highly functional and have a few requirements we must achieve. A user's balance should load in 5 or less seconds upon logging in. When a user "purchases" or "exchanges" their Kudos for a reward, ideally, the reward confirmation will be given to the user within a few minutes or an email will be sent out to the correct person for the reward to be received. When sending currency, it will take less than 2 minutes to generate the message and send another user Kudos. After sending Kudos a user should see the Kudos amount removed from their bank 5 or less seconds. On the receiving end a user should see their Kudos within 2 minutes of them being sent.

4.3 Environmental Requirements

Non-functional requirements in essence of copyright, constraints on the product, restrictions on the hardware platform, software libraries, programming languages, codebase privacy and external standards play a big role in shipping a successful product.

- Badges should be unique and hard to replicate/photoshop. Our main objective is to use badges as a way of social acknowledgment between employees to employees, managers



to employees, managers to managers, and team to team. Adding some type of unique identification or information on these badges will help reduce replication.

- Badges should also be protected with copyright and must be unique to State Farm. Violating copyrighted intellectual property could bring devastating damage to an organization.
- There is no particular client constraint on hardware platform restrictions. However, we will be developing a web app that goes hand in hand with current technologies.
- Our web app will support Web 2.0 standard. There are also no restrictions on software libraries. However, our team will use as minimum as possible on any modules and helper packages. Our product is planned to be used for the long term and using the main libraries is ideally sufficient. External packages or modules used during development have to be used sparingly and updated accordingly.
- There is no constraint on programming languages. As mentioned in the technological feasibility document, our team picked technologies that are best suited for our team. Our web app will use React for the front-end, NodeJS supplemented with Python for the back-end, Firebase for the database, Github for version control, and Gimp for badge designing.
- Github will be used as the main version control software and our codebase will be private. Only contributors, team mentors, class professors, and State Farm will have access to it. This will help us to hide the structure of our web app from potential attackers.



5. Potential Risks

When developing a project of this scale, there comes a possibility of potential risks. Through consideration, we found several possible risks and listed them in the table below.

Risk	Likelihood	Severity
Inadequate GUI	Low	Medium
Database Security	Medium	High
Browser Incompatibility	Medium	Low
Maintenance	Medium	High

Figure 2: Potential risk with likelihood of occurrence and its respective impact (severity) on the health of the project

Inadequate GUI

Our product will be an interesting badging system, where users can earn and distribute various badges. It is important that users can manage their badges easily and efficiently. Our goal is to develop a web application with elegant and highly usable GUI. An inadequate GUI can kill the enthusiasm of users, and make them not want to use it, which is against our original intention. We hope users like this badging system and use it frequently.

Solution:

At the moment, our product is specially designed for the State Farm company, so we can keep in close touch with our client. When we have some design ideas of the GUI, we send it to



our client and then they carry out a survey through the company to get the opinions of their employees. So we can get instant feedback and make adjustments timely.

Database Security

In the network era, information security is particularly important. Our badging system may involve some information like names, contact information or even some projects which the company is working on. The leakage of those information will result in not only troubles in personal life but also loss for the company. The place where the information is stored is the database and we need to make sure our database is secure enough.

Solution:

We chose Firebase as our Database. Google does not provide secure access control mechanisms or security rules that identify potential attacks. We would build our own user authentication mechanisms for all database tables and rows to protect our databases from unauthorized access.

Browser Incompatibility

Web pages may appear differently on different browsers, causing compatibility problems between the browser and the web page. This will affect the user experience, and in a worse case, our website may not work properly. Although some problems can be solved by switching browsers, we want to make our product perfect and can be displayed normally under different browsers.

Solution:

We will use more compatible syntax when we are writing codes and test different browsers by using JS unit tests. We would also adopt responsive web design to respond to the user's device environment. Our web will design for high-end browsers as a priority, and also



consider degradation solutions for low-end browsers. For those browsers our web does not support, we will make them clear in the notification bar.

Poor Maintainability

Our product will be used by the client company for a long time, so maintainability is going to be critical. If we don't consider these factors at the beginning of the design, it becomes very difficult to maintain our website after it is released. We will be unable to update or repair our product in time, causing poor user experience, more loss of time, money, and manpower.

