BTM 413 / Robb Sombach

Systems Proposal Document

Elections Canada

A New Approach for an Optimized Voting Experience

Prepared By

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1. Executive Summary

Canada's governmental system is the root of what allows us to make collective decisions that have the potential to create country-wide positive and, in some cases, negative change. Voter turnout and engagement is critical for our democratic system to represent the values of our citizens most accurately. Currently, our system offers in-person and mail-in voting, which allows voting at a set of approved locations that are strategically placed to offer the best accessibility.

That being said, COVID-19 has created a unique situation where we have to consider major shifts in the responses to sickness. Feeling under the weather now commonly requires individuals to stay home and, if this occurs on election day, some Canadians may be unable to vote. Furthermore, the rise of social media's usage and reliance on news and journalistic content consumption has also increased the chance for misinformation. Voters consuming content on social media platforms may not be given the chance to make informed decisions about how and when they should vote. The current system has the opportunity to be optimized to support these situations, increasing the extent to which voters are informed and can vote.

With all of this in mind, we propose the creation of the new webapp "ElectCAN". Being the next digital advancement in Canada's array of CAN applications (beginning with ArriveCAN), ElectCAN aims to combine the campaigning and elections process for politicians, election managers and voters. ElectCAN would offer politicians an easy way to share information with their constituents, communicate electoral platforms and engage with their potential voters through a verified social media-like platform. As for voters, they would be given the ability to vote using their electronic devices, offering a new way to vote when regular channels are unavailable. Voters could also research all electoral platforms and make better informed political decisions, raising the education level of voting Canadians.

A project can only be feasible if Elections Canada is able to find the means to complete it. Technical means represent the ability of available technology and expertise, with economic feasibility being indicative of whether or not we can fund the project. Operational means represent the project's capacity to attain Election Canada's needs and goals. Finally, scheduling feasibility represents the capacity to fit the project into current schedules and workloads on an effective timeline for involved actors. Our analysis determines the project to be a solid option for electoral reform, increasing voter turnout and engagement through verified information sources and opportunities to connect with local candidates virtually.

ElectCAN's proposal outlines the needs and requirements for such a program, providing the guidelines for what will be required to complete its development. Examining the facets of the problem and actor experiences, this proposal aims to effectively outline the data required to develop an actionable approach for its completion. Our democracy should ensure that all voting citizens have every chance to engage and share their voice and, with the help of ElectCAN, we can become a beacon for voting accessibility, political education and engagement.

1.1 Roles & Responsibilities

Lead Project Coordinator - Zach Ketter

1. Ensure unified project vision and stakeholder goal alignment.
2. Audit and maintain project standards and expectations for Elections Canada.

Data Management Coordinator - Hashim Khawaja

1. Design project systems and processes.

Data Analyst - Kazi Hasin Sohail

1. Research and develop project metrics and expectations.
2. Create data-driven project forecasts.

Project Actors Analyst - Omer Syed

1. Provide user and actor insights.
2. Outline use cases, design requirements and experience expectations for clients.

Operations Management - Manu Malotra

1. Systems analysis, outlining, development, and communication to other stakeholders.

1.2 Project Sponsor

To ensure that we are in contact with the proper representatives, it will be critical to be in contact with the management of the Field Liaison Officer team and coordinate with their technological support division. It is important to work alongside both human resource and technology contacts to ensure that the solution we provide enables all facets of the Canadian election's process. It will be useful to connect with the Service Point and Poll Operations Managers to receive system feedback and optimization opportunities.

1.3 Business Needs & Problems

The electoral process is a cornerstone of a healthy and well-functioning democracy, and it can be viewed from three stakeholders' perspectives:

Candidate's perspective: They need to run for an election, promote their campaign, inform their voter-base, and get elected.

Voter's perspective: They must conduct due diligence by researching candidates and understanding their policies, and then take time off from work to cast their vote.

Perspective of Elections Canada: They must all ensure a fair elections process and counting of ballots. Additionally, they must prevent the spread of misinformation that might skew election results unfairly.

These processes consume vast amounts of time, energy, and resources, and they can be improved by integrating digital technologies into the electoral process. Designing a robust web app to support the elections process will alleviate numerous roadblocks faced by stakeholders in the election process:

Problems faced by voters: Taking time off to go and vote at a voting station, Canadians living abroad currently have to cast mail-in ballots, and it is difficult to obtain accurate information regarding political candidates amidst misinformation.

Problems faced by candidates: Reaching audience in an authentic manner, sending message without it being lost in translation by reporting agencies, and encouraging voter turnout.

Problems faced by Elections Canada and political parties: Ensuring a fair elections process by preventing the spread of misinformation, and the large amount of administrative effort and costs associated with running an election.

1.4 Business Value

Enhanced Accessibility and Voter Convenience: The app makes voting more accessible and convenient, catering to individuals with physical limitations and those in remote areas, ensuring broader participation in elections.

Empowered and Informed Electorate: The app provides voters with comprehensive information on candidates and policies, promoting transparency and enabling voters to make well-informed choices.

Increased Political Engagement: The digital and interactive nature of the app encourages more citizens to engage with the electoral process, fostering a stronger democratic culture.

Cost-Efficiency and Environmental Sustainability: By reducing the need for physical voting infrastructure and materials, the app contributes to significant cost savings and lessens the environmental impact of elections.

1.4.1 Special Issues

Cybersecurity Threats: Risk of hacking, phishing, and other cyber threats that might compromise the election's integrity.

System Scalability: Ensuring the platform can handle a vast influx of voters simultaneously without experiencing slowdowns or crashes.

Digital Inclusivity: Guaranteeing participation from all citizens, regardless of technical proficiency.

Accessibility: Developing the application to be fully accessible for individuals with disabilities, adhering to global standards and guidelines.

Contingency Planning: Readiness for unexpected challenges, including power outages, natural disasters and other potential disruptions.

1.5 Design Cost Overview

Hardware

ElectCAN's hybrid cloud infrastructure balances the benefit of security of on-site data centers and systems while leveraging AWS cloud systems for online voting system management. Balancing both ensures that the services offered by ElectCAN will be consistent and able to handle high traffic during voting periods. On-site data centers will maintain election integrity and the security of election data throughout the election process, ensuring online votes are as valid as any other type of vote. These critical operations will be kept local to ensure any sensitive data is not at risk by being on the cloud, with non-sensitive information and systems leveraging the scalability and processing power of and AWS cloud system to meet the quality and efficiency standards of Elections Canada. Based on our forecasted and drafted ElectCAN infrastructure proposal, we have a **predicted systems budget of $1,368,082 CAD.**

Labour

Based on a three-point estimate from a variety of reputable North American job sources, labor will be an expensive aspect o f this proposal. Given numerous technicians, developers and managers will be needed to meet the federal standards of design quality, our forecasts factor in additional positions for better standards. A legal ethics advisor was included to ensure that data management and systems design was considered from a legal perspective to ensure we reflect the design standards of the Canadian government. In total, **our forecasted labor budget is $1,408,144.80 CAD**.

1.6 Project Timeline Milestones

Ensuring ElectCAN's effective delivery is important and, to achieve this, setting effective milestones for employees and teams to work towards allows for this project to be digestible and easy to delegate between different divisions. We've divided our overall timeline into a series of milestones, ensuring a clear set of deliverables throughout the project's lifetime. For ElectCAN to reach completion, it will be important to complete:

1. Project Definition and Approval (Sep-Oct 2023):

- Finalize and gain consensus on project scope, goals, and key deliverables.
- Secure formal approval from all critical stakeholders.

2. System Design and Stakeholder Buy-in (Nov 2023-Dec 2023):

- Develop a comprehensive system proposal with technical specs and compliance plans.
- Conduct in-depth project analysis, including feasibility studies and risk assessment.
- Achieve stakeholder sign-off on the proposed system design.

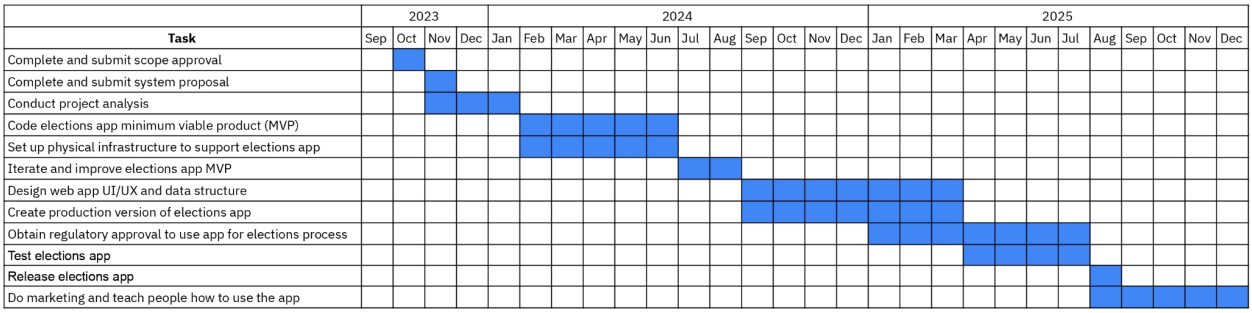
3. App Development and Infrastructure Setup (Jan 2024-Jun 2024):

- Code and develop the ElectCAN MVP with essential functionalities.
- Establish robust physical infrastructure to support the app, ensuring top-tier security and data protocols.

4. App Optimization, Testing, and Launch (Jul 2024-Sep 2025):

- Iterate the MVP based on user feedback and refine UI/UX for optimal performance.
- Conduct extensive testing phases and secure regulatory approvals for election use.
- Release the app to the public, followed by a targeted marketing and education campaign.

