Software Requirements Specification for Bridging Gaps: AI for Diagram Accessibility: subtitle describing software

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Contents

Revision History

Date	Version	Notes
Date 1	1.0	Notes
Date 2	1.1	Notes

1 Purpose of the Project

1.1 User Business

Insert your content here.

1.2 Goals of the Project

Insert your content here.

2 Stakeholders

The project stakeholders consist of people who have a need or interest, whether direct or indirect, for alternative text generation for visual, idle content (such as images or diagrams). These stakeholders will influence and be affected by the project's development decisions and progress. To meet user needs, it is vital to understand the stakeholder roles and expectations.

First, this section introduces the client, customer and other stakeholders involved in this project. Then, the product users are described, specifically the hands-on users of the project. Finally, personas, priority levels and anticipated participation levels are listed for each stakeholder.

2.1 Client

This project's client is Ms. Jingchuan Sui who works as a Media Lab Specialist Supervisor at the Faculty of Engineering, McMaster University. As this project's supervisor, her main role is to provide guidance and voice any concerns during the development phase with her technical and domain expertise. She will be the main source for setting requirements while also being directly involved in the development of this project, providing feedback and opinions on the Human-Computer interface components.

2.2 Customer

The customers of this product are McMaster users, specifically, McMaster students, staff and teaching instructors who are directly involved in learning from course content or making them accessible as per the Accessibility for

Ontarians with Disabilities Act (AODA). In other words, McMaster University stakeholders who benefit directly from accessible course content. For example, primary customers can include students who use a screen reader for learning purposes or a teaching assistant who is making a course's content AODA compliant. Furthermore, under her position at McMaster University, Ms. Sui can also be considered a customer, as she aids in course content remediation and thus, is also one of the intended end-users.

For development, Group 22 is tailoring the solution to the McMaster demographic in line with Ms. Sui's requirements. However, the product has the potential to support any users who require alternative text generation for visual content. Feedback from McMaster stakeholders will be prioritized to maintain a clear and manageable scope.

2.3 Other Stakeholders

This subsection discusses other groups that are indirectly impacted or who contribute to the ecosystem of accessibility, content creation, and AODA compliance.

2.3.1 Faculty of Engineering Instructors

This group consists of professors and lecturers responsible for creating and maintaining course content. They may benefit from automated alternative text generation to ensure their teaching materials are accessible.

2.3.2 Teaching Assistants (TAs)

As part of their work, TAs are often responsible for preparing, modifying, and uploading course content. They are stakeholders as they could use the system to simplify accessibility compliance.

2.3.3 Accessibility Services Office at McMaster

This group includes staff members who oversee accessibility compliance and provide accommodations for students. They have a strong interest in ensuring tools meet AODA standards.

2.3.4 McMaster IT Services / Media Production Services

These teams may be involved in system integration, technical support, and maintenance of the product within the university's digital infrastructure.

2.3.5 Students with Accessibility Needs

These students are those who may not be primary testers but are indirectly impacted by improved accessibility of course materials.

2.4 Hands-On Users of the Project

2.4.1 Students with Accessibility Needs

In some cases, students who use screen readers may provide feedback loops to improve generated alternative text. While they are customers, they may also be "hands-on" users if they test or adjust alt text themselves.

2.4.2 Teaching Staff

This group consists of TAs and instructors. As mentioned above, TAs Frequently upload, adapt, and remediate course content. They would be interacting directly with the tool to generate and refine alt text. On the other hand, some instructors (especially those who prepare their own slides, diagrams, or assignments) would use the system to add or edit alternative text.

2.5 Personas

Persona: Alice Bayes

Age: 27
Job Title: Teaching Assistant at McMaster University
Education: Bachelor's in History
Work Environment: Alice works under several teaching instructors to help deliver course content to students. She is in charge of marking assignments and has recently been tasked with auditing then remediating any inaccessible learning content.
Professional Background: Alice graduated two years ago, and as part of her undergraduate career, she has experience in working with students with

disabilities. She is trained on making content accessible and AODA compliant.

