



Medical Marijuana Cultivation and Production Tracking System

Creativity and Value Creation

Module: Changemakers

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Project Management & Design – Medical Marijuana Cultivation and Production Tracking System	2
Introduction	2
Task 1	3
Project Management & Planning.....	3
Project Scope and Propose Solution	3
Technologies and Resources	3
Project Timeline, Schedule, and Constraints	3
Development Methodology	4
Project Design	4
Requirements Specification	4
Design Artefacts	4
Task 2	5
PEST & SWOT Analysis for a Tech Company: “GreenTrack Solutions”	5
Company Overview	5
PEST Analysis	5
Political	5
Economic	5
Social.....	6
Technological	6
SWOT Analysis	6
Strengths	6
Weaknesses	6
Opportunities.....	6
Threats.....	7
Startup Details, Strategy, and Funding	7
Task 3	8
Reflection on Project Idea	8
Developing a Blockchain-Based Medical Cannabis Tracking System	8
Developing New Skills	8
Societal Impact and Contribution	9
Risks, Challenges, and Mitigation Strategies	9
Conclusion	10

References.....	10
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Introduction

This project focuses on developing a robust cultivation and production tracking system for the agricultural sector. By employing rigorous research strategies, including a blend of quantitative and qualitative methods. The project aims to enhance the validity, reliability, generalisability, and ethical integrity of its findings. The outcomes will support better record-keeping, technology adoption, and informed decision-making within farming operations.

Task 1

Project Management & Planning

Project Scope and Propose Solution

This project aims to design and implement a comprehensive “seed-to-packaging” tracking system for medical marijuana cultivation and production. The project’s main objective is to enable precise tracking of every plant and product batch from its origin as a seed, through cultivation and processing, until it is packaged for distribution.

This is crucial in an industry with strict regulatory oversight, where compliance, quality control, and transparency are essential. The tracking system will offer real-time updates, automated alerts for anomalies, and detailed reporting to meet both operational and legal requirements.

The solution involves creating a secure software platform that integrates barcode and RFID technologies with a robust database and an intuitive web interface. Cultivation and production staff will be able to scan plants and products at each stage, with all data securely logged and accessible for audit and compliance checks.

Technologies and Resources

The development will utilise:

- **Backend Database:** PostgreSQL for reliable data storage.
- **Frontend:** React.js for a user-friendly web interface.
- **Middleware/API:** Node.js for efficient communication between frontend and backend.
- **Hardware:** Barcode and RFID scanners for physical stock tracking.
- **Cloud Hosting:** AWS for scalable, secure deployment.
- **Personnel:** Developers, a project manager, QA testers, and compliance consultants.

- **Testing Site:** Access to a cultivation facility for real-world testing.

Project Timeline, Schedule, and Constraints

The project is structured around the five phases of the Project Management Life Cycle:

1. **Initiating (2 weeks):** Define project scope, objectives, and key stakeholders.
2. **Planning (4 weeks):** Develop detailed requirements, technical specifications, risk management, and allocate resources.
3. **Executing (12 weeks):** Build the database, develop the web application, and integrate scanning hardware.
4. **Monitoring and Controlling (6 weeks, overlapping with execution):** Conduct iterative testing, collect feedback, and adjust features as needed.
5. **Closing (2 weeks):** Finalise deliverables, hand over to operations, and review project outcomes.

A Gantt chart, created using Microsoft Project, visually outlines these phases, tasks, dependencies, and milestones. Tasks such as database schema design, UI prototyping, and integration testing are mapped with clear start and end dates. Overlapping development and testing phases ensure continual quality assurance and rapid problem resolution.

Key project constraints include regulatory compliance (state/federal laws), data privacy (HIPAA), a fixed budget, and tight timelines dictated by cultivation and production cycles.

Development Methodology

Given the dynamic regulatory environment, the Agile methodology is most suitable for this project. Agile enables iterative development, regular feedback, and quick adaptation to changing requirements. The team will operate in two-week sprints, holding regular stand-ups and sprint reviews to ensure alignment and continuous improvement.

Project Design

Requirements Specification

A requirements specification was developed to clarify both functional and non-functional needs:

- **Functional Requirements:** Unique ID assignment to each plant, lifecycle tracking, batch audit logs, real-time anomaly alerts, customisable reporting, and role-based user access.
- **Non-Functional Requirements:** Data security, system scalability, high uptime, and an intuitive user interface.