1.6.1 Projected Timeline - Gantt Chart



1.6.2 Key Deliverables

To ensure ElectCAN's proper completion and to align it with voting Canadian's needs, a key set of deliverables was defined as guide points for our project. To ensure we meet the needs of Canadians in our elections, we must achieve the following:

Key Deliverable	**Description**
Informed Voter Populous	● Create a platform that offers accurate information that equips Canadian voters with the knowledge to be politically informed.
Limiting Misinformation	● Create a source of electoral data and information that combats misinformation and party bias
Respectful Discussion & Debate	● Offer a collaborative space for voters to discuss different electoral topics amongst themselves as well as open the floor for easy cross-party discussions for respectful debate.
Increase Voter Turnout Through Alternatives	● Offer an alternative easy-access voting tool for voters at the same level of security as current offerings

1.7 Project Scope

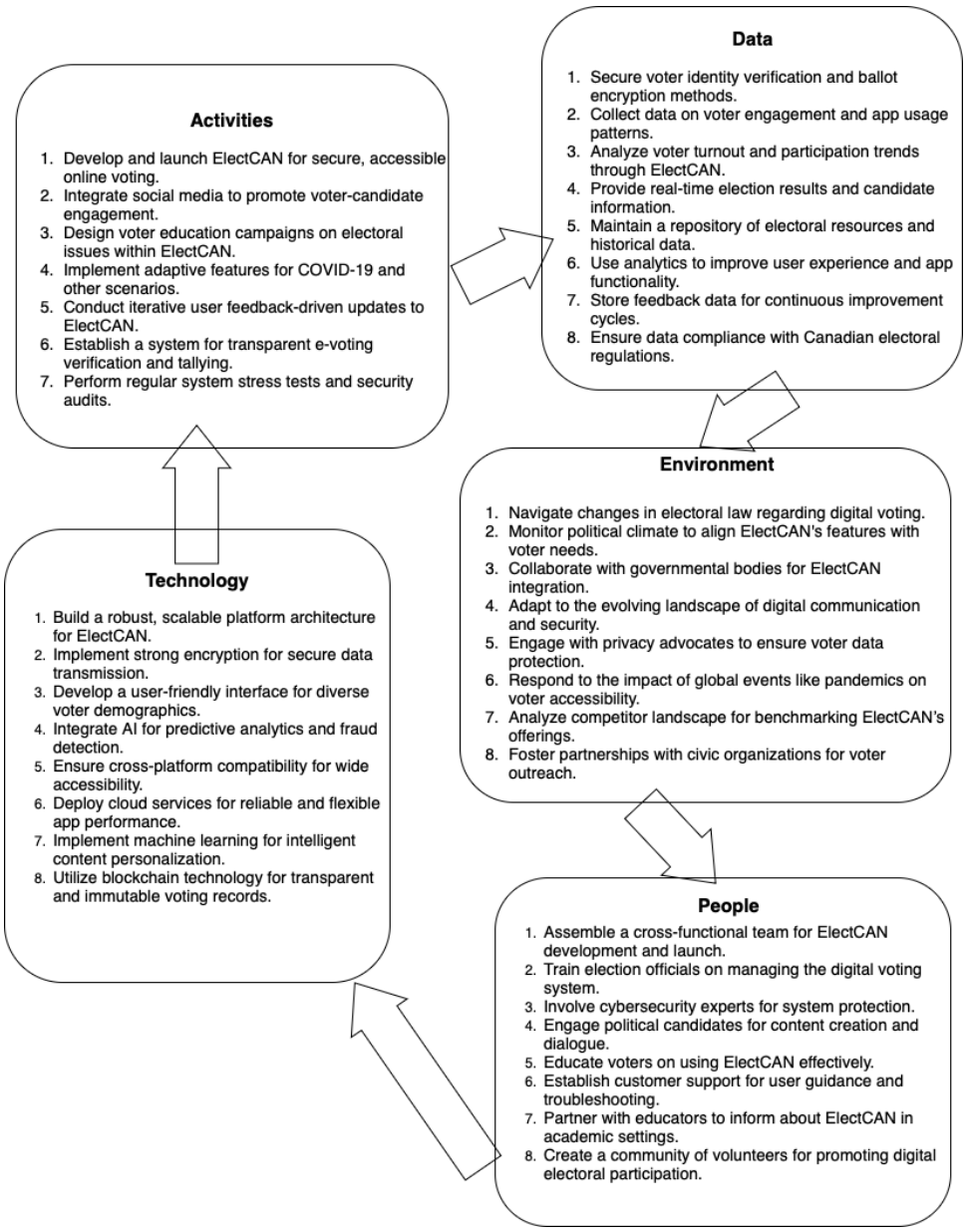
ElectCAN's focus is on the creation of a new platform that centralizes all electoral information and processes. ElectCAN's goal is to, firstly, become a verified source of information for all candidate electoral platforms and event information. Since many candidates and political parties have their own platforms, ElectCAN aims to serve as a hub for all links as well as offer easy-to-understand content to enhance political literacy in Canada. For individuals who are sick or may struggle to commute to in-person election sites or mail services, ElectCAN also aims to offer digital voting services in a secure way, offering an optional alternative to those who need it.

Our proposal does not cover the approaches required to fully augment the current electoral systems, instead offering a turn-key and readily-integratable set of systems. ElectCAN's systems will need to meet the data standards of current electoral systems, ballot verification services and other critical election processes; our proposal is unable to cover the measures required to achieve this, but has taken steps to ease this step upon project completion.

2. Background & Research

2.1 ADEPT Analysis

The ADEPT framework for the ElectCAN app breaks down the project into simple, essential parts: the tasks we need to do, the data we'll handle, the tech we'll use, the setting we're working in, and the people involved. It's a clear roadmap that shows us what's important at every step, making sure ElectCAN is easy, safe, and fits right into the way Canadians vote. This way, we make sure the app not only works well but also truly helps voters have their say in elections.



2.2 Important Organizations & Relevant Actors

Identifying the affected and relevant actors for ElectCAN ensures our project considers how each individual is affected, considering all angles for points of concern. By considering all important organizations and individuals, we can ensure our project will meet the needs of all Canadians effectively.

Relevant Actor	Reasoning
Elections Canada	Elections Canada is the conduit for all electoral systems and processes, meaning our ElectCAN project will require constant communication to stay up to date with current system expectations. Elections Canada will also be at the forefront of the resulting change, managing the core of the change from ElectCAN
Elections Canada - IT Division	With digital systems being a core part of ElectCAN's project, it is important to have an effective team maintaining and implementing services. Training, hiring and communication will be critical in ensuring the longevity of ElectCAN's services.
Political Candidate & Campaign Organizations	As a platform intending to centralize information, candidates and campaign organizations will have a new tool to leverage during their election processes and will also have to adapt to having a new means of communication with their constituencies.
Government of Canada	Project approvals and post-election processes require discussion and engagement from Canada's governmental body. Although ElectCAN may not directly cause any large changes to them, the Government of Canada will be affected by a shift in digitization of our electoral processes.
News Organizations	New organizations will have a new source for journalists through ElectCAN, as well as possible opportunities to connect with party members and candidates for further questioning and news processes. News organizations may leverage ElectCAN's information for increased efficiency and research.

Social Media Platforms	ElectCAN offers a discussion opportunity for voters, which may have previously been done on social media platforms. To promote the usage of these services, possible API integrations and discussions will occur to ensure smooth relations post-implementation.
Campaign & Marketing Organizations	Any campaign and marketing organizations will begin to communicate with voters or create content while making use of ElectCAN's services. Campaign ads may be showcased on party platform pages (avoiding change on core pages to ensure minimal content bias) as well as events and engagement opportunities being organized through ElectCAN's services.
Voters	Voters will now have a new source of reliable information and tools at their disposal to optimize their election experience. With easier access to accurate information, voters will be able to increase their political literacy without having to invest a high amount of effort verifying source biases.

2.3 Problem Analysis and Solution Identification[1]

During our project research and problem identification, we identified a series of growth areas in the current election system facilitated by Elections Canada. Below, you will find a series of possible solutions for each of these growth areas and what we aim to achieve upon ElectCAN's completion.

1. Low Voter Turnout:

> **Problem:** Historical data demonstrates continuous low voter turnout, suggesting challenges with engaging citizens in the electoral process.
>
> **Solution:** Implement digital voter engagement features including personalized reminders, interactive candidate sessions, and user-friendly interfaces in ElectCAN to foster citizen participation in the democratic process.

[1] This section's content is based on the content from the following sources:
1.https://globalnews.ca/news/8209056/canada-election-voter-turnout/
2.https://www150.statcan.gc.ca/n1/daily-quotidien/220216/dq220216d-eng.htm

2. Accessibility Issues:

Problem: Certain demographic groups, particularly those with physical disabilities or who live in remote areas, face challenges accessing traditional voting centers.

Solution: ElectCAN is designed to adhere to global accessibility standards, ensuring that the application is fully accessible to individuals with disabilities and provides multilingual support for Canada's diverse population.

3. Challenges for Candidates:

Problem: Candidates have problems authentically connecting with voters, and there is a risk of messages being distorted or misunderstood.

Solution: Provide a variety of services within ElectCAN that allow candidates to communicate their electoral platforms, engage with constituents, and overcome challenges in delivering authentic messages.

4. Misinformation on Social Media:

Problem: The rise of misinformation on social media platforms threatens voters' ability to make informed decisions.

Solution: Develop a section within ElectCAN that provides accurate and up-to-date information on political candidates and topics, with the goal of improving voter education and combating misinformation.

5. Impact of COVID-19 on In-Person Voting:

Problem: People who are sick on election day may be unable to vote in person which poses a challenge to the inclusivity of the electoral process.

Solution: Develop contingency plans within ElectCAN to address unexpected challenges such as power outages, natural disasters, or other disruptions, ensuring the electoral system's resilience.

6. Inconvenience for Canadians Abroad:

Problem: Canadians living abroad face difficulties in participating in elections due to the current mail-in ballot system.

Solution: Enable Canadians living abroad to vote remotely through the internet, creating a seamless and efficient process to replace or supplement the current mail-in ballot system.

7. Resistance to Technological Change:

Problem: Politicians may be resistant to incorporating a new app into their campaigning process.

Solution: Implement a targeted public awareness campaign to address concerns about the security of personal data and to foster trust in the new digital voting system

8. Lack of Voter Education:

Problem: Voters may not have easy access to comprehensive and precise information about political candidates and their platforms.

Solution: Develop a dedicated voter education section in ElectCAN, offering accurate and up-to-date information on political candidates and topics in order to improve overall voter awareness.

9. Concerns About Data Security:

Problem: There might be public concerns about the security of personal data and the integrity of the voting procedure in a digital platform.

Solution: Potential solution could be to implement robust security measures within ElectCAN, including secure user authentication, encryption, and transparency features to mitigate concerns and build trust among the public.