Need: With so many courses to grade student work for, Alice needs a tool that can easily and quickly generate content for her to use as alternative text while she can ensure that her boss' teaching content meets AODA compliance.
Challenges: Balancing her work and life has been difficult as there are multiple images per document, and several documents per course. She is overwhelmed with the amount of grading she has to do on top of manually writing alternative text for over 50 images.

Persona: Chetan Dakshesh

Age: 20
Job Title: Chetan is a student at McMaster University.
Education: He is currently pursuing a Bachelor's in Electrical Engineering
Work Environment: Chetan has a super busy course load with six courses and volleyball club!
Professional Background:

Need: With so many courses and volleyball practice to keep up with, Chetan is finding it hard to keep track of course content. Furthermore, through his screen reader, he has picked up that there is no alternative text generated for several diagrams in a course he is taking. These diagrams are vital to his learning experience but he has little clue on what they indicate.
Challenges: Using large language models (LLMs) such as Chat-GPT doesn't work for him as the text generated is too generic and lacks substance. Chetan needs a tool that can effectively describe the diagram to him while staying relevant to the course material.

Persona: Eyad Fahim

Age: 40
Job Title: Professor at McMaster University
Education: Doctor of Philosophy (PhD) in Engineering
Work Environment: Eyad works on a fast paced work environment, connecting with over 100 students. **Professional Background:** With over 20 years of experience both in the workforce and academic, Eyad loves to teach

the next generation of leaders about various engineering techniques.

Need: With the goal to celebrate students of experiences, Eyad is looking for help to make his teaching content accessible for all.
Challenges: Eyad needs a fast tool that can help gap the accessibility knowledge he lacks. He wants to ensure all students can learn from his materials with little to no barriers, including alternative text but he has no idea how to get started.

2.6 Priorities Assigned to Users

Primary users:

- Students with accessibility needs
- Ms. Jingchuan Sui
- Teaching Staff

Secondary users:

- Accessibility Services Office at McMaster
- McMaster IT/Media Production Services

2.7 User Participation

During the development process, the requirements will be gathered mainly from Ms. Sui. During testing phase, Group 22 will conduct usability testing to ensure AODA compliance and to further refine the product.

2.8 Maintenance Users and Service Technicians

For this project, maintenance activities may involve updating alternative text generation models, fixing bugs, or upgrading dependencies.

Expected Maintenance Users and Roles

- **McMaster IT Services / Media Production Services**
  These teams may oversee deployment, integration with institutional systems, and technical support. They require access to configuration

tools, diagnostic information, and documentation for updates or troubleshooting.

- **Accessibility Services Office Staff**
  Although initially secondary stakeholders, some staff may contribute to iterative refinement of alt-text generation accuracy or compliance updates. Their participation may prompt system adjustments or patches.
- **Development Team (Group 22) or Future Maintainership Team**
  During initial deployment and handover, the development team or a designated successor group may perform updates to improve usability, resolve technical issues, or adapt to new accessibility standards.

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

Insert your content here.

5 Relevant Facts And Assumptions

5.1 Relevant Facts

Insert your content here.

5.2 Business Rules

Insert your content here.

5.3 Assumptions

Insert your content here.

6 The Scope of the Work

6.1 The Current Situation

Insert your content here.

6.2 The Context of the Work

Insert your content here.

6.3 Work Partitioning

Insert your content here.

6.4 Specifying a Business Use Case (BUC)

Insert your content here.

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

Insert your content here.

10 Look and Feel Requirements

10.1 Appearance Requirements

Insert your content here.

10.2 Style Requirements

Insert your content here.

11 Usability and Humanity Requirements

11.1 Ease of Use Requirements

Insert your content here.

11.2 Personalization and Internationalization Requirements

Insert your content here.

11.3 Learning Requirements

Insert your content here.

11.4 Understandability and Politeness Requirements

Insert your content here.

11.5 Accessibility Requirements

Insert your content here.

12 Performance Requirements

12.1 Speed and Latency Requirements

Insert your content here.

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

Insert your content here.

