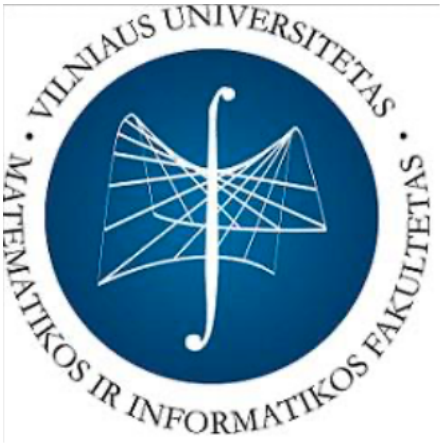

VILNIUS UNIVERSITY
FACULTY OF MATHEMATICS AND INFORMATICS
INFORMATICS STUDY PROGRAM

Project: “Building a smart greenhouse”

Subject: **IT PROJECT MANAGEMENT**

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Vilnius - 2025

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1. Purpose

Design and implement a smart greenhouse in yard.

2. Motivation

- Control and management of environmental conditions inside greenhouses.
- Reduce manual labor and enhance sustainability.

3. Goal

The project will build a smart greenhouse equipped with IoT sensors (temperature, humidity, irrigation, lighting) and automated shading/ventilation systems to ensure control of environmental conditions with the installation of solar panel for saving energies, reduce water waste, and maintain optimal temperature ranges. By leveraging technology to automate operations and minimize manual effort, it aligns with the client's goals of efficiency and sustainability, with time bound 3 months starting form first March.

4. Current Situation

The property is situated outside the city and includes a house with an adjacent 4.10 m * 7.94m yard, currently unused. The yard will be transformed into a smart greenhouse. On the left side of yard, there is a small storage area, and on the right side, there is an accessible water source. Electricity 220V, and internet are available making it feasible to install automated systems. The roof of the house is the best place for sunlight exposure throughout the day. The client has prior experience in plant cultivation, ensuring familiarity with basic gardening needs.

5. Before and After Scenarios

Before	After
Empty space with no greenhouse.	Fully functional smart greenhouse.
No plant cultivation	Year-round optimized plant growth
No automated irrigation or monitoring. No existing climate control system.	IoT-powered real-time monitoring and control. Remote monitoring via mobile app.

6. Scope of the Decision

In Scope:
- Installation of greenhouse, solar panel and IoT sensors (temperature, humidity, soil moisture, light).
- Automated irrigation and climate control systems.
- Mobile app development for remote monitoring/control.

Out of Scope:
- Landscaping outside the greenhouse area.

Boundaries:
- Limited to the client's yard area.

7. Alternatives

1. Buying a Prebuilt Smart Greenhouse with Installation:
- Purchasing a fully integrated smart greenhouse that includes pre-installed automation systems and professional installation. The greenhouse is ready to use upon setup.

2. Building from Scratch:
- All materials are purchased separately (the green house materials, Panel solar, IOT sensors) and the greenhouse is built entirely from the ground up.

3. Hybrid Approach :
- Buying a basic greenhouse structure and then installing the automation systems separately.

8. Evaluation Alternatives

Criteria \ Alternatives	Alternative 1	Alternative 2	Alternative 3
Cost	3/5	4/5	4/5
Customization	2/5	5/5	4/5
Time	5/5	2/5	4/5
Suport	4/5	2/5	4/5
Long-term value	2/5	5/5	4/5
Total	16/20	18/25	20/25

Recommended alternative is the third one which is using **hybrid approach**.