3. Analysis

3.1 Feasibility Analysis

We examined the technical, economic, operational and scheduling feasibility of the project, using a single-point system to compare equally-weighted criteria. Our analysis ensures all parties involved and affected by the project are considered equally, better quantifying the feasibility of our election reform application plan.

a. **Means Availability and Attainability:** Are the means either currently available or easily attained to facilitate the project?
b. **Scalability and Adaptability:** In the event of sudden changes, delays or unforeseen circumstances, are Election Canada's means scaleable or adaptable to respond to change?
c. **Social & Ethical Implications:**
    i. **Political:** Are the political actors socially or ethically affected? Does the project benefit government officials equally without offering electoral advantages?
    ii. **Voter:** Are all voters able to take advantage of the project's to-be-implemented tools in a way that either:
        1. Does not change the current experience for voters
        2. Positively affects a voter's experience, turnout and election process.
    iii. **Development:** Is the projected development team for the project affected negatively? Are expectations, goals and resources requested with respect to the team's expertise and capacity?
d. **Positive Cost-Benefit:** Does the forecasted project offer more benefit compared to the time, monetary and social costs of it?
e. **Build Process - Ease of Change:** During the build process, is the shift from pre-development to the build phase of the program logical and feasible based on the involved actors' capacity for change?
f. **Transition - Ease of Change:** With effective change management, can the affected actors respond to the project's implementation without experiencing long-term negative impacts and inefficiencies?

Based on these criteria, we were able to create a tangible “score” indicative of the program’s overall feasibility. Any scores 20 or above suggest that the project is most likely to succeed and offer a tangible benefit. That being said, any scores between 13 and 19 suggest that the project should be optimized, reviewed and improved prior to development.

Type	Means available or attainable	Scaleable & Adaptable	Social & Ethical Implications	Positive Cost-Benefit	Build Process - Ease of Change	Transition - Ease of Change	**Total**
Technical	1	0	1	1	0	1	**4**
Economic	1	1	1	1	1	1	**6**
Operational	1	1	0	1	1	0	**4**
Scheduling	1	1	1	1	1	1	**6**
Total	**4**	**3**	**3**	**4**	**3**	**3**	**20**

With this analysis, it is clear that, despite a failure to meet the criteria in some areas, the program is overall a great opportunity for electoral reform that affects all actors positively. The following criteria were unable to meet Elections Canada’s needs:

1. **Technical Feasibility:** Build Process, Ease of Change
    a. The current technical capacity of Elections Canada would be put under stress when shifting from current deliverables to the inclusion of a large-scale application development process, potentially causing a decrease in efficiency.
2. **Technical Feasibility:** Scalability and Adaptability
    a. Technical capacity is rooted in talent acquisition, training and physical hardware. The time required to adapt to unforeseen changes at this level would likely result in longer than desired delays and issues.

3. **Operational Feasibility:** Transition, Ease of Change
    a. Political officials will need to make considerable reform to their approaches with the implementation of this project. Some may find discomfort in incorporating an app into their campaigning process, meaning less tech-adept actors may be disadvantaged in the campaigning process.
4. **Operational Feasibility:** Social and Ethical Implications
    a. Our project, although ethically sound given its aim to improve the voter experience, may have trouble receiving the full support of all actors involved. Some actors may view the time investment as a poor usage of operational capacities, seeing it better spent on current Canadian issues.

3.1.1 Assumptions

1. **Criteria Weighting:** We weighted all criteria across all actors equally. In some situations, certain criteria may have a larger impact or more minimal effect. It may be useful to examine how different criteria may be weighted differently using an interview and research process.
2. **Acceptable Score Definition:** Elections Canada likely experiences difficulty when reforming an electoral process used by all Canadians. We defined a score of 20 or above as the approval range, but it is possible that, based on criteria weight, a different acceptable score may be more accurate.

3.2 Requirements Definition

User Authentication - *Functional*

1. The system should provide a secure and intuitive user authentication process.
2. Users should be able to register using their ID/passport details.
3. Implement face recognition technology to validate the identity of the users.

Security and Data Privacy - *Functional*

1. Use cutting-edge security technologies to safeguard user data, election results, and the integrity of the voting process.
2. Comply with appropriate privacy requirements to protect user information.

Remote Voting for Canadians Abroad - *Functional*

1. Provide Canadians living overseas to vote through the internet.
2. Create a seamless and efficient process to replace or supplement the existing mail-in ballot system.

Voter Education and Information - *Functional*

1. Provide a section on the site where users can find accurate and up-to-date information on political candidates and topics.
2. Ensure that this information is accurate and verified to prevent false information from spreading.

Convenience and Accessibility - *Non-Functional*

1. Ensure the system is user-friendly and accessible to all eligible voters.
2. Provide multilingual support alternatives to accommodate Canada's diversified population.

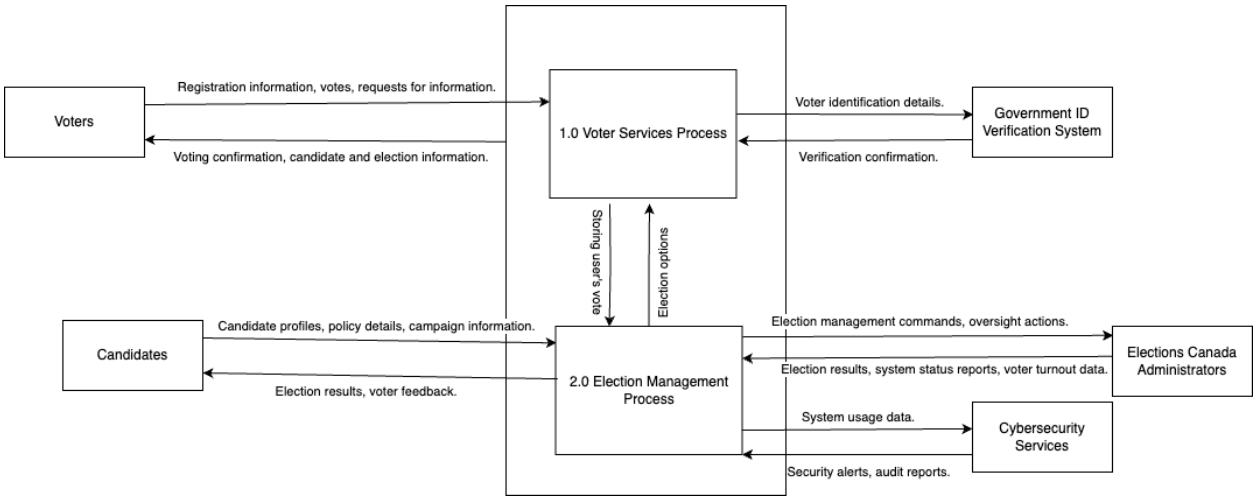
Transparency and Trust - *Non-Functional*

1. Develop a transparent and trusted voting system that ensures the creation of a clear and thorough audit record for each cast vote
2. Make sure the system can't be hacked or tampered with.

3.3 Data Flow Diagrams

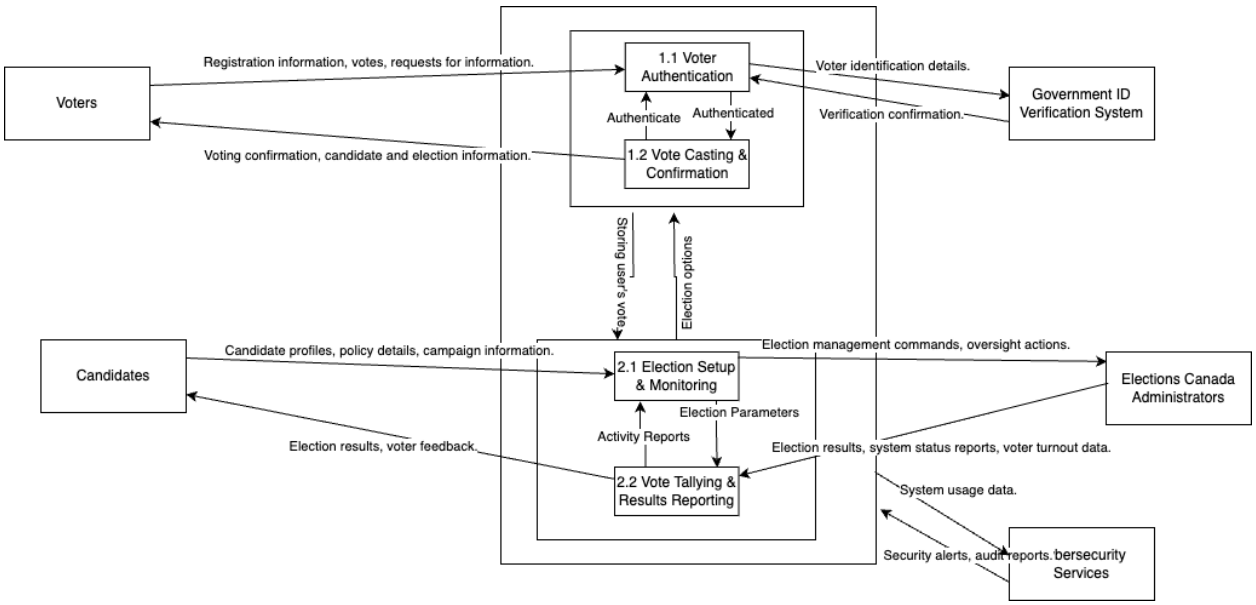
3.3.1 Elections Canada Voting System

The data flow diagram for the Elections Canada Digital Voting System outlines two core processes: Voter Services for user-facing operations and Election Management for backend electoral functions. It illustrates the system's interaction with voters, candidates, and administrative bodies, detailing the flow of information for registration, voting, and result dissemination, all while emphasizing security and integrity through external cybersecurity and ID verification services.