12.5 Capacity Requirements

Insert your content here.

12.6 Scalability or Extensibility Requirements

Insert your content here.

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

Insert your content here.

14.2 Supportability Requirements

Insert your content here.

14.3 Adaptability Requirements

Insert your content here.

15 Security Requirements

15.1 Access Requirements

Insert your content here.

15.2 Integrity Requirements

Insert your content here.

15.3 Privacy Requirements

Insert your content here.

15.4 Audit Requirements

Insert your content here.

15.5 Immunity Requirements

Insert your content here.

16 Cultural Requirements

The following list conists of cultural requirements the system shall follow:

CR 1. *The system shall generate alternative text using neutral and inclusive language appropriate for academic environments.*
Rationale: Ensures that generated content is respectful to diverse cultural and educational backgrounds.
Fit Criterion: Generated alt text contains no culturally biased, exclusionary, or inappropriate terminology.
Priority: High

CR 2. *The system shall avoid using culturally specific references unless the visual content explicitly requires it.*
Rationale: Prevents misinterpretation and maintains accessibility for a wide audience.

Fit Criterion: Alt text focuses on visual description and context without unnecessary cultural assumptions.
Priority: Medium

CR 3. *The system shall use professional and educationally appropriate tone in all generated content.*
Rationale: Maintains usability across academic departments and contexts.
Fit Criterion: Outputs remain formal, non-colloquial, and context-relevant.
Priority: Medium

17 Compliance Requirements

17.1 Legal Requirements

CR-LR 1. *The system shall comply with AODA standards for alternative text generation.*
Rationale: Ensures the tool supports institutional accessibility requirements and legal obligations.
Fit Criterion: All generated alt text meets WCAG 2.1 Level AA criteria for accuracy, clarity, and relevance.
Priority: High

17.2 Standards Compliance Requirements

CR-SCR 1. *The system shall follow institutional privacy and data-handling guidelines for uploaded teaching materials.*
Rationale: Prevents unauthorized distribution or mishandling of academic content.
Fit Criterion: No files are stored beyond active use unless explicitly authorized; logs exclude proprietary content.
Priority: High

CR-SCR 2. *The system shall provide verifiable documentation or statements of compliance upon request.*
Rationale: Facilitates audits, approvals, and integration into university workflows.

Fit Criterion: A compliance overview document or help section is available to stakeholders.
Priority: Medium

18 Open Issues

Insert your content here.

19 Off-the-Shelf Solutions

19.1 Ready-Made Products

Insert your content here.

19.2 Reusable Components

Insert your content here.

19.3 Products That Can Be Copied

Insert your content here.

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

MNP-RMNP 1. *The system shall support a phased implementation to allow gradual adoption while minimizing disruptions.*
Rationale: Reduces organizational risk and allows controlled testing during rollout.
Fit Criterion: Each phase is deployed and validated independently before progressing to the next.
Priority: High

MNP-RMNP 2. *The organization shall operate the new system in parallel with the old product for a defined transition period.*
Rationale: Ensures continuity and confirms correct operation before full cutover.
Fit Criterion: Parallel operation lasts until all critical functions pass

acceptance testing.
Priority: High

MNP-RMNP 3. *The system shall provide procedures and tools for manual backup during transition.*
Rationale: Maintains operational stability during migration.
Fit Criterion: Backup processes are documented, tested, and accessible to staff.
Priority: Medium

MNP-RMNP 4. *The transition plan shall identify and schedule major components and release phases.*
Rationale: Guides project planning and resource allocation.
Fit Criterion: A migration timeline with milestones and dependencies is documented.
Priority: Medium

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

This section does not apply to this project as there is no current system to replace, thus, no data at all.

23 Costs

Insert your content here.

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:

1. What went well while writing this deliverable?

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

3. How many of your requirements were inspired by speaking to your client(s) or their proxies (e.g. your peers, stakeholders, potential users)?

4. Which of the courses you have taken, or are currently taking, will help your team to be successful with your capstone project.

5. 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, mechatronics 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.

6. 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?