

Software Requirements Specification for Software Engineering: A Platform for Event Management

Team 4, EvENGage
Virochaan Ravichandran Gowri
Omar Al-Asfar
Rayyan Suhail
Ibrahim Quraishi
Mohammad Mahdi Mahboob

October 9, 2025

Contents

1	Purpose of the Project	iii
1.1	User Business	iii
1.2	Goals of the Project	iii
2	Stakeholders	iv
2.1	Client	iv
2.2	Hands-On Users of the Project	iv
2.3	Personas	v
2.4	Priorities Assigned to Users	vi
2.5	User Participation	vi
3	Mandated Constraints	vii
3.1	Solution Constraints	vii
3.2	Implementation Environment of the Current System	vii
3.3	Partner or Collaborative Applications	vii
3.4	Off-the-Shelf Software	vii
3.5	Anticipated Workplace Environment	vii
3.6	Schedule Constraints	vii
3.7	Budget Constraints	vii
3.8	Enterprise Constraints	vii
4	Naming Conventions and Terminology	viii
4.1	Glossary of All Terms, Including Acronyms, Used by Stakeholders involved in the Project	viii
5	Relevant Facts and Assumptions	viii
5.1	Relevant Facts	viii
5.2	Business Rules	ix
5.3	Assumptions	ix
6	The Scope of the Work	x
6.1	The Current Situation	x
6.2	The Context of the Work	xi
6.3	Work Partitioning	xii
6.4	Specifying a Business Use Case (BUC)	xiii

7	Business Data Model and Data Dictionary	xvii
7.1	Business Data Model	xvii
7.2	Data Dictionary	xvii
8	The Scope of the Product	xvii
8.1	Product Boundary	xvii
8.2	Product Use Case Table	xvii
8.3	Individual Product Use Cases (PUC's)	xvii
9	Functional Requirements	xviii
9.1	Functional Requirements	xviii
10	Look and Feel Requirements	xviii
10.1	Appearance Requirements	xviii
10.2	Style Requirements	xix
11	Usability and Humanity Requirements	xx
11.1	Ease of Use Requirements	xx
11.2	Personalization and Internationalization Requirements	xx
11.3	Learning Requirements	xxi
11.4	Understandability and Politeness Requirements	xxi
11.5	Accessibility Requirements	xxii
12	Performance Requirements	xxii
12.1	Speed and Latency Requirements	xxii
12.2	Safety-Critical Requirements	xxii
12.3	Precision or Accuracy Requirements	xxii
12.4	Robustness or Fault-Tolerance Requirements	xxiii
12.5	Capacity Requirements	xxiii
12.6	Scalability or Extensibility Requirements	xxiii
12.7	Longevity Requirements	xxiii
13	Operational and Environmental Requirements	xxiii
13.1	Expected Physical Environment	xxiii
13.2	Wider Environment Requirements	xxiii
13.3	Requirements for Interfacing with Adjacent Systems	xxiv
13.4	Productization Requirements	xxiv
13.5	Release Requirements	xxiv

14 Maintainability and Support Requirements	xxiv
14.1 Maintenance Requirements	xxiv
14.2 Supportability Requirements	xxiv
14.3 Adaptability Requirements	xxv
15 Security Requirements	xxv
15.1 Access Requirements	xxv
15.2 Integrity Requirements	xxvi
15.3 Privacy Requirements	xxvi
15.4 Audit Requirements	xxvii
16 Cultural Requirements	xxvii
16.1 Cultural Requirements	xxvii
17 Compliance Requirements	xxvii
17.1 Legal Requirements	xxvii
17.2 Standards Compliance Requirements	xxviii
18 Open Issues	xxviii
19 Off-the-Shelf Solutions	xxviii
19.1 Ready-Made Products	xxviii
19.2 Reusable Components	xxviii
19.3 Products That Can Be Copied	xxix
20 New Problems	xxix
20.1 Effects on the Current Environment	xxix
20.2 Effects on the Installed Systems	xxix
20.3 Potential User Problems	xxx
20.4 Limitations in the Anticipated Implementation Environment That May Inhibit the New Product	xxx
20.5 Follow-Up Problems	xxx
21 Tasks	xxx
21.1 Project Planning	xxx
21.2 Planning of the Development Phases	xxx

22 Migration to the New Product	xxx
22.1 Requirements for Migration to the New Product	xxx
22.2 Data That Has to be Modified or Translated for the New System	xxx
23 Costs	xxxi
24 User Documentation and Training	xxxi
24.1 User Documentation Requirements	xxxi
24.2 Training Requirements	xxxi
25 Waiting Room	xxxi
26 Ideas for Solution	xxxi

Revision History

Date	Version	Notes
Date 1	1.0	Notes
Date 2	1.1	Notes

1 Purpose of the Project

The purpose of this project is to create a centralized platform for the McMaster Engineering Society (MES) that simplifies how large-scale events are managed. By consolidating event registration, form creation, attendee tracking, and data analytics into a single system, the platform aims to reduce administrative workload, eliminate fragmented workflows, and enhance the overall experience for both event organizers and attendees.