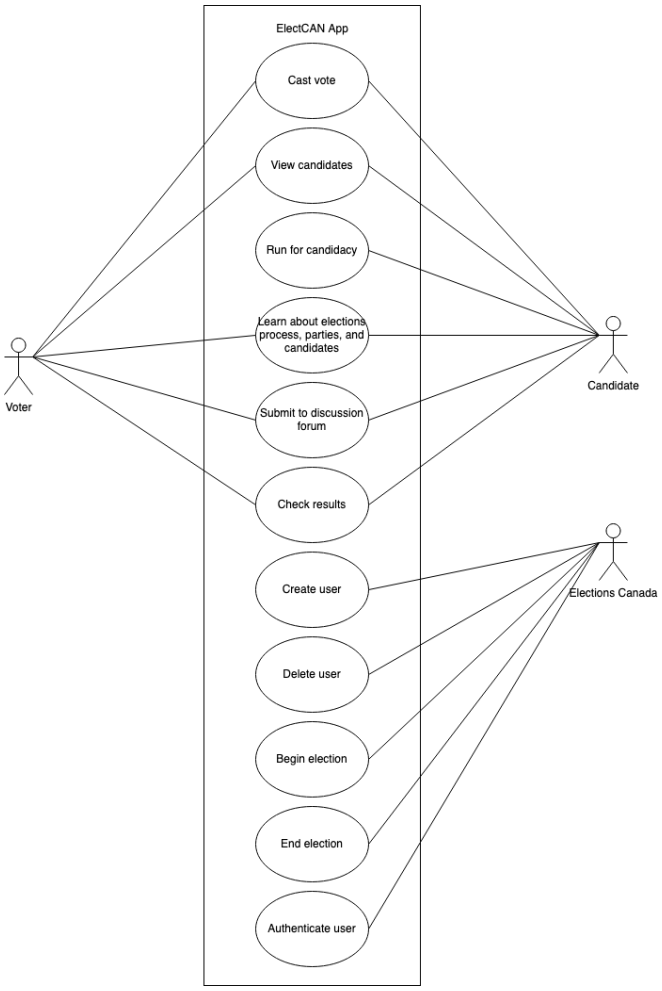


3.3.2 Decomposed Data Flow Diagram

The further decomposition of the Elections Canada Digital Voting System's data flow diagram delves into the intricacies of the electoral process. This detailed diagram expands on the two pivotal functions: Voter Services and Election Management. For Voter Services, it breaks down into Voter Authentication, where users are verified before voting, and Vote Casting & Confirmation, where votes are securely submitted and acknowledged. Election Management is similarly dissected into Election Setup & Monitoring, which configures and oversees the electoral environment, and Vote Tallying & Results Reporting, which meticulously counts votes and publishes outcomes. This diagram offers a granular view of the system's architecture, showcasing the meticulous exchange of data that ensures a seamless and secure voting experience, from the initial voter verification to the final results publication.



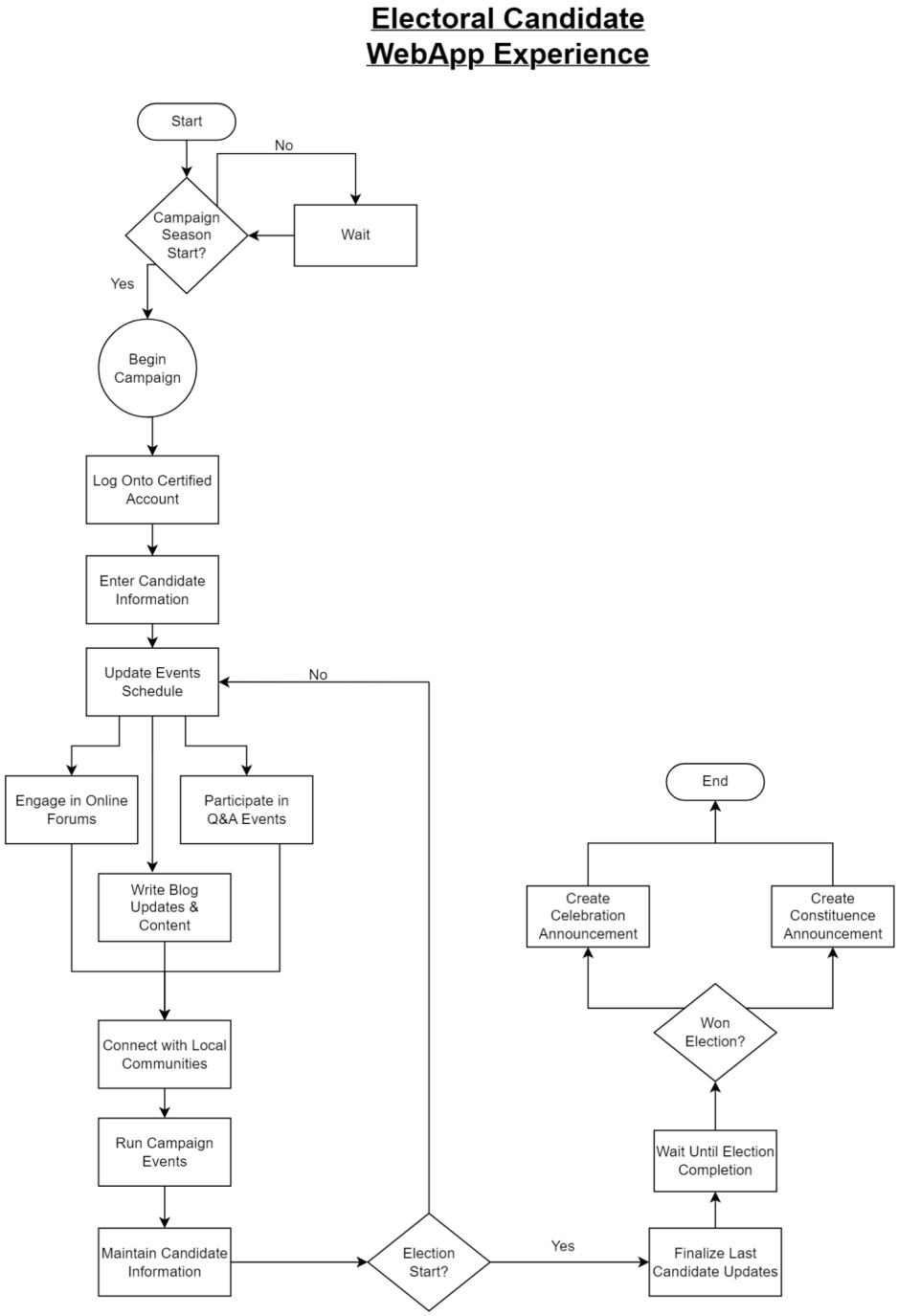
3.3.3 Use Case Diagram



The above use-case diagram shows the features that will be accessible to different users of the ElectCAN app. Since candidates can also be voters, they have many of the same privileges as voters (such as viewing other candidates, voting, submitting to discussion forums, etc.). However, candidates get some extra user privileges that voters do not, such as releasing candidate posts, putting out candidate newsletters, running for election, etc. Elections Canada, being the overseeing body of the electoral process in Canada, has administrative privileges that most users do not, such as creating, authenticating, and deleting users; registering individuals as candidates; starting and ending the election; and finally, verifying and releasing the elections results.

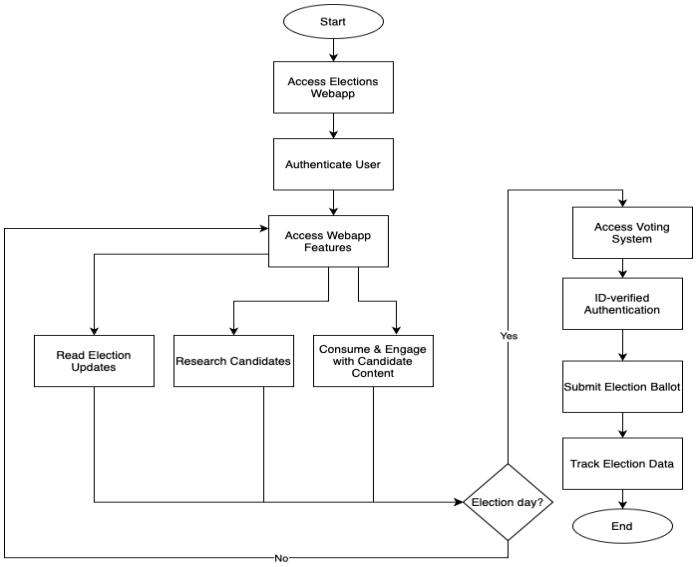
3.4 Electoral Candidate Workflow Activity Diagram

Electoral candidates have a unique approach to using ElectCAN compared to other users. To illustrate the tasks performed by electoral candidates and their support staff, the activity diagram has been created. Below is an outline of the tasks performed during the campaigning and post-election processes from the perspective of electoral candidates.



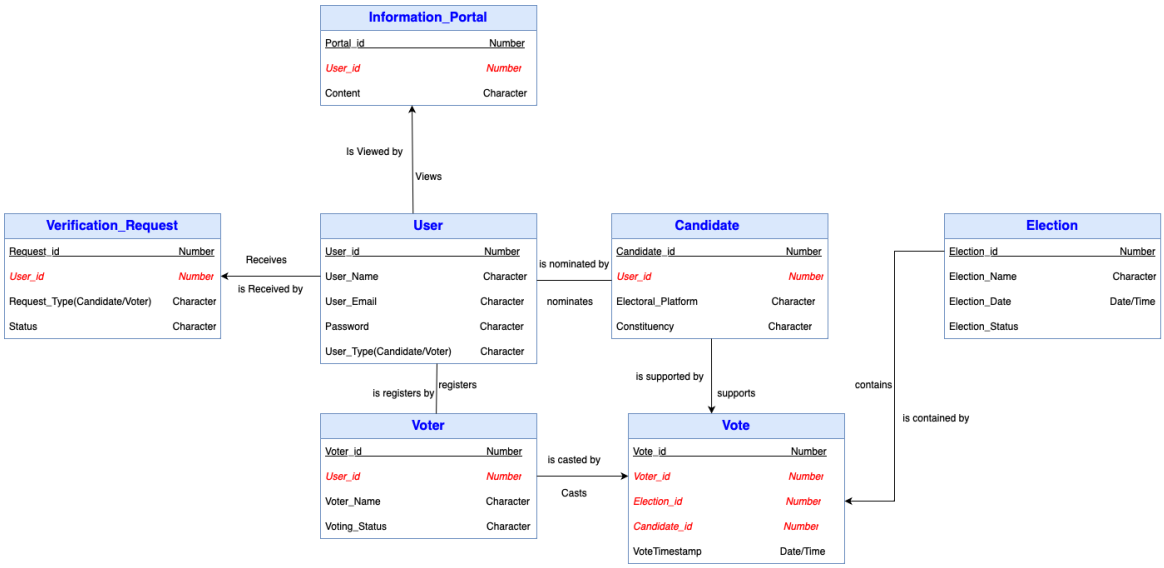
3.5 Voting Experience Activity Diagram

The flowchart outlines the user journey within a Canadian federal online voting web application. It starts with user authentication, followed by access to election information and candidate research. On election day, users undergo an additional ID verification before submitting their ballot. The application then records the vote, concluding the process. This model ensures a secure and informed online voting experience for all Canadians.



