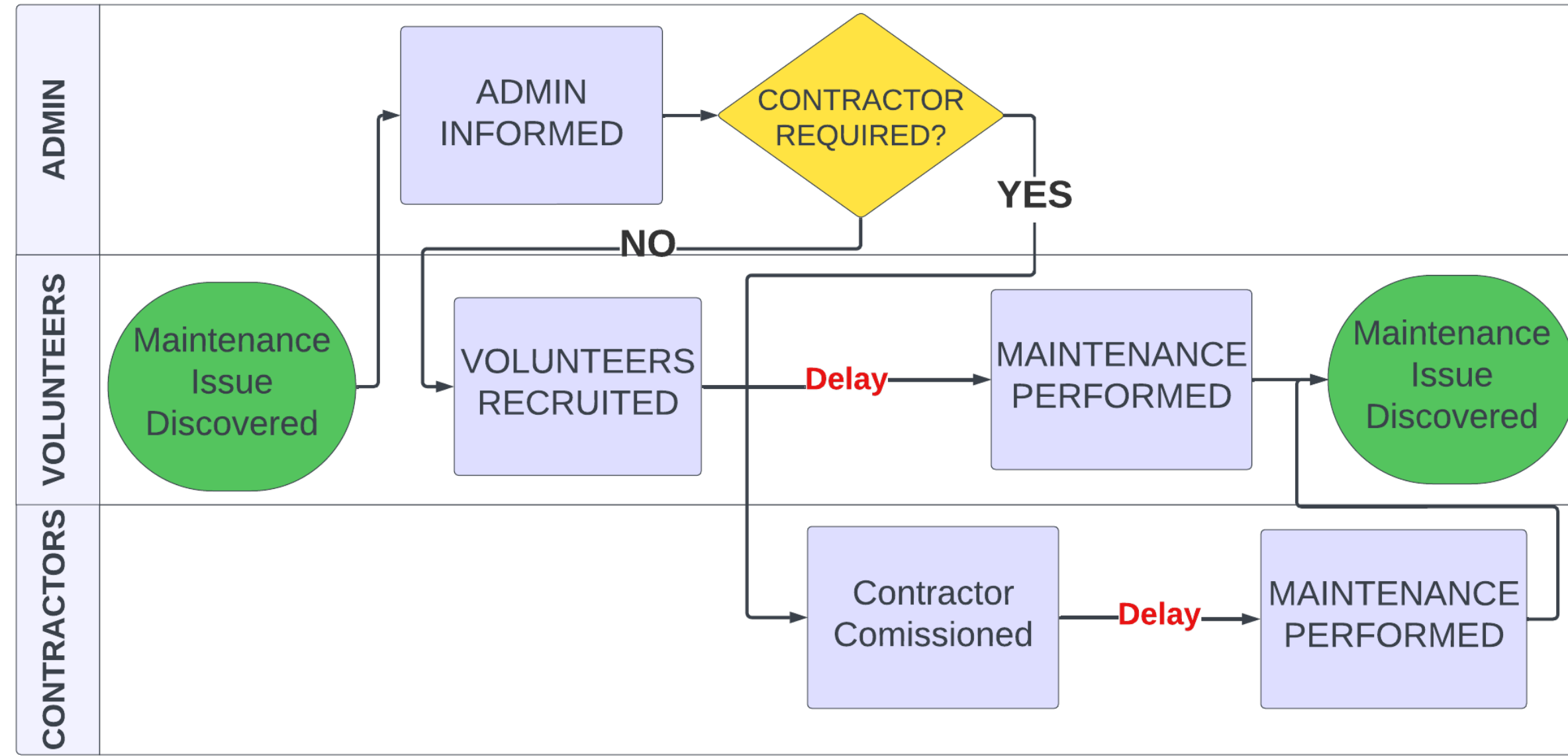




INTRODUCTION

- Rockingham United Church is a non-for-profit group, run from a historic building bordering the Bedford Basin, at 12 Flamingo Drive.
- The client is experiencing difficulties maintaining the building and premises, and they are lacking an overall maintenance plan and maintenance record keeping.
- The current maintenance strategy is reactive, meaning maintenance tasks are performed when maintenance issues are discovered by the members.
- The church community includes a group of volunteers, who are available to assist with maintenance tasks.