1.1 User Business

The primary users of this system are members of the McMaster Engineering Society, including executives and event organizers, as well as McMaster engineering students who attend MES events.

- **Administrators (MES Executives and Organizers):** Responsible for creating events, designing registration and feedback forms, managing attendee information, and analyzing data through the dashboard. They will use the platform to reduce manual work and improve event coordination.
- **End Users (Students and Attendees):** Students will use the platform to register for events, complete waivers or feedback forms, and receive event confirmations and updates. The goal is to create a seamless and engaging experience that encourages participation.

By serving both groups through a single platform, the system eliminates redundant workflows and ensures continuity of data across multiple events.

1.2 Goals of the Project

The primary goals of this project are as follows:

1. **Develop a Custom Form Builder:** Build an intuitive tool that lets administrators design and manage event or feedback forms with different question types and conditional logic, without needing third-party software.

2. **Implement a Unified Registration and Feedback System:** Create a simple, centralized process for students to register for events, complete waivers, and share feedback—all in one place.
3. **Create an Attendee Overview Dashboard:** Give administrators a clear view of event participation by displaying key details such as registration status, payments, and waiver completion in real time.
4. **Integrate Backend Analytics:** Include tools that help MES organizers analyze event data, track trends, and use insights to plan and improve future events more effectively.

2 Stakeholders

2.1 Client

The client for this project is the supervisor, Luke Schuurman. He is a member of the MES and has first hand experience planning and hosting events with the MES. As the supervisor he will play a crucial role by ensuring the project aligns with objective of the MES and integrate the platform seamlessly with existing systems. He will also provide us with feedback and guidance throughout the project and will help define the project requirements in this document.

2.2 Hands-On Users of the Project

MES Executives and Council Members: They will be utilizing this system to create and manage events, configure forms and surveys, monitor event data and generate data analytics reports. They can be characterized as primarily undergraduate students who value their time greatly. They aim to reduce the time taken to do administrative tasks as well as provide a better experience during MES events. Their experience with systems like this can range from Journeyman - Master as they can be experienced in event planning and student engagement. There may be a slight learning curve to utilizing the new technology but these users have experience performing these functions.

McMaster Engineering Students: They will be utilizing this app to to

register for events, purchase tickets, sign waivers, check in at venues, and complete feedback surveys. They want to enjoy their university experience and connect with other students, They are also very busy and value their time greatly so are looking for an intuitive and straightforward user experience. Their general experience with systems like this is Journeyman as they may have used similar systems for other use cases.

Other Students and Guest Event Attendees: This group includes non-engineering students, alumni, and invited guests who participate in large-scale MES events such as the Fireball Formal and Graduation Formal, which extend beyond the core engineering community. It could also include students and guests from other universities as well as industry which attend the engineering conferences that the MES helps host. They are generally looking for an easy and seamless experience registering and attending these events. Their general experience with systems like this is Journeyman as they may have used similar systems for other use cases.

2.3 Personas

1. **Matthew Cruise (Engineering Student):** Matthew is a 20-year-old second-year Mechanical Engineering student at McMaster University. He lives in a shared house near campus with two close friends. He enjoys attending MES events like pub nights and the Fireball Formal as a way to balance his heavy academic workload with some enjoyment and entertainment. He usually hears about events through word-of-mouth or social media and would prefer an easy and effortless way to find and register for events. Matthew is generally tech savvy and is comfortable using online platforms but doesn't want to be bothered by too many notifications and forms. He has many ideas on how he can generally improve his university experience but doesn't believe he has an outlet to convey them. For Matthew his priority is convenience as he wants to enjoy himself but doesn't want to spend too much time or effort doing so.
2. **Adam Clooney (MES Executive):** Adam Clooney is a 22-year-old final-year Civil Engineering student who currently serves as VP Social on the MES. He is responsible for coordinating large-scale events like Fireball Formal, working closely with other council members to handle

logistics, advertising, and student engagement. Adam is outgoing and enjoys bringing people together, but often feels the strain of balancing his role with academic responsibilities. He is proficient with common digital tools such as Google Drive, spreadsheets, and design platforms for promotions, but he's not highly technical. Adam appreciates structure and tools that keep things organized because he dislikes wasting time fixing errors or repeating work. He is motivated by the sense of accomplishment that comes from hosting a successful event and wants tools that help him stay on top of details.

3. **Margot Watson (McMaster Student):** Margot Watson is a 21-year-old undergraduate student in Political Science at McMaster University. Although she is not part of the engineering faculty, she often attends large MES-hosted events such as the Fireball Formal and other socials because many of her friends are in engineering. Margot lives in an off-campus apartment with two roommates and enjoys being involved in student life across faculties. She has a relaxed attitude toward technology since she uses her phone daily for social media and messaging but she prefers things to be straightforward and intuitive. She is cautious with her money, balancing tuition and living expenses, but she's willing to spend on experiences with friends. She is motivated by spending time with her friends and having good experiences to have a fulfilling student life.