3.6 ElectCAN Data Model

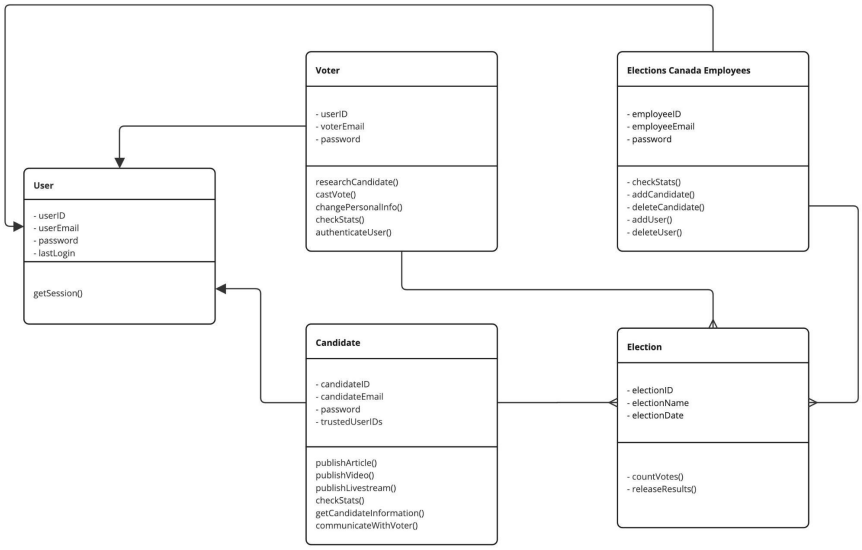
The ElectCAN application's Entity-Relationship Diagram (ERD) depicts the key entities and their relationships. The User entity acts as the center, capturing information such as user ID, username, password, email, and user type (candidate or voter). The Voter and Candidate entities are one-to-one associated with the User entity, indicating that each user is a voter or a candidate. The model encompasses key components such as elections, votes, and information portals, fostering a comprehensive understanding of the ElectCAN system. Relationships between entities, represented by foreign keys, reveal links between users, their voting activities, and electoral processes. The Verification_Request entity handles verification requests. Overall, the ERD serves as a visual roadmap, outlining the critical data structure for implementing and optimizing the ElectCAN application.



4. Project Design

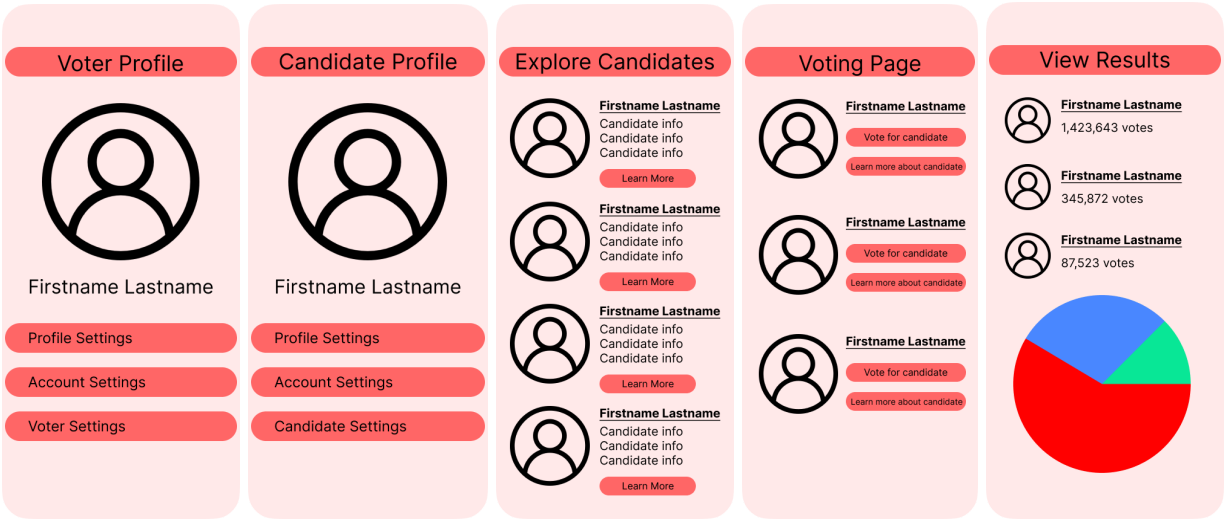
4.1 Class Diagram

The following class diagram shows the major classes, attributes, and functions that will be contained within those classes to help our web app achieve its desired functionality. Furthermore, there are associations between the classes, such as the one-to-many relationship between voters and elections, or the inheritance relationship from the “Voter”, “Candidates”, and “Elections Canada Employees” classes to the “User” class.



4.2 ElectCAN App User-Interface Design Mockups

Below are a series of mockups that display the user-interface of the ElectCAN app. The pages that are displayed are the Voter Profile, Candidate Profile, Explore Candidates, Voting, and View Results pages.