Design Artefacts

Mindmap:



Flow Chart: A flow chart illustrates the plant's journey from seed

Registration → Planting → Growth Stages → Harvesting → Processing → Packaging → Distribution. This ensures all system interactions, data capture points, and compliance checks are accounted for in the workflow.

Through structured project management and leveraging defined phases, Agile methodology, and clear planning documents. This project is positioned to deliver a robust and compliant stock tracking system for medical marijuana production. Design artefacts like mindmaps and flow charts ensure the solution meets both user needs and regulatory demands, supporting transparency and operational efficiency from seed to packaging.

Task 2

PEST & SWOT Analysis for a Tech Company: "GreenTrack Solutions"

Company Overview

GreenTrack Solutions is a hypothetical start-up specialising in compliance-driven tracking systems for the legal cannabis industry, offering "seed-to-sale" software platforms similar to the Medical Marijuana Cultivation and Production Tracking System described above.

PEST Analysis

Political

Regulatory Environment: Cannabis regulations vary widely by jurisdiction. Compliance with both state and federal laws (e.g., HIPAA, FDA, DEA) is critical.

Policy Shifts: The potential federal rescheduling of cannabis (e.g., to Schedule III) would trigger new compliance and cybersecurity requirements.

Economic

Market Growth: The legal cannabis industry is projected to grow rapidly, driven by ongoing legalisation in new regions.

Funding Access: Access to traditional banking and funding can be limited; start-ups may rely on private investors or venture capital.

Social

Public Perception

Growing social acceptance of medical and recreational cannabis enhances market legitimacy.

Workforce Needs

Specialised knowledge in compliance, agriculture, and technology is required.

Technological

Integration Challenges:

Seamless integration with hardware (RFID/barcode scanners) and cloud platforms (AWS).

Cybersecurity:

The need for robust encryption and secure data handling to protect sensitive patient and product data.

SWOT Analysis

Strengths

Niche Compliance Expertise: Deep focus on medical cannabis compliance and traceability.

Agile Development: Ability to quickly adapt to changing regulations via iterative Agile practices.

Weaknesses

Resource Constraints:

As a start-up, limited resources may hinder rapid scaling and feature development.

Market Entry Barriers: Gaining client trust in a highly regulated sector.

Opportunities

Expansion Potential:

As legalisation spreads, opportunities exist to expand into new markets.

Partnerships:

Strategic alliances with cultivators, distributors, and compliance consultants.

Threats

Legal Risks

Uncertainty in federal legalisation and potential regulatory reversals.

Competition: Established players (e.g., BioTrackTHC) already have market share.

Legal & Ethical Considerations

Data Privacy: Ensuring compliance with HIPAA and other privacy laws.

Patient Confidentiality

Strong ethical responsibility to protect sensitive medical data.

Transparency

Maintaining transparency in data usage and reporting to build trust.

Startup Details, Strategy, and Funding

Startup Name:

GreenTrack Solutions



Business Type and Legal Classification:

Private Limited Company Ltd. Registered in a jurisdiction with legal medical cannabis operations.

Business Strategy:

Specialise in compliance software for the medical cannabis sector, emphasising regulatory adaptation and security.

Agile Development:

Employ an agile methodology to rapidly respond to evolving client and regulatory needs.

Integrated Solutions:

Offer a full-stack platform integrating physical tracking (RFID/barcode) with cloud-based data analytics and real-time reporting.

Compliance Consulting:

Position as both a software provider and a partner in regulatory compliance.

Funding Initiatives:

Approach angel investors and specialised cannabis venture capitalists.

Government Grants:

Apply for innovation grants targeting healthcare or agricultural technology.

Strategic Partnerships:

Collaborate with established cultivators and hardware manufacturers to co-develop and pilot solutions, possibly in exchange for equity or revenue sharing.

Revenue Model:

Subscription-based SaaS (Software as a Service) with tiered packages for different facility sizes; consulting services offered as an add-on.

Task 3

Reflection on Project Idea

Developing a Blockchain-Based Medical Cannabis Tracking System

As I contemplate the next steps in my academic and professional development, I am inspired to take forward a project focused on building a blockchain-based, seed-to-sale tracking system for medical cannabis cultivation and distribution. This project draws from the comprehensive approaches outlined in the sample texts, particularly