2.4 Priorities Assigned to Users

Key Users: Luke Schuurman, MES Council Members and Executives, McMaster Engineering Students.

Secondary Users: Other Students and Guest Event Attendees.

2.5 User Participation

Our requirements will primarily be derived through meetings with our supervisor Luke Schuurman. If we have the need to clarify or elicit more requirements we will look to engage other MES members either through our supervisor or directly.

3 Mandated Constraints

3.1 Solution Constraints

Insert your content here.

3.2 Implementation Environment of the Current System

Insert your content here.

3.3 Partner or Collaborative Applications

Insert your content here.

3.4 Off-the-Shelf Software

Insert your content here.

3.5 Anticipated Workplace Environment

Insert your content here.

3.6 Schedule Constraints

Insert your content here.

3.7 Budget Constraints

Insert your content here.

3.8 Enterprise Constraints

Insert your content here.

4 Naming Conventions and Terminology

4.1 Glossary of All Terms, Including Acronyms, Used by Stakeholders involved in the Project

- **MES:** McMaster Engineering Society

5 Relevant Facts and Assumptions

This section outlines the key facts, business rules, and assumptions that guide the design and development of Project A — which focuses on the Custom Form Builder, Registration and Feedback Forms, Attendee Overview, and Backend Analytics components of the larger MES Event Management System.

5.1 Relevant Facts

- The McMaster Engineering Society (MES) currently manages events such as Fireball Formal and the CALE Conference using several disconnected tools like Google Forms and Google Sheets, which creates inefficiencies and limits data analysis.
- Each MES event involves registration, waiver collection, and feedback surveys that must comply with university data privacy and accessibility standards.
- The system will be used by both administrators and students on a wide range of devices and browsers, so responsive and cross-platform design is required.
- The overall Event Management System is being co-developed by three Capstone teams. Project A must maintain compatibility and shared data models with the other two teams' components.
- The project's frontend stack was recently updated from **Next.js** to **Vite + TanStack Router + TanStack Create** to improve development speed, hot reloading performance, and flexibility for building a Single Page Application (SPA) with integrated admin dashboards and authentication.

- PostgreSQL remains the chosen database technology for data storage and analytics.

5.2 Business Rules

- Only verified MES administrators can create, edit, or delete forms and view backend analytics.
- Event data, form responses, and attendee details must be securely stored and retrievable for future event reviews.
- All user input will be validated to prevent incomplete or invalid submissions before being stored in the database.
- A consistent data format must be maintained across all events to support accurate analytics and report generation.
- Administrators can export data such as attendee lists or analytics summaries in standard formats (e.g., CSV, PDF).

5.3 Assumptions

- The MES will provide sample event and registration data to support development and testing.
- Users will have stable internet access when using the platform, as it relies on real-time connectivity.
- Collaborating teams (Projects B and C) will follow the agreed API and database specifications to ensure system integration works smoothly.
- Authentication and authorization will be handled securely within the shared platform using standardized methods.
- Future MES administrators and developers will continue maintaining the project using the provided GitHub repository, documentation, and CI/CD workflows.

6 The Scope of the Work

The purpose of the section is to define the expected scope of the project, including specifications on how the system is partitioned, business data models, and business use cases.

6.1 The Current Situation

Currently, the MES uses plethora of different platforms to host events and conduct surveys such as tools for registration, signing of waivers, and checking in attendees. The main platforms used are a combination of Google Forms and Google Sheets. There are several pain points to address with the current system.

- **Decentralized System Components** Registration and surveying is split across a plethora of tools and software which may not be compatible with each other. For example, Google Forms is used for registration forms and surveys, Google Sheets stores form data and LinkTree holds links to all the registration forms, and event updates is done by email or social media.
- **Overly Complex Form Logic** The current CFES survey consists of 70 pages of questions linked together through complex branching logic. The Google Forms form building UI makes this very complicated as all form elements are displayed as a linear list of sections making it very hard to track paths through the form.
- **Disorganized Data Visualization** Form response data is currently stored using Google Sheets. While Google Form data is easily imported into Google Sheets, any analytics on the data must be done manually through equations and macros.
- **Lack of Reusability** Google Forms comes with a few templates that provide an initial starting point for many types of forms such as registrant information. However, after the first section of the form, each subsequent section must be made manually. Sections may be imported from other forms but this requires the user to have access to a form with the wanted section and to scour through an unorganized list of forms and sections.

- **Low Response Rates on Surveys** The response rates on the annual CFES survey of undergraduate engineering students have been decreasing due to the long length of the Google Form and the lack of ability to submit a partially completed form.
- **Manual Registration Scheduling** Event registration is managed through a combination of Instagram, Google Forms, and LinkTree. Events are advertised on Instagram, and a link to the signup Google Form is posted on the MES LinkTree. This solution lacks automation since a new Google Form must be made for every event and links have to be manually added and removed for each form when registration is opened or closed.