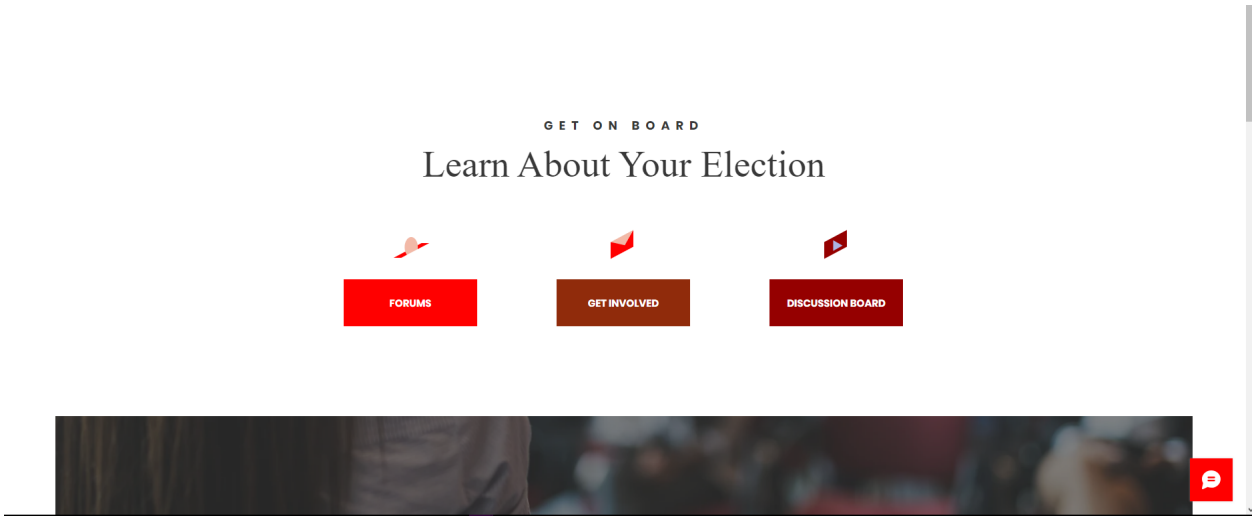


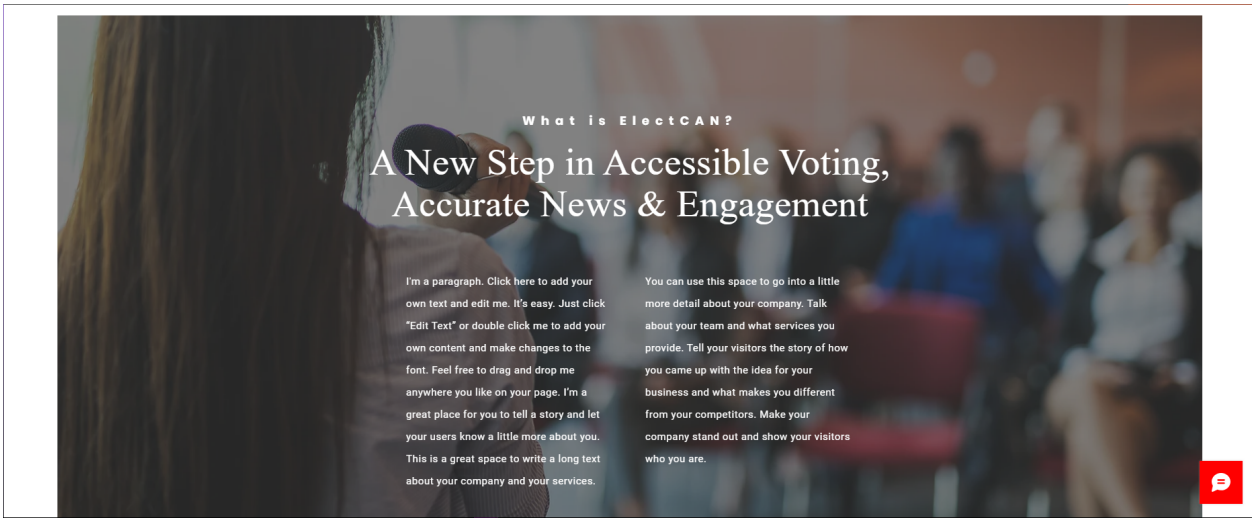
4.3 ElectCAN WebApp Prototype

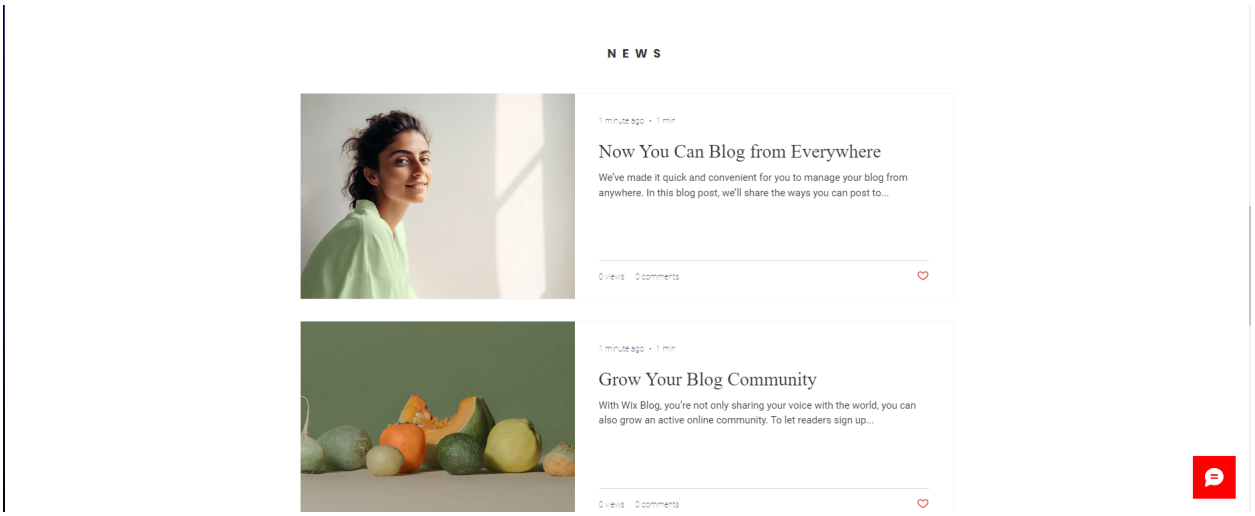
Below is a series of images showcasing a draft of ElectCAN's webapp design, including a mockup of all front-end features for voting, discussion, research and engagement.

4.3.1 Homepage

Note: The blank space on the front page ofElectCAN's webapp prototype is designated for an election countdown, offering an easy one-click vote button on election day, as well as a timeline for when to expect voting to start for Canadians accessing the site.




What is ElectCAN?
A New Step in Accessible Voting, Accurate News & Engagement
I'm a paragraph. Click here to add your own text and edit me. It's easy. Just click "Edit Text" or double click me to add your own content and make changes to the font. Feel free to drag and drop me anywhere you like on your page. I'm a great place for you to tell a story and let your users know a little more about you. This is a great space to write a long text about your company and your services.
You can use this space to go into a little more detail about your company. Talk about your team and what services you provide. Tell your visitors the story of how you came up with the idea for your business and what makes you different from your competitors. Make your company stand out and show your visitors who you are.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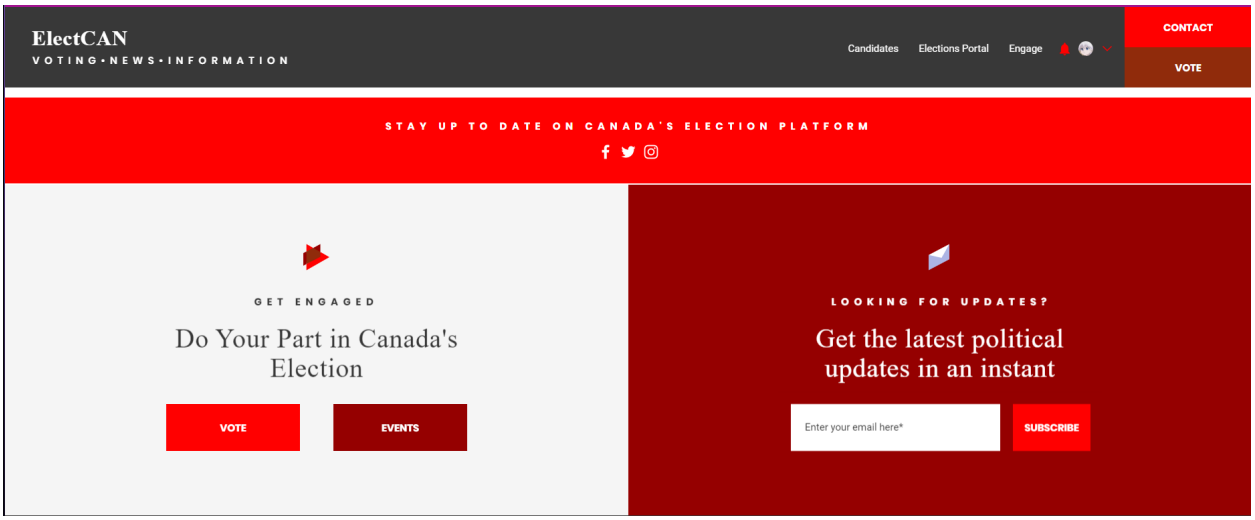
ElectCAN
VOTING • NEWS • INFORMATION
Candidates
Elections Portal
Engage
CONTACT
VOTE
STAY UP TO DATE ON CANADA'S ELECTION PLATFORM
GET ENGAGED
Do Your Part in Canada's Election
VOTE
EVENTS
LOOKING FOR UPDATES?
Get the latest political updates in an instant
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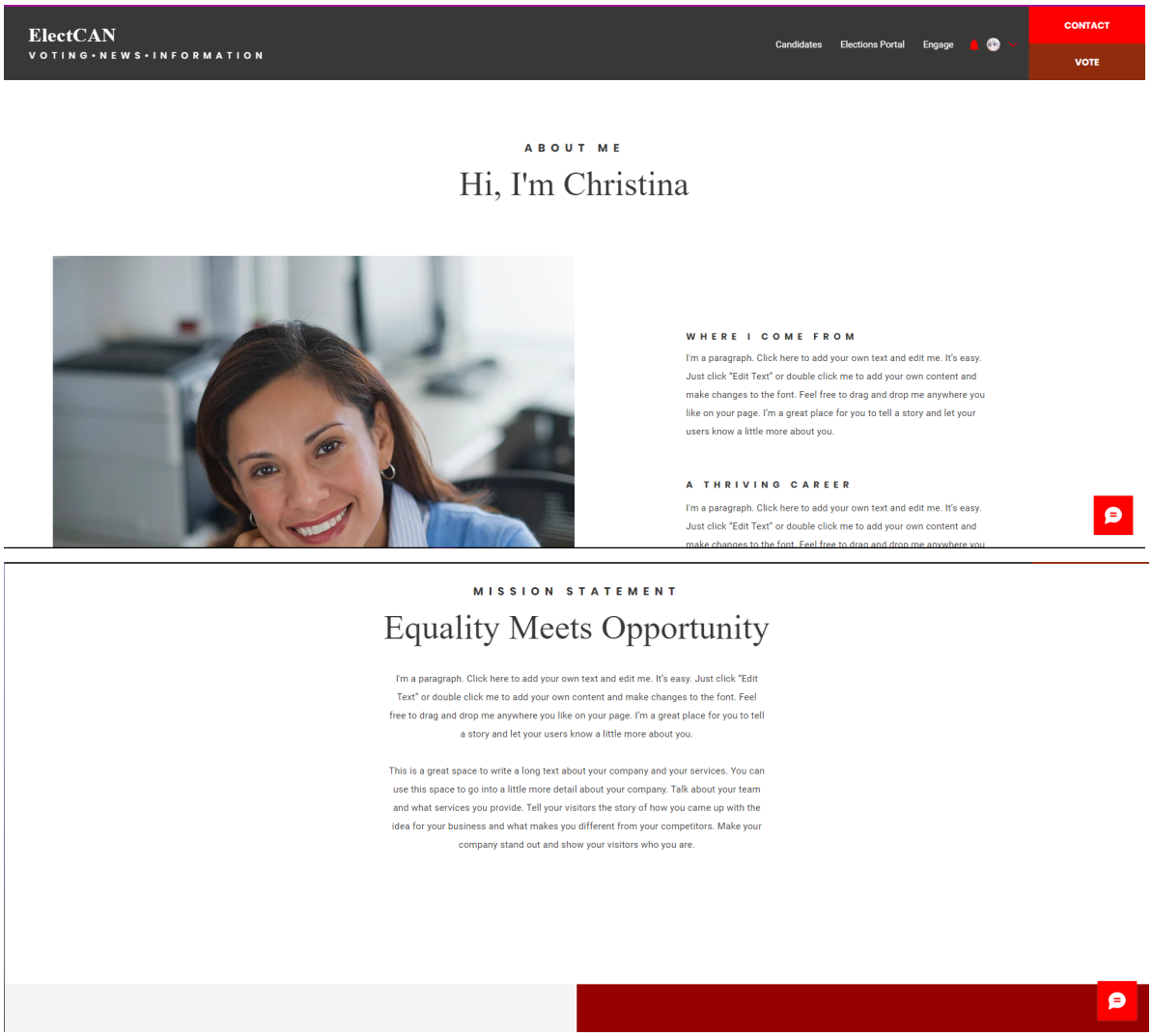
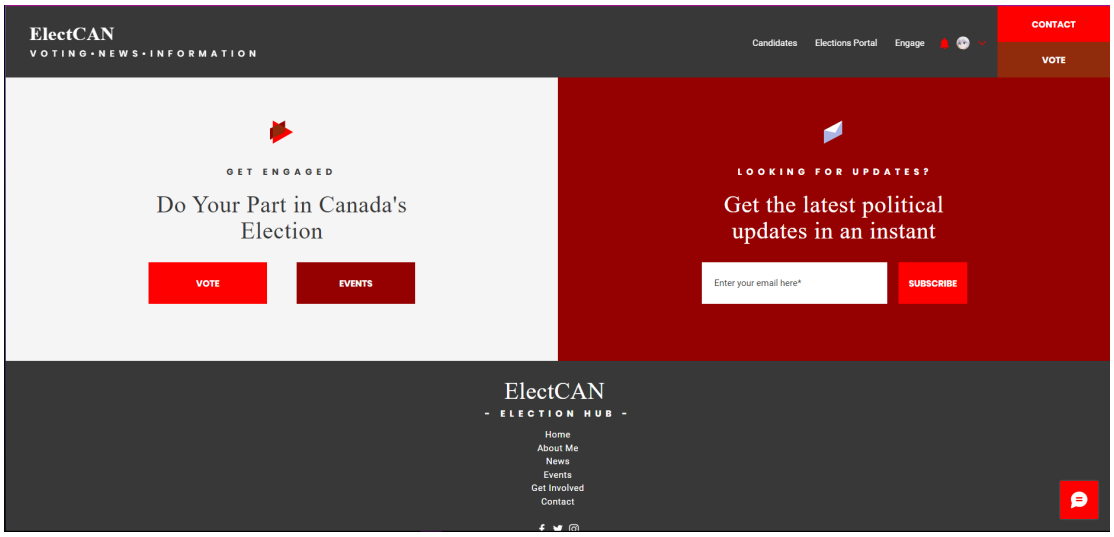
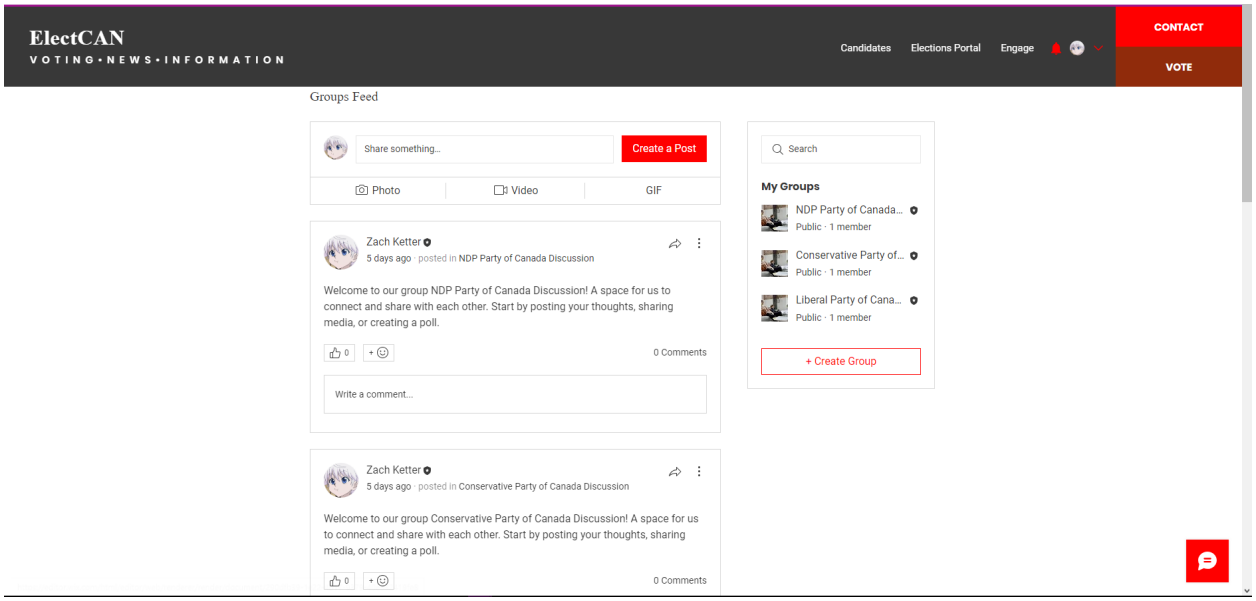
4.3.2 Candidate Page