Process Flow: Current Reactive Maintenance

This Capstone Project will aim to shift the maintenance from reactive to preventive by:

- Improving maintenance scheduling and record keeping.
- Utilizing the church's volunteer base.
- Detailing task instructions for maintenance.

Project Objective



DESIGN PROCESS

- Problem Definition:** A preventive maintenance plan is required to improve the maintenance operations and documentation done by the client.
- Data Collection:** Site visits were conducted to collect records of historic maintenance tasks, photos of maintenance tasks, and floor plans.
- Brainstorming, Evaluation, and Solution Choosing:** Ideas for prototypes were generated and demonstrated to the client, including (A) *Excel VBA Scheduling Tool*, (B) *Volunteer Sign-Up Sheet*, and (C) *Maintenance Instructions/Bill of Materials*. An overall implementation strategy was developed.
- Prototype Development:** Prototypes for A,B and C were generated and frequently demonstrated to the client and academic advisor. Feedback for each prototype was implemented into subsequent versions.
- Solution Testing:** Solutions were tested with peers and friends, before demonstrated to the client and administrator.
- Solution Adjustments:** Improvements to functionality and user interface were implemented continuously.

#	Design Requirement
1	Back end of solution shall have appropriate user interface for administrator (A)
2	Front end of solution shall have appropriate user interface for volunteers (B)
3	Solution shall provide detailed schedule for one calendar year (A)
4	Solution shall be updateable (A),(C)
5	Solution shall provide visual cues and reminders (A)
6	Solution shall contain detailed instructions and user manuals (A),(C)

FINAL PRODUCT - TOOLS

TOOL A – Interactive Maintenance Scheduler



Task #	Maintenance Task	Frequency	Date Last Completed	Task Status	Assigned to	Due Date	Due in (Days)
1	Annual check on alarm system	Annually	2023-03-27	Pending	Contractors	2024-03-27	2.00
2	Inspect the Parking Lot Lines	Twice a year	2023-01-02	Overdue	Volunteers	2023-07-02	-267.00
3	Monthly check on fire extinguishers	Monthly	2024-03-12	Completed	Staff	2024-04-12	18.00
4	Inspection of emergency lights	Weekly	2024-03-14	Overdue	Volunteers	2024-03-21	-4.00
5	Landscaping Outdoor Cleaning Yearly task	Twice a year	2024-03-13	Cancelled	Contractors	2024-09-13	172.00
6	Lawn maintenance	Monthly (Spring, Summer, Fall)	2024-03-03	Completed	Contractors	2024-04-03	9.00
7	Paint stairs and railings	Every 2 years	2024-03-20	Completed	Volunteers	2026-03-20	725.00
8	Kitchen Clean and Inspection	Twice a year	2024-03-05	Cancelled	Volunteers	2024-09-05	164.00
9	Clean Elevator Equipment Room	Annually	2024-02-20	Completed	Volunteers	2025-02-20	332.00
10	Elevator Maintenance/Check	Every second month	2024-03-18	Completed	Contractors	2024-05-18	54.00
11	Recreation Room Floor	Every 2 years	2024-03-11	Completed	Contractors	2026-03-11	716.00
12	Furnace Maintenance	Annually	2023-12-12	Completed	Contractors	2024-12-12	262.00
13	Inspect the Parking Lot Lines	Twice a year	2023-08-08	Overdue	Volunteers	2024-02-08	-46.00
14	Landscaping/Outdoor Clean up	Twice a year	2024-03-18	Completed	Volunteers	2024-09-18	172.00
15	Mold in Bathroom	Twice a year	2024-03-12	Completed	Volunteers	2024-09-12	171.00
16	Pull Station - Fire Alarm Check	Monthly	2024-02-25	Pending	Staff	2024-03-25	0.00
17	Hire snow removal services	Annually	2024-02-05	Completed	Admin	2025-02-05	317.00
18	Storage Room Organization	Annually	2023-09-13	Completed	Volunteers	2024-09-13	172.00
19	Window Washing	Twice a year	2024-01-10	Completed	Staff	2024-07-10	107.00
20	Regular Floor Maintenance	Twice a year	2023-09-12	Overdue	Volunteers	2024-03-12	-13.00
21	Paint washrooms	Every 2 years	2022-12-13	Completed	Volunteers	2024-12-13	263.00
22	Loose pews to be secured	Annually	2023-03-30	Pending	Volunteers	2024-03-30	5.00
23	Temperature Check in Fridges/Freezers	Weekly	2023-11-08	Completed	Volunteers	2024-11-08	228.00
24	Loose pews to be secured	Annually	2023-11-08	Completed	Volunteers	2024-11-08	113.00
25	Ceiling Tiles in Lower Level	Annually	2024-02-28	Completed	Volunteers	2025-02-28	340.00
26	Ceiling Tiles in Lower Level	Annually	2024-01-15	Completed	Volunteers	2025-01-15	296.00
27	Ceiling Tiles in Lower Level	Annually	2024-03-24	Completed	Volunteers	2024-03-31	6.00
28	Ceiling Tiles in Lower Level	Annually	2024-03-19	Pending	Volunteers	2024-03-26	1.00