6.2 The Context of the Work

This section provides an overview of the high-level inputs and outputs between the system and external systems or actors. Figure X illustrates a work context diagram showing the interactions between the system components and external elements.

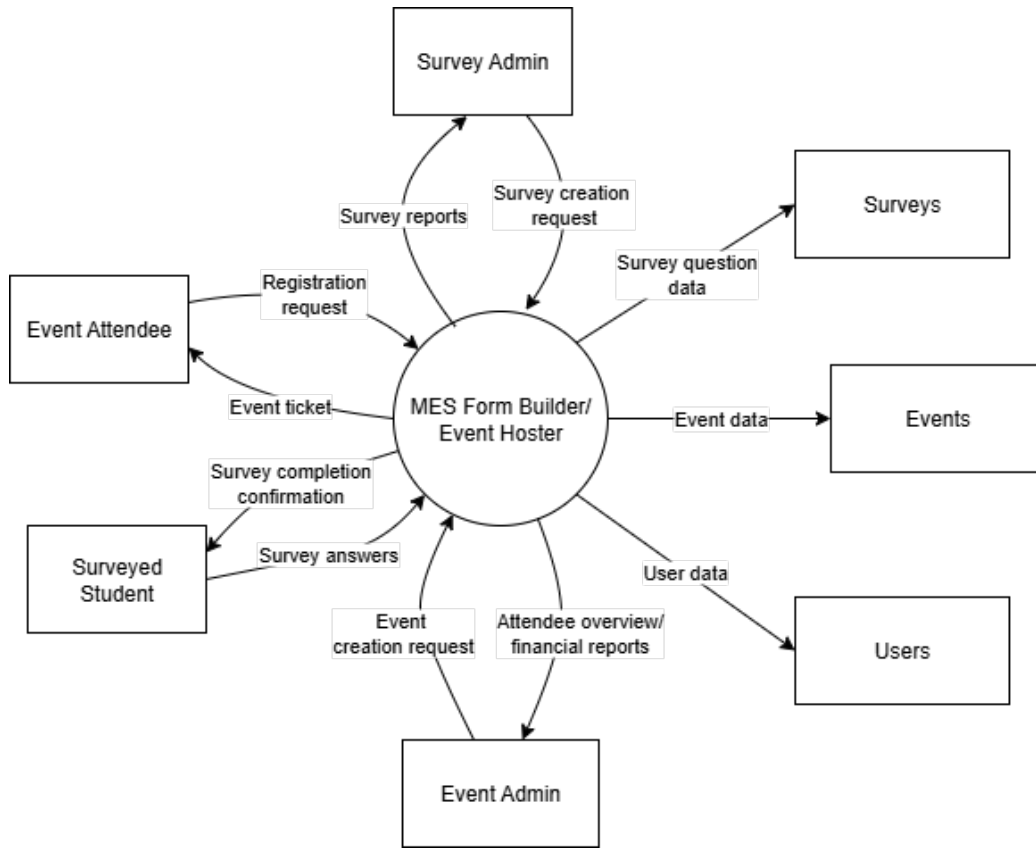


Figure 1: Work context diagram of the form builder and event hosting system

6.3 Work Partitioning

This section describes how the work done by the system can be partitioned into smaller and more manageable workflows. Below is a table describing each of the sub-workflows of the proposed systems. Note that event creation and survey creation have been grouped as a single workflow since they are nearly identical.

No.	Event	Input	Output	Requirements
1	User registers for event	Registration data	Event ticket	
2	User fills out a survey	Survey responses	Survey completion confirmation	
3	Admin creates a form module	Module question data	Reusable form module	
4	Admin creates an event/survey	Event/survey data	Event/survey creation confirmation	
5	Admin views survey/event statistics	Event/survey to view	Event/survey registration/response reports	

Table 1: Partitioning of system workflows

6.4 Specifying a Business Use Case (BUC)

BUC 1: User registers for an event

Input: Registration data

Output: Event tickets

Pre-condition: User has downloaded the application and has created an account

Scenario:

1. The user application receives the registration data
2. The user application verifies the data is filled correctly
3. The user application sends the registration data to the backend server
4. The backend server verifies the event is not full and the deadline has not passed
5. The backend server adds the user to the list of attendees

6. The backend server generates an event ticket and sends it to the user application
7. The user application confirms with the user that the registration was successful and presents the user with the ticket

Sub variations:

- 2a. The submitted registration data has errors, the user application prompts the user to fix the errors and resubmit
- 4a. The event is full or the deadline has passed, the backend sends an error code to the user application
- 4b. The user application alerts the user of the error.