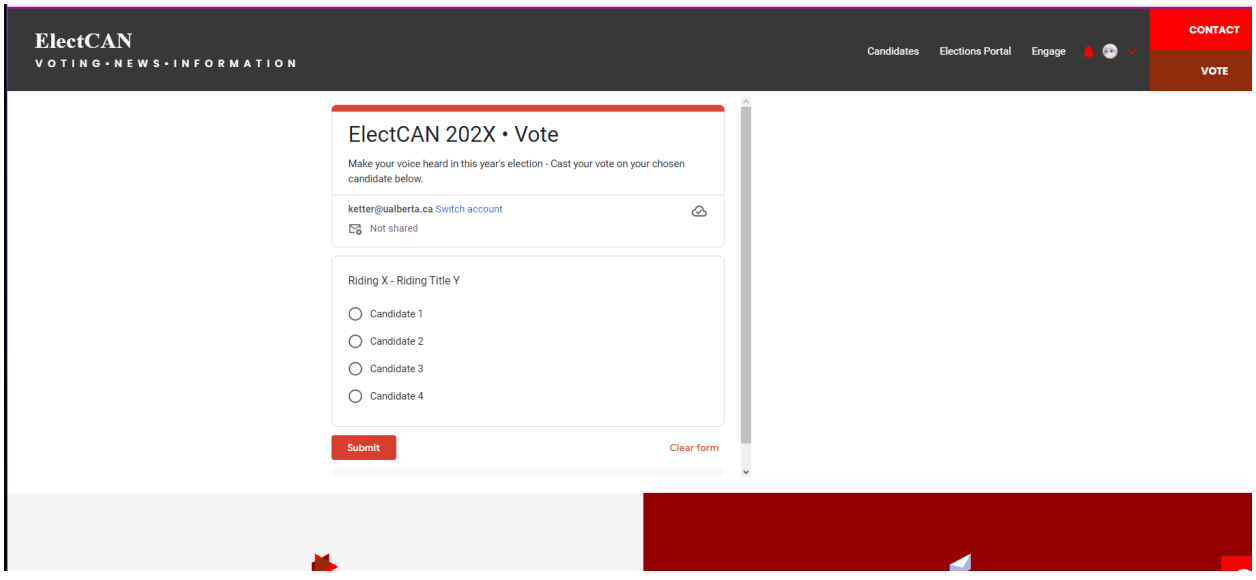




4.3.3 Community Discussions



4.3.4 Voting Portal Mockup (Post-Authentication)



To view the ElectCAN webapp mockup further, feel free to view the live website example here.

4.4 Project Roles - Hourly Wage Forecasts

Using a three-point estimate, we estimated the likely wage for each required role for ElectCAN's project. These data points offer a reference point for the expected range for each hourly wage in the project in case of any fluctuation from our estimates.

Role	**Lower**	**Likely**	**Maximum**	**3-Point Estimate**
Project Manager	$44/hr	$50.61/hr	$63.13/hr	**$52.58/hr**
Project Coordinator	$22/hr	$29.81/hr	$32/hr	**$27.94/hr**
IT Systems Director	$20.38/hr	$37/hr	$40.39/hr	**$32.59/hr**
Systems Technician	$24/hr	$35.63/hr	$55.04/hr	**$38.22/hr**
Systems Training Coordinator	$24/hr	$35.63/hr	$55.04/hr	**$38.22/hr**
Software Developer	$23.60/hr	$40.38/hr	$58.97/hr	**$40.99/hr**
Legal Ethics Advisor	$26.00/hr	$28.77/hr	$42.21/hr	**$32.33/hr**
Web Developer	$20.60/hr	$36.06/hr	$58.97/hr	**$36.06/hr**
Product Manager	$28.37/hr	$54.52/hr	$91.35/hr	**$54.52/hr**

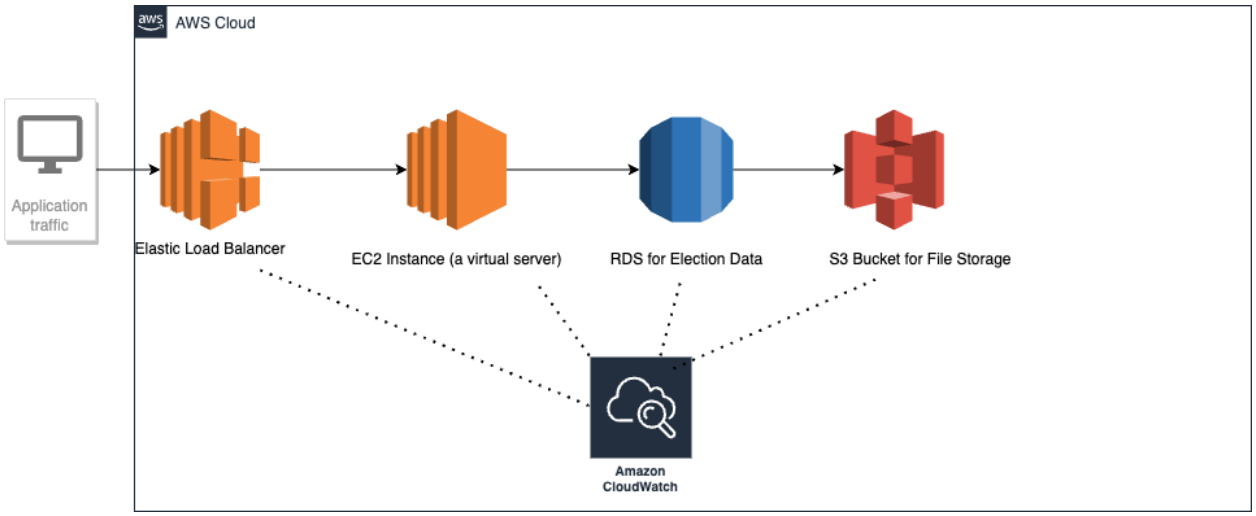
4.5 Total Salary Cost Forecasting

Based on these hourly wages, we forecasted a total salary cost for each project role based on predicted hours worked. Taking the project timeline and a predicted 8-hour work day, we estimated the following salaries for ElectCAN's project roles:

Role	**Hourly Wage**	**Time Required (Hrs)**	**Total Cost**
Project Manager	$52.58/hr	3,984	**$209,478.72**
Project Coordinator	$27.94/hr	3,984	**$111,312.96**
IT Systems Director	$32.59/hr	3,984	**$129,838.56**
Systems Technician	$38.22/hr	3,984	**$152,268.48**
Systems Training Coordinator	$38.22/hr	3,984	**$152,268.48**
Software Developer	$40.99/hr	3,984	**$163,304.16**
Legal Ethics Advisor	$32.33/hr	3,984	**$128,802.72**
Web Developer	$36.06/hr	3,984	**$143,663.04**
Product Manager	$54.52/hr	3,984	**$217,207.68**
-	-	**Total**	**$1,408,144.80**

Note: Based on a total of 498 days spent on the project as per the timeline, including 8-hour predicted work days.

4.6 AWS Cloud Architecture Diagram & Cost



The ElectCanada AWS architecture provides a robust and efficient framework for an online voting system. Here's a concise overview of the flow and function of each component:

- **Elastic Load Balancer (ELB):** Directs user traffic to multiple EC2 instances, ensuring even distribution for reliable access during peak voting periods.
- **Amazon EC2 Instances:** Host the ElectCanada application, processing both user interactions, like vote casting, and backend operations.
- **Amazon RDS Instance:** Manages all election data, including voter records and results, with a focus on security and real-time data availability.
- **Amazon S3 Storage:** Safeguards election documents and logs, providing a secure and persistent storage solution for all application data.