Summary of Tool A Features:

- Preventive maintenance schedule for one calendar year with 53 maintenance tasks (updateable).
- Secure administrator login.
- User friendly graphical user interface and tool navigation.
- Updateability: addition of tasks and contractor contact information.
- PDF Report monthly generation, automatically sent via outlook emails.
- Automated generation of maintenance records.
- Filtering and searching of records.
- Automated notifications of scheduled tasks.

TOOL B – Volunteer Sign-Up Board

Rockingham Maintenance Sign Up Sheet

MAINTENANCE TASK	INSTRUCTION GUIDE REFERENCE #	DATE POSTED	VOLUNTEER NAME
Painting the Parking Lot Lines	12	April 15th - 2024	
Landscaping and Outdoor Clean Up	7	April 16th - 2024	
Ceiling Tiles in Lower Level. Paint/Replace	20	April 18th - 2024	
Kitchen Clean Out and Inspection	24	April 18 - 2024	

Summary of Tool B Features:

- Dry erase sign up sheet, posted in lobby of Rockingham United Church.
- Updateable by administrator, based on schedule provided in Tool A.
- Corresponding maintenance task reference numbers to Tool A and C.

TOOL C – Maintenance Task Instructions and Bill of Materials

Summary of Tool C Features:

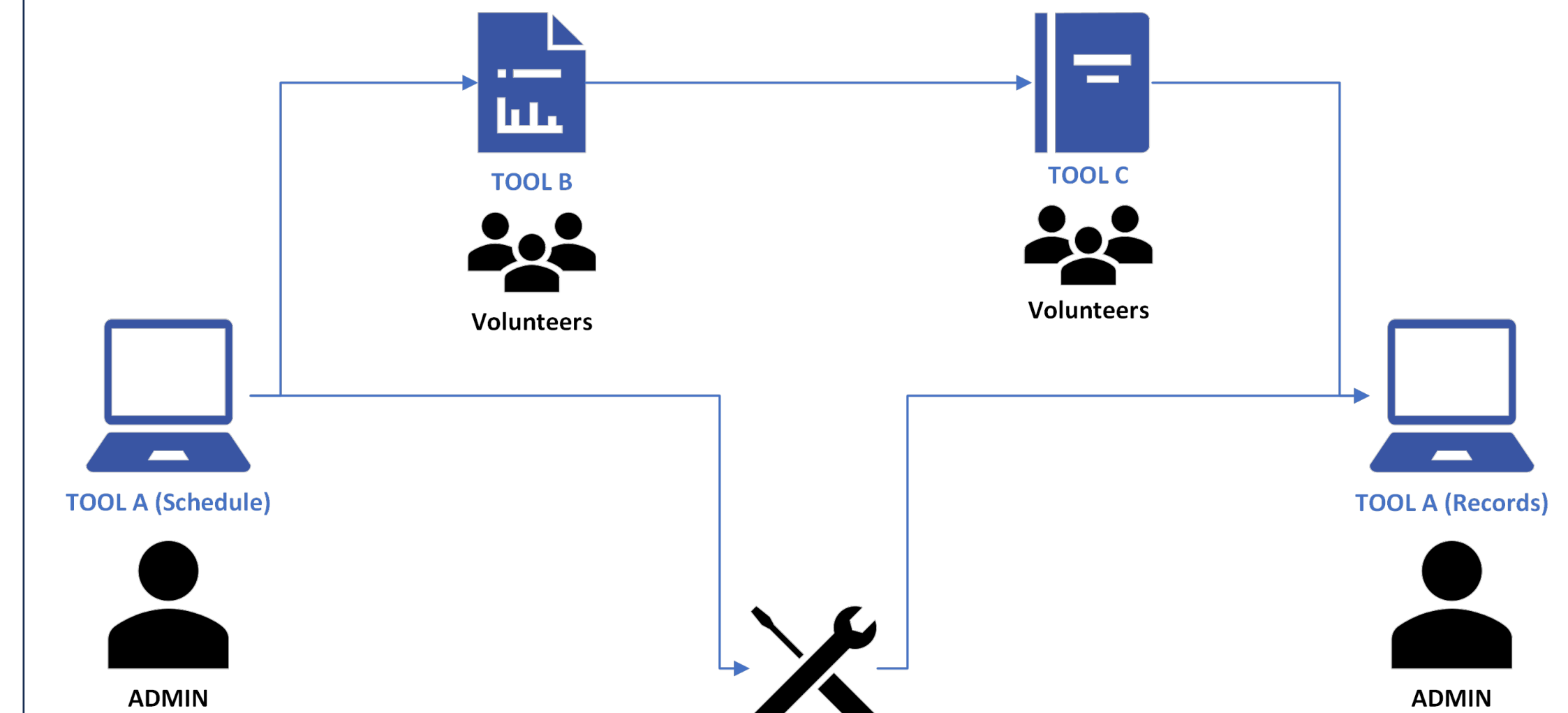
- Detailed instructions of each maintenance task.
- Bill of materials for each maintenance task with cost estimations.
- Corresponding maintenance task reference numbers to Tool A and B.
- Booklet format, hanging up next to Tool B.

MAINTENANCE TASK 5- INSPECTION AND REPLACEMENT OF LIGHTS

Step #	Step Description	Check	Check	Check	Check	Additional Notes/Comments
1	Turn off the power to the light fixture at the circuit breaker.					
2	Set up the ladder securely under the light fixture.					
3	Remove the light fixture cover using a screwdriver if necessary.					
4	Inspect the bulb. If it's darkened or broken, it needs replacement.					
5	Unscrew the old bulb by turning it counter-clockwise. Watch glasses to protect your hands.					
6	Screw in the new bulb clockwise until snug. Do not over-tighten.					
7	Replace the light fixture cover.					
8	Turn the power back on and test the new bulb.					