BUC 2: User fills out a survey module

Input: Survey responses

Output: Survey completion confirmation

Pre-condition: User has downloaded the application and has created an account

Scenario:

1. The user application receives the survey data
2. The user application verifies the data is filled correctly
3. The user application sends the survey data to the backend server
4. The backend server updates the survey database with the user's data
5. The backend server sends a confirmation message to the user application
6. The user application confirms with the user that the survey data has been submitted

Sub variations:

- 2a. The submitted data has errors (i.e. mandatory fields not filled), the user application prompts the user to fix the errors and resubmit

BUC 3: Admin creates a form module

Input: Form fields

Output: Reusable form module

Pre-condition: Admin has access to create custom form modules

Scenario:

1. The admin portal receives the list of form fields and questions from the admin user for the custom module
2. The admin portal verifies the custom module has been created correctly
3. The admin portal sends the custom module data to the backend server
4. The backend server authenticates the admin user
5. The backend server saves the custom module data to the template database
6. The backend server sends a confirmation message to the admin portal
7. The admin portal updates the list of custom modules with the completed module
8. The admin portal confirms with the admin user that the custom module has been created

Sub variations:

- 2a. The submitted form module has errors (i.e. unfinished fields), the admin user is prompted to fix these errors before resubmitting
- 4a. Authentication of the admin fails, the admin portal is notified of the request denial

BUC 4: Admin creates an event/survey

Input: Event details

Output: Event creation confirmation

Pre-condition: Admin has access to create events

Scenario:

1. The admin portal receives the event/survey details
2. The admin portal verifies the event/survey details are correct

3. The admin portal sends the event/survey data to the backend server
4. The backend server authenticates the admin user
5. The backend server saves the event/survey data to the database of events/surveys
6. The backend server sends a message to the user application to notify users of the new event/survey
7. The backend server sends a confirmation message to the admin portal
8. The admin portal adds the created event/survey to the event/survey dashboard
9. The admin portal confirms with the admin user that the event/survey has been created

Sub variations:

- 2a. The submitted details have errors (i.e. event date has already passed), the admin user is prompted to fix these errors before resubmitting
- 4a. Authentication of the admin fails, the admin portal is notified of the request denial

BUC 5: Admin views event/survey statistics

Input: Event/survey to view

Output: Event registration/survey response report

Pre-condition: Event/survey has been created, and users have registered/responded

Scenario:

1. The admin portal receives the request to view event/survey statistics
2. The admin portal sends a request to the backend server containing the identification for the event/survey to view
3. The backend server receives the request and authenticates the admin user
4. The backend server retrieves the registrant/response data for the requested event/survey from the database

5. The backend server generates a statistical report of all the data
6. The data is sent back to the admin portal
7. The admin portal formats all the data into a readable format
8. The admin user is presented with the event/survey statistics

Sub variations:

- 3a. Authentication of the admin fails, the admin portal is notified of the request denial

7 Business Data Model and Data Dictionary

7.1 Business Data Model

Insert your content here.

7.2 Data Dictionary

Insert your content here.

8 The Scope of the Product

8.1 Product Boundary

Insert your content here.

8.2 Product Use Case Table

Insert your content here.

8.3 Individual Product Use Cases (PUC's)

Insert your content here.

9 Functional Requirements

9.1 Functional Requirements

- FR-1:** The system shall allow admins to create forms with multiple fields types.
- FR-2:** The system shall allow admins to organize forms for analytics, and specify how the analysis should be done.
- FR-3:** The system shall generate QR codes for confirmation and check-in integration.
- FR-4:** The system shall provide an attendee dashboard for administrators with filters for status updates on payments and waivers, event sign-ins, etc.
- FR-5:** The system shall store all event data in a secure, centralized database.
- FR-6:** The system shall store all questionnaire data in a secure, centralized database.
- FR-7:** The system shall allow administrators to generate analytics dashboards and export CSV/Excel reports.
- FR-8:** The system shall provide event attendees with a medium to relay feedback for the event.
- FR-9:** The system shall provide administrators with a medium to view all event feedback once an event has completed.
- FR-10:** The system shall store all questionnaire data in a secure, centralized database.

10 Look and Feel Requirements

10.1 Appearance Requirements

- LFR-AP.1** The interface shall comply with MES branding criteria (logo, colour scheme).

Motivation: Ensures that the product is recognizable as an official MES event registration platform.

Fit Criterion: The MES representative shall certify that the product complies with the current standards.

LFR-AP.2 The tool shall have a clean, minimalist layout prioritizing the functionality.

Motivation: Increases accessibility and user productivity, and allows for consistency across different events.

Fit Criterion: During usability testing across the MES events, at least 80% of students rate the forums ease of use a 4+.

LFR-AP.3 Admin dashboard shall clearly display relevant analytics, and distinct charts.

Motivation: Improves organizer accessibility and readability, allowing for easier management during planning operations.

Fit Criterion: The representative shall approve of the analytics layout.