Users connect via the ELB, which routes their requests to EC2 for processing. Results are stored and managed in RDS, while S3 maintains a backup of all transactions, ensuring data integrity and facilitating audits. This streamlined setup is crafted to support high traffic, maintain data security, and provide a seamless voting experience.

Cost assumptions:

- **Elastic Load Balancer (ELB)**: An Application Load Balancer will be needed for high availability.
- **EC2 Instances:** Increased instance size or quantity to handle the load of 30 million users.
- **RDS Instance:** Upgraded to a larger instance size to handle the high transaction volume.
- **S3 Storage:** Increased storage and requests due to significant user activity.

Given the scale, we'll have to significantly increase our estimates for EC2 and RDS instances. We'll assume an architecture that can scale and possibly use reserved instances for cost efficiency. We'll also assume significant usage of S3 for storing logs, voting records, and backups.

ELB: Around $20 CAD/month after usage charges.

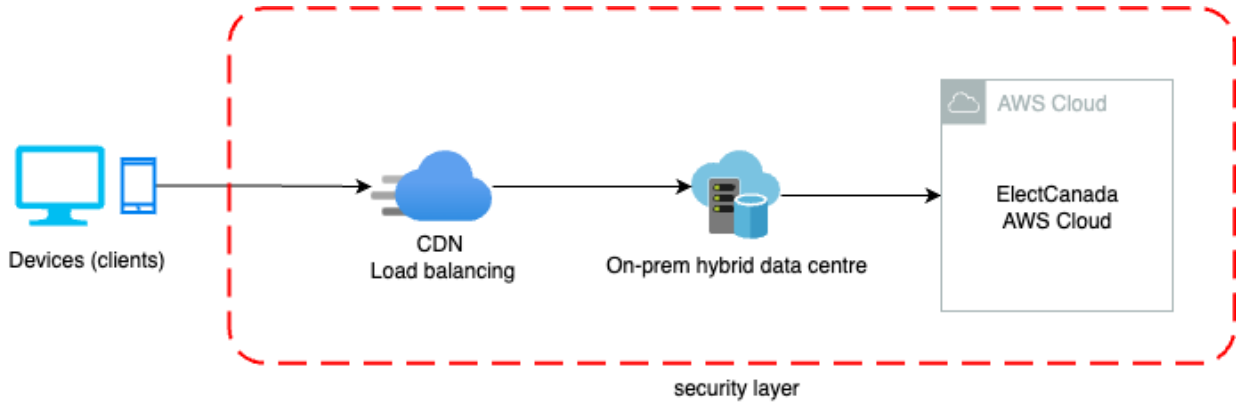
EC2 Instances: 100 instances * $0.0832/hour * 24 hours * 30 days = ~$59,904 USD/month. With reserved instances, let's estimate a 30% cost reduction, giving us $41,932.80 USD/month ($52,416 CAD/month).

RDS Instance: 1 db.r5.large Multi-AZ instance at about $0.25/hour * 24 hours * 30 days = ~$1800 USD/month. Reserved instances might give us a 20% discount, so $1440 USD/month ($1800 CAD/month).

S3 Storage: The cost for S3 can vary widely, but let's say we need 50 TB at $0.023 per GB, which is $1150 USD/month ($1437.50 CAD/month).

ELB + EC2 + RDS + S3 = $20 + $52,416 + $1800 + $1437.50 = ~$55,673.50 CAD/month.
For a 12-month period, the cost might be:
12 * $55,673.50 = ~$668,082 CAD/year.

4.6.1 Physical Architecture Diagram & Total Cost



The ElectCanada physical architecture integrates user devices with cloud and on-premise resources within a secure environment. Users access the system via phones or computers, connecting through a CDN that ensures fast content delivery. Critical operations and sensitive data are managed by on-premise data centers, complementing the AWS Cloud's scalability and robustness for application processing and data storage. The encompassing security layer, crucial for election integrity, safeguards all data exchanges, ensuring ElectCanada meets stringent security and regulatory standards. This hybrid approach delivers a resilient, responsive, and secure voting experience.

Cost Analysis:
The annual cost of maintaining this hybrid infrastructure is broken down as follows:

- **AWS Cloud Services:** Estimated at approximately $668,082 CAD, AWS provides the backbone for hosting and computing services, ensuring that ElectCanada can manage the vast amount of interactions and data processing effectively.
- **On-Premise Data Centers:** The operational expenses for the on-premise components are estimated at $300,000 CAD annually, covering hardware maintenance, utilities, and staffing.
- **CDN (Cloudflare Enterprise):** With custom enterprise pricing, the CDN services are estimated to cost $300,000 CAD annually, providing ElectCanada with enhanced performance and security features.
- **Data Transfer Costs:** Additional AWS data transfer costs are estimated at $100,000 CAD per year, accounting for the data flow between the cloud services and user devices, as well as between the cloud and on-premise data centers.

The total estimated annual cost for ElectCAN's hybrid cloud infrastructure is approximately **$1,368,082 CAD.** This investment ensures that the system is not only capable of handling the expected user load with high performance but also maintains the highest standards of security and compliance essential for national election integrity.

4.7 Timeline Breakdown:

Complete and submit scope approval (Sep-Oct 2023):

- Define project goals, objectives, and deliverables.
- Obtain approval from stakeholders on the scope.

Complete and submit system proposal (Nov 2023):

- Prepare detailed system proposal including technical requirements, system architecture, and compliance considerations.
- Submit the proposal for stakeholder review and approval.

Conduct project analysis (Nov-Dec 2023):

- Analyze requirements.
- Conduct feasibility studies.
- Identify risks and mitigation strategies.

Code elections app minimum viable product (MVP) (Jan-Apr 2024):

- Develop a basic version of the app with essential features for voting.
- Implement core functionalities like user registration, candidate listing, and vote casting.

Set up physical infrastructure to support elections app (May-Jun 2024):

- Establish the necessary servers, databases, and network infrastructure.
- Ensure security measures and data protection protocols are in place.

Iterate and improve elections app MVP (Jul-Aug 2024):

- Test the MVP with a select group of users.
- Gather feedback and make improvements to the app.

Design web app UI/UX and data structure (Sep-Oct 2024):

- Design the user interface and experience for the app.
- Optimize data structures for performance and scalability.

Create production version of elections app (Nov 2024-Feb 2025):

- Finalize the app with all intended features and security measures.
- Prepare the app for deployment.

Test elections app (Mar-Apr 2025):

- Conduct comprehensive testing including user acceptance testing, security testing, and performance testing.

Obtain regulatory approval to use app for elections process (May-Jun 2025):

- Ensure the app meets all legal requirements.
- Obtain necessary certifications and approvals from election authorities.

Release elections app (Jul 2025):

- Launch the app for public use.
- Monitor the app for any immediate issues post-launch.

Do marketing and teach people how to use the app (Aug-Sep 2025):

- Create and implement a marketing plan to promote the app.
- Educate voters on how to register and use the app through tutorials and support materials.

5. Project Review

1. Problem Identification Meeting

- Established a clear understanding of the challenges to address with ElectCAN.
- Identified the need for a digital solution to improve the accessibility and efficiency of voting in Canada.

2. Scope Identification

- Defined the project's goals and objectives, aligning with the course's learning outcomes.
- Set the stage for the project's requirements and constraints, ensuring team alignment.

3. Delegate Sections to Group Members

- Allocated project sections according to individual strengths and roles within the team.
- Conducted thorough reviews and cross-referencing of the work to maintain a cohesive project vision.
- Achieved on-time completion without any significant issues, demonstrating effective initial task management.

4. Systems Proposal Delegation Meeting

- Divided sections of the proposal among team members, ensuring comprehensive coverage.
- Encountered scheduling challenges with follow-up, leading to a text-only discussion on the due date.
- Despite the time crunch, we managed to submit the proposal on time.

5. Final Systems Proposal - First Delegation Meeting

- Started off strong with a clear delegation of tasks and areas to cover for the systems proposal.
- Identified crucial sections and undertook a detailed analysis to ensure nothing was overlooked.

6. Follow-Up Delegation Meeting

- Assigned final diagrams and sections, ensuring all elements of the project were addressed.
- This meeting was critical in closing any gaps and preparing for the final project submission.

7. Final Project Meeting

- Engaged in a productive discussion around the project review.
- Effectively finalized all delegated sections.
- Successfully completed our tasks in advance of the final deadline, showing improved time management.

Growth Areas

- Time Management of Delegated Tasks: Realized that better planning was needed to avoid close calls and make sure there was enough time for review and revision.
- Document Standards and style: Knew how important it was to have a standard document style so that everyone on the team could work together easily.
- Active Team Communication: Figured out that we need to talk to each other more often and more proactively to avoid stress and last-minute rushes.
- Design Process Iteration: It was agreed that the original design talks were not clear enough and that more iterations would help make things more clear.
- Evidence and Analysis: We understood that we needed to make stronger connections between our findings and the sources we used to back them up. This would give our work more authority and depth.

6. References & Notes

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10. https://calculator.aws/#/
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12. Some content creation was supported using generative AI to assist in the creation of the proposal document.
    OpenAI. (2023). ChatGPT [Large language model]. https://chat.openai.com
13. Course Content & Learning: BTM 311, 417, 415 & 413.
14. Note: Having leveraged personal work experience and knowledge outside of academic and digital sources, our proposal did not make use of sources in cases where anecdotal work experience was available.
    a. ie. Experience from digital presence consulting, hardware tech experience, and other personal experience sources.

Labour Sources (3-Point Analysis Data)

- Project Manager (Lower, Likely, Max)
- PC (Lower, Likely, Max)
- IT Director (Lower, Likely, Max)
    - Promotion for someone, saving costs
- Sys. Tech (Lower, Likely, Max)
- Sys. Training Coordinator
    - Same as technician, job will be filled by same person
- Software Developer (Lower, Likely, Max)
- PM vs PC
- Legal Ethics Advisor (Lower, Likely, Max)
- Web Developer (Lower, Likely, Max)
- Product Manager (Lower, Likely, Max)