- MATERIALS REQUIRED:**
- LADDER
 - SCREWDRIVER
 - LIGHT BULBS
 - RUBBER GLOVES

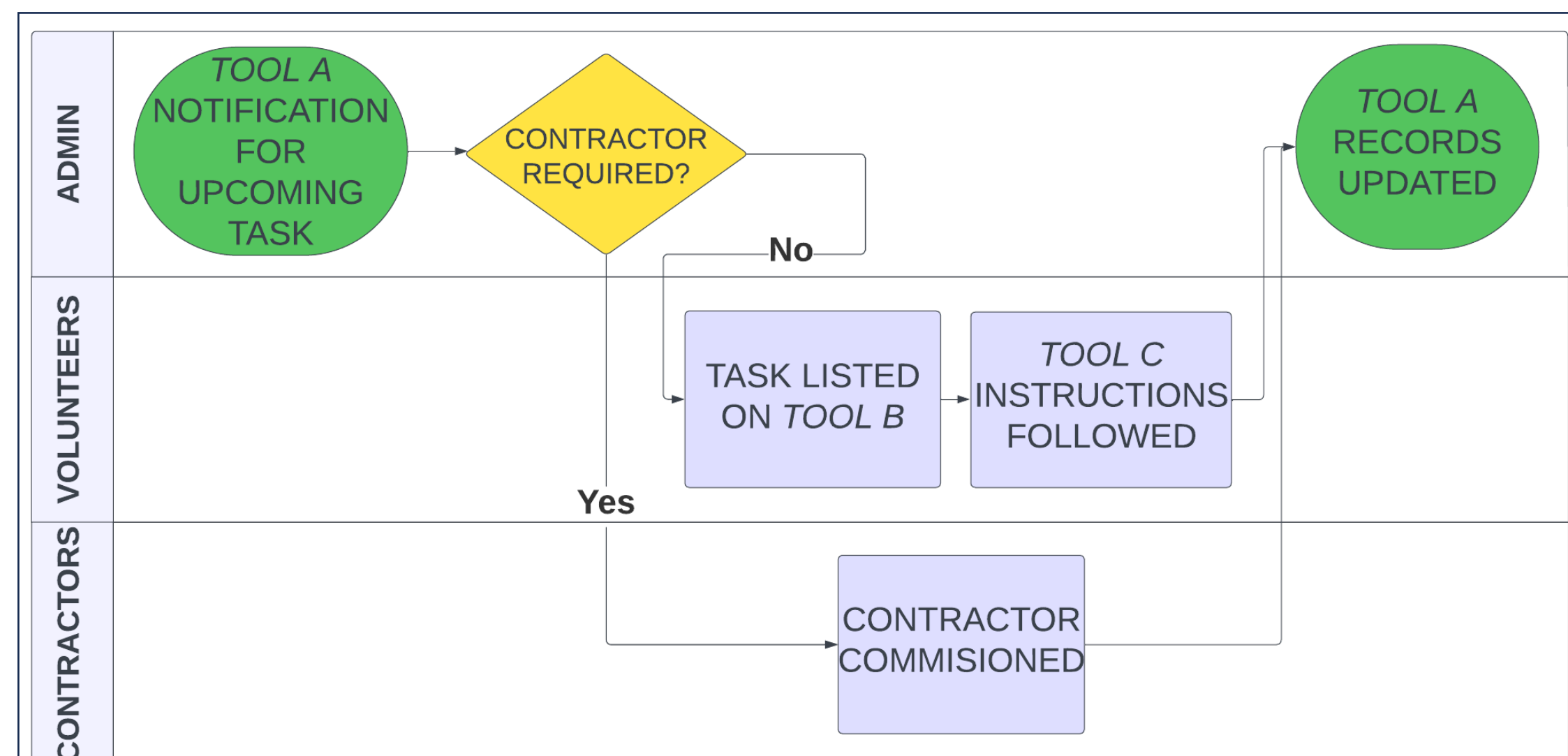
IMPLEMENTATION



Process Flow: Implementation of Tools

- The implementation strategy allows for the optimal use of each tool developed in the solution.
- This process has been generated in collaboration with the client, allowing for seamless integration.
- The process relies on the administrators understanding of the system, and the three tools. A reference guide of instructions for operating Tool A was reviewed and provided to the administrator.

IMPACT/RESULTS



Process Flow: Expected Preventive Maintenance

Improved Documentation, Records and Communication

Reduction of Major Repairs and Maintenance Costs

Increase in Volunteer and Community Engagement

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 - Project Academic Advisor: *Floris Goerlandt*
 - Academic Instructor: *Sandra MacAulay Thompson*
- References: Metcalfe, Z. (2024, February 28). *A renovation and a prayer*. Canada's National Observer, Stenström, C., Norrbin, P., Parida, A., & Kumar, U. (2015). Preventive and corrective maintenance – cost comparison and cost–benefit analysis. *Structure and Infrastructure Engineering*, 12(5), 603–617