10.2 Style Requirements

LFR-S.1 The design shall be professional but approachable, accomodating all types of events.

Motivation: The app should have a friendly vibe for casual student use, but maintain a sense of maturity for the more formal uses.

Fit Criterion: After use in some MES events, 70% of users shall agree that they trust and respect the product, and 70% shall agree that it was not boring.

LFR-S.2 The admin dashboard shall emphasize functionality and clarity, avoiding distractions just for the sake of aesthetics.

Motivation: Admin and organizers require clear data and analytics, they have no use for stylistic components.

Fit Criterion: A sample of event organizers and club executives approve and are able to interpret all analytics without prior explanation.

11 Usability and Humanity Requirements

11.1 Ease of Use Requirements

UHR-EoU.1 Registration and feedback forms shall be easily and quickly filled out for anyone with no instruction.

Motivation: The app should have a friendly vibe for casual student use, but maintain a sense of maturity for the more formal uses.

Fit Criterion: After use in some MES events, 70% of users shall agree that they trust and respect the product, and 70% shall agree that it was not boring.

UHR-EoU.2 Users shall sign-up/sign-in to the app with no instruction.

Motivation: The registration process is the most important aspect of the platform, so the app should have a clear and simple layout.

Fit Criterion: A sample of users shall register/login within 2 minutes without instruction.

UHR-EoU.3 The admin dashboard shall emphasize functionality and clarity, avoiding distractions just for the sake of aesthetics.

Motivation: Admin and organizers require clear data and analytics, they have no use for stylistic components.

Fit Criterion: A sample of event organizers and club executives approve and are able to interpret all analytics without prior explanation.

UHR-EoU.4 The system shall provide survey progress indicators to reduce form abandonment rates.

11.2 Personalization and Internationalization Requirements

UHR-PIR.1 The custom form builder shall allow admin to create personalized forms with event-specific fields.

Motivation: Flexibility is essential to accommodate the diverse

set of events as per the scope.

Fit Criterion: The forum is used for 2 events successfully without developer assistance.

UHR-PIR.2 Admin dashboard shall support sorting and filtering of attendees by predefined metrics.

Motivation: Streamlines the attendee organizing process, allowing admin to categorize attendees as per the event requirements.

Fit Criterion: Organizers shall filter attendees within 1 minute of use without instruction.

11.3 Learning Requirements

UHR-LR.1 The app shall be easy for anyone with an intermediate level of English.

Motivation: Users should expect intuitive, concise interactions.

Fit Criterion: 80% of students successfully complete a form with no assistance.

UHR-LR.2 Admin shall be able to build a form with the custom builder with no prior instruction.

Motivation: Event organizers are constantly changing, so it is important to reduce dependency on technical training.

Fit Criterion: 80% of organizers shall complete a basic test form on their first attempt.

11.4 Understandability and Politeness Requirements

UHR-UPR.1 Basic, non-technical language will be used (Sign-up instead of RSVP).

Motivation: Increases accessibility among non-technical users, or non-fluent English speakers.

Fit Criterion: 80% of students understand all wording without clarification.

UHR-UPR.2 The app shall communicate errors clearly and politely.

Motivation: Clear error messages reduce frustration and improve user experience.

Fit Criterion: Feedback suggests that 80% of students found the experience satisfying.

UHR-UPR.3 The app shall hide sensitive and confidential information from users.

Motivation: Enhances security and confidence of organizations in the product.

Fit Criterion: Approval from MES representative.

11.5 Accessibility Requirements

UHR-AR.1 The app shall conform to WCAG 2.1 AA standards, improving visibility for impaired users.

Motivation: Ensures accessibility for users with visual disabilities and impairments.

Fit Criterion: Approval from a sample of students with impairments, and evaluation tools (WAVE Web Accessibility).

12 Performance Requirements

12.1 Speed and Latency Requirements

SL-1: The system shall have a maximum 2-second latency for form loading, optimized for mobile devices.

12.2 Safety-Critical Requirements

Insert your content here.

12.3 Precision or Accuracy Requirements

Insert your content here.

12.4 Robustness or Fault-Tolerance Requirements

- RF-1:** The system shall support 2047 concurrent users during peak event times.
- RF-2:** The system shall auto-save partially completed surveys every 30 seconds.
- RF-3:** The system shall recover from a server crash within 60 seconds without data loss.
- RF-4:** The system shall allow new form modules to be added without any downtime.
- RF-5:** The system shall allow administrators to update event templates without disruption during ongoing events.

12.5 Capacity Requirements

Insert your content here.

12.6 Scalability or Extensibility Requirements

- SE-1:** The system shall support up to 2047 registrations per event.

12.7 Longevity Requirements

Insert your content here.

13 Operational and Environmental Requirements

13.1 Expected Physical Environment

Insert your content here.

13.2 Wider Environment Requirements

Insert your content here.

13.3 Requirements for Interfacing with Adjacent Systems

Insert your content here.