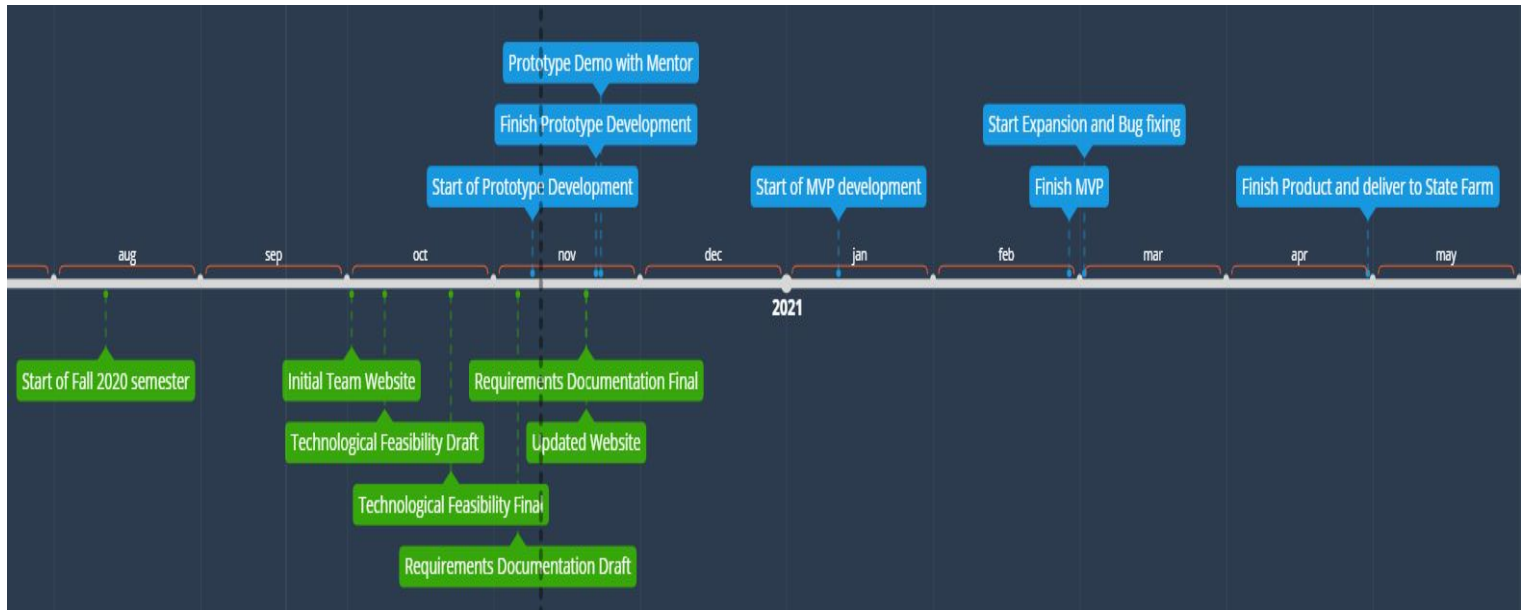
Solution:

Our group will develop code writing specifications to avoid poor code structure in the development process. We will adopt modular design to develop our product to make it easier for error locating and new features addition. We will periodically change the user password for the database and make backups.



6. Project Plan

1. First we have to create the GUI in React to let users interact with our application. Our goal is to make it look inviting to potential users so they can have a great experience while they use our application.
2. We will create a database for our project. Having a database will help us to be able to store all the information about the users and their badges/Kudos
3. Creating an account system that will identify the users, store their information, and provide the ability to log into the application.
4. We will then implement the badge system to award sent/receive/remove badges.
5. Implementing a waterfall feed to display the badging system.
6. Creating an option to print badges allowing users to specify which badge to print on an award certificate.
7. After that we will implement the Social Currency (Kudos) system so users can give/spend points
8. Create Email Signature generation for users so they can integrate their badges in their emails.
9. Design the badges that will be awarded to users and store them in the database/application.
10. For security, we will build our own client verification instruments for all database tables and lines to shield our information bases from unapproved access.





7. Conclusion

Many companies, since the beginning of March, were forced to switch to a virtual workspace due to the covid-19 pandemic. With this new workspace a new set of problems have been introduced. Those include a lack of recognition and thus their enthusiasm and incentive at work drops sharply. Although some companies have tried mechanisms to provide the missing acknowledgement and feedback, they were only partially effective. State Farm on the other hand has challenged our team to build a gamified web based application to award and incentivise their employees in the form of badges and Kudos.

Badges are a permanent and highly visible acknowledgement of recognition and appreciation. We want to create a badging system where people can get and give badges between each other. This system will have an elegant and highly usable GUI to give the user the best experience possible. Our Badge Delivery System will have three core levels, Admin level, Manager level and Employee level for different kinds of users. Each of these roles comes with its own set of permissions. Along with the Badge Delivery System, we will develop another “social currency” system to further enhance the acknowledgements between people in a workplace. Kudos will be used for the day to day recognitions and the badges are reserved for the larger milestones.

Through the requirement specification, we looked into some existing and potential problems. By giving solutions to those problems and making requirements through researching and thinking, we got a deeper understanding of our product and what we are going to do.