9.Output and outcome

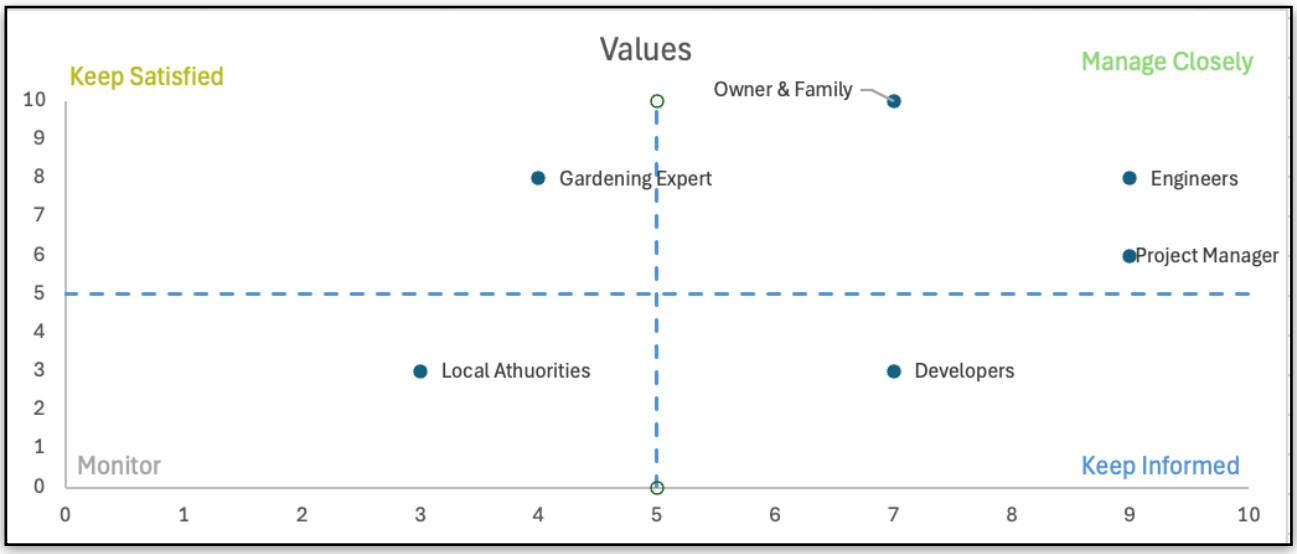
Output:
- Functional smart greenhouse with IoT systems.
- Custom mobile app for real-time monitoring.
- Training materials and maintenance guides.

Outcome:
- Reduced water/energy consumption.
- Year-round plant cultivation with minimal manual intervention.
- Enhanced client satisfaction through tech-driven convenience.

10. Stakeholders and responsibilities

Stakeholders	Role	Responsibilities
Owner and family	end users	- Define requirements and expectations. - Provide feedback during testing. - Use the final system.
Project Manager	Project Lead	-Plan and coordinate tasks/ timelines. - Manage budget and risks. - Communicate updates to stakeholders
Developers	Technical implementation	- Develop system with IOT sensors and mobile app.
Engineers	Hardware setup	- Install greenhouse structure. - Configure solar panels and electrical systems. - Integrate automation systems (shading, irrigation)
Gardening Expert	Plant Advisor	- Advise on optimal plant conditions (humidity, temperature).
Local Authorities	Regulatory Compliance	-Approve permits for greenhouse construction and solar panel installation

11. Stakeholder Map



12. Risks

Risk	Type	Probability (1-3)	Impact (1 - 3)	Effect (1-9)	Mitigation
Power Outages	Technology	2	3	6	Use of backup power sources (battery, generator).
Weather Delays	Environment	2	3	6	Schedule outdoor work.
Client Adoption Issues	People	1	2	2	Create simple user guides and host a hands-on training session post-installation.
Sensor Malfunction	Technology	2	2	4	Use redundant sensors for critical metrics (temperature, humidity). Test each 2 weeks.
Permit Delays	Environment	3	3	9	Submit applications early; assign a liaison for follow-ups.