13.4 Productization Requirements

Insert your content here.

13.5 Release Requirements

Insert your content here.

14 Maintainability and Support Requirements

14.1 Maintenance Requirements

MT-1: The system shall provide updated documentation upon every release and be accessible to all developers

Motivation: Allows for developers to understand the changes made on each release and will be easily be able to modify the code to fix errors or make updates.

Fit Criterion: Updated documentation will be included with the release of each version.

14.2 Supportability Requirements

SU-1: The system shall include a FAQ section to help clarify or answer common questions.

Motivation: Will allow for a better user experience as they can solve their own problems quickly and will make it easier for MES support teams.

Fit Criterion: Ensure a FAQ with common questions obtained from stakeholders (supervisor and MES council members) is included within the system.

14.3 Adaptability Requirements

AD-1: The system shall run as a web app accessible through Chromium, Firefox, and Safari browsers.

Motivation: This will allow users to use whatever browser they want and will make the application more accessible.

Fit Criterion: Test for compatibility of the application to ensure it runs on all specified browsers.

AD-2: The mobile app components will work on both IOS and Android platforms.

Motivation: Allows users on both mobile ecosystems to use the app making the application more accessible.

Fit Criterion: Test the application in both the IOS and Android Environment ensuring correct functionality of all components.

15 Security Requirements

15.1 Access Requirements

AC-1: The system shall require all users to authenticate using their McMaster University Email before accessing the system

Motivation: Ensure that only the expected users of the system are using and prevent misuse from external actors.

Fit Criterion: Allow only users who have authenticated with their emails to access the system. Ensure logs track who accesses the system and that they are authenticated.

AC-2: Admin level features and sensitive data are only available to users who are assigned admin roles.

Motivation: Prevents unauthorized users from viewing sensitive event and user data.

Fit Criterion: Perform testing to ensure that features deemed to be admin-level are only accessible to the users who are given those roles. Ensure that data is only accessible to admins

15.2 Integrity Requirements

IG-1: The system shall provide input validation for all user submitted data

Motivation: Ensures the safety of our application by ensuring only the required input types are entering our database. Protects us from SQL injection and data corruption in our database.

Fit Criterion: All inputs will include checks to ensure only the correct type is entering our database. Perform testing to ensure that all inputs have validation checks.

IG-2: The system shall only use HTTPS for communication between clients and servers

Motivation: Ensures a secure connection between our client and server and protects against the interception or tampering of data during data transmission.

Fit Criterion: All requests will be done through HTTPS and if an HTTP request is done we will redirect it to HTTPS.

15.3 Privacy Requirements

PV-1: Users shall have the ability to request for the deletion of their stored personal data

Motivation: Increases transparency and control over their own data for users. Provides reassurances for users that their data can be removed if necessary.

Fit Criterion: Ensure a mechanism exists for users to delete their data. Perform testing so that the mechanism actually removes all related data from the database.

PV-2: The system shall only store sensitive data after obtaining the consent of the user

Motivation: Keeps us legally sound as we are not storing user data without first obtaining consent. Also provides users with information on what their data is actually being used for.

Fit Criterion: Ensure that all sections which require inputting sensitive information have consent checks where we explicitly ex-

plain what is being stored and how it may be used.

PV-3: All sensitive user information such as student numbers, names and emails shall be encrypted in storage using AES-256

Motivation: Protects user's information from unauthorized viewing and ensures that even if a breach were to occur sensitive information will not be leaked.

Fit Criterion: Inspect database to show that the required fields are stored encrypted and not in plaintext.

15.4 Audit Requirements

AU-1: The system shall track admin action inside an audit log

Motivation: Ensures traceability of admin actions and allows other admins to know who performed what.

Fit Criterion: 100% of actions will be in a log with tracking of user who did the action, timestamp and action committed. Testing will be done to ensure all actions are being logged and logs should be exportable for review.

16 Cultural Requirements

16.1 Cultural Requirements

Insert your content here.

17 Compliance Requirements

17.1 Legal Requirements

LG-1: The system shall store and handle all sensitive personal data in compliance with PIPEDA regulations.

17.2 Standards Compliance Requirements

Insert your content here.

18 Open Issues

Insert your content here.

19 Off-the-Shelf Solutions

19.1 Ready-Made Products

There are some products that exist on the market which solve certain components of this product but no product exists that combines these components into one. For event management there are various tools such as EventBrite and Stubhub which can allow for the selling of tickets for events. The problem with these products is that they don't integrate well with current MES Systems and don't provide all the features as required such as collecting waivers and ensuring McMaster students attend university specific events. For general data collection Google Forms is the most used tool and it allows for the creation of complex forms and stores data in spreadsheets. For further data analysis it requires effort on the part of the form creator to actually go and analyze the data to gain actual insights. Also the forms can become hard to handle as they become complex and can become confusing for respondents. As mentioned before there is no tool that has a combination of the two components.

19.2 Reusable Components

There are various components that we can use to help develop our application:

- **Vite**: Provides us with a framework for developing web apps in **React** and provides built-in routing behaviour. It also handles many built-in libraries and packages that we can use for front-end styling such as **tailwind-css**. We can also integrate it with other libraries for authentication and for database management

- **TanStack:** Provides us with a powerful middleware to connect back-end and front-end services. Will primarily be used for routing but also offers data visualization capabilities. Offers many libraries for working with data and state management that we can leverage.
- **SurveyJS:** This is a potential tool we can use to develop the form builder as it provides us with some pre-built components we can use to develop and customize our own forms.
- **Recharts:** This could be potential charting tool we can use to develop our admin dashboard. Though there are other charting tools the benefit of Recharts is that it provides customization on top of the pre built charts.
- **Drizzle:** We can use Drizzle as an ORM to map from our database to our web-app. Drizzle is useful since it is lightweight and is code first. Drizzle's simplicity allows for faster development and is perfect for our use case.

These components will allow us to develop our application faster and more efficiently as many of these products are already optimized. All the above products are free to use so do not incur any extra costs or require the handling of licenses.

19.3 Products That Can Be Copied

There don't seem to be any products that can be copied which contain all the required components within a single product. Moreover the MES wants a product that doesn't require an external license and wants to be fully built in house so they have control over future development and usage.

20 New Problems

20.1 Effects on the Current Environment

Insert your content here.

20.2 Effects on the Installed Systems

Insert your content here.

20.3 Potential User Problems

Insert your content here.

20.4 Limitations in the Anticipated Implementation Environment That May Inhibit the New Product

Insert your content here.

20.5 Follow-Up Problems

Insert your content here.

21 Tasks

21.1 Project Planning

Insert your content here.

21.2 Planning of the Development Phases

Insert your content here.

22 Migration to the New Product

22.1 Requirements for Migration to the New Product

Insert your content here.

22.2 Data That Has to be Modified or Translated for the New System

Insert your content here.

23 Costs

We don't expect any costs to arise during the development of the project. We will be using free tools and libraries for development and for hosting we will look to host databases and the back-end locally. In production the hosting will be done by the MES so it is out of the scope of this capstone.

24 User Documentation and Training

24.1 User Documentation Requirements

Insert your content here.

24.2 Training Requirements

Insert your content here.

25 Waiting Room

Insert your content here.

26 Ideas for Solution

Insert your content here.

Appendix — Reflection

The purpose of reflection questions is to give you a chance to assess your own learning and that of your group as a whole, and to find ways to improve in the future. Reflection is an important part of the learning process. Reflection is also an essential component of a successful software development process.

Reflections are most interesting and useful when they're honest, even if the stories they tell are imperfect. You will be marked based on your depth of thought and analysis, and not based on the content of the reflections themselves. Thus, for full marks we encourage you to answer openly and honestly and to avoid simply writing "what you think the evaluator wants to hear."

Please answer the following questions. Some questions can be answered on the team level, but where appropriate, each team member should write their own response:

Virochaan Ravichandran Gowri Reflection:

1. What went well while writing this deliverable? During the writing

During the writing of this deliverable we all had a clear understanding of the goals of this project and the general plan which we did in the past deliverable. From this through conversations with our supervisors we were easily able to obtain requirements that were relevant to our project. The best part was the communication between the members of our team and with the supervisor. This allowed us to

2. What pain points did you experience during this deliverable, and how did you resolve them?

We needed to make sure that we remained flexible in our requirements if we had to make changes in the future. This was especially crucial because we knew that there could be a chance that there could be additional requirements or changes based on what the client wanted. Also the client wanted a certain stack so we didn't really have flexibility regarding that so it was some new technologies that we need to become accustomed with.

3. For each of the knowledge areas and skills identified in the previous question, what are at least two approaches to acquiring

the knowledge or mastering the skill? Of the identified approaches, which will each team member pursue, and why did they make this choice?

Group Reflection

1. How many of your requirements were inspired by speaking to your client(s) or their proxies (e.g. your peers, stakeholders, potential users)? Most of our functional requirements were obtained directly through conversations with out supervisor (Luke) or through toddocumentation provided by him. This provided us with a good starting point on what his vision of the system would look like
2. Which of the courses you have taken, or are currently taking, will help your team to be successful with your capstone project.
 - SFWRENG 4HC3: This course will help us design the frontend components and create a platform which will provide a positive user experience.
 - SFWRENG 3DB3: Help us design effective database schema and queries.
 - SFWRENG 3A04: This will help us design our architecture for the system.
3. What knowledge and skills will the team collectively need to acquire to successfully complete this capstone project? Examples of possible knowledge to acquire include domain specific knowledge from the domain of your application, or software engineering knowledge, mecha-tronics knowledge or computer science knowledge. Skills may be related to technology, or writing, or presentation, or team management, etc. You should look to identify at least one item for each team member.