13.Risk Matrix

	Low	Medium	High
High	0	0	1
Medium	0	1	2
Low	0	1	0

14.Trade off

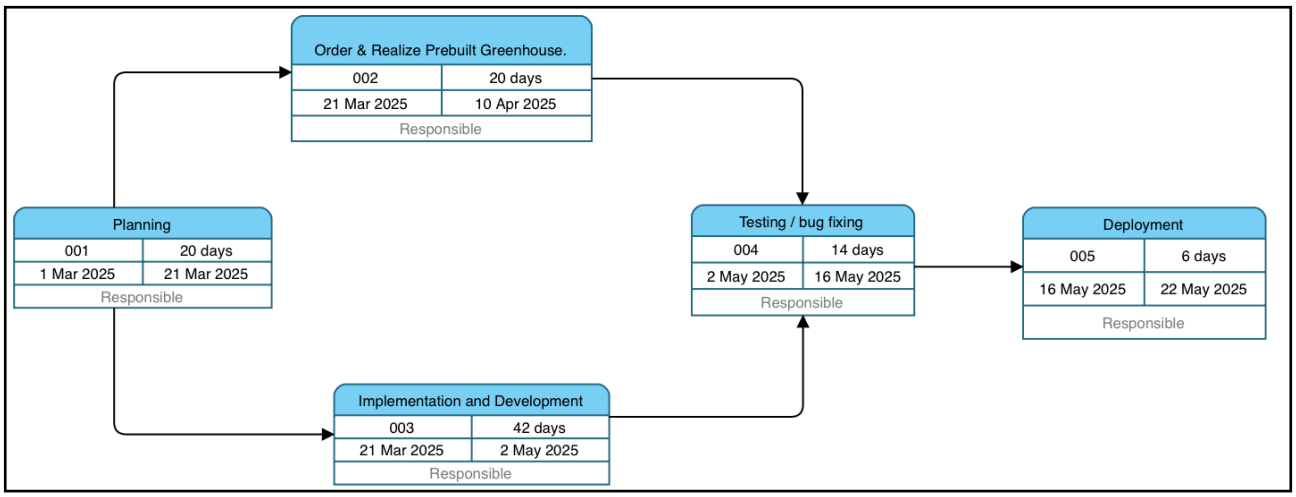
	Fixed	Flexible	Adjustable
Cost		X	
Time	X		
Scope			X

Description :

- Scope: Adding AI-driven pest control(scope increase) -> increases bugged and time.
- Time: Delays in solar panel installation —> Hire group of electrician (+500 Euro).
- Budget: Reducing budget by 500 Euro —> Use basic sensors (customization reduction).

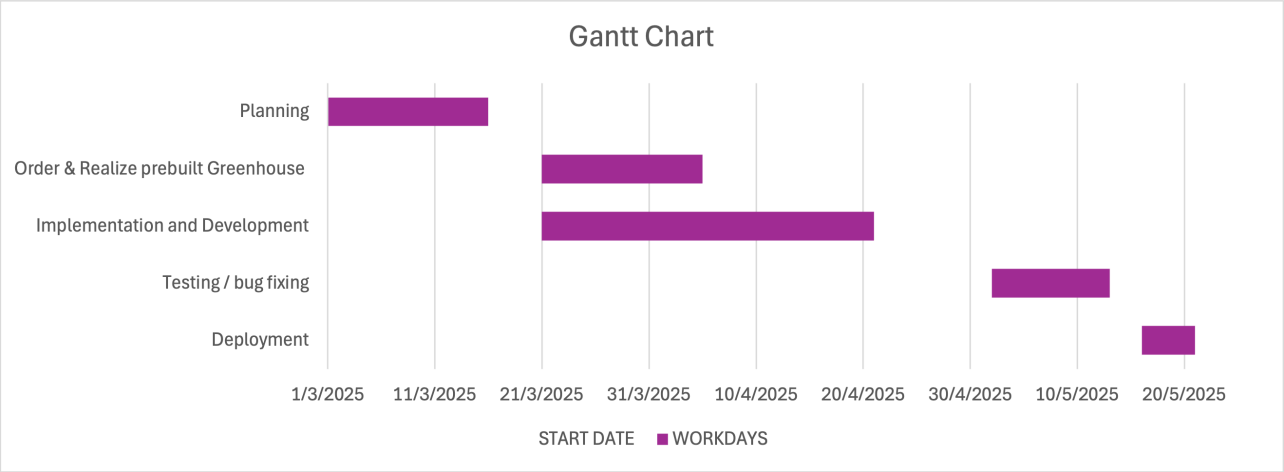
15.Scheme

- **Pert chart:**



Pert chart

- **Gantt chart:**



16.Timeline and buffers

Phase	Task	Time	Buffer
Planning	Planning and research	3 weeks	1 Week
Implementation and Development	- Order & Realize Prebuilt Greenhouse structure. - Implementation of solar panel, IOT sensors and system development	6 weeks	2 Weeks
Testing / bug fixing	System validation	2 weeks	1 Week
Deployment	Final setup	1 week	-

17.Budget

Items	Cost
Greenhouse	1500
IOT sensors and ventilation	1200
Solar panel	800
Mobile app development	1200
Labor cost	3000
Warranty (1 year)	800
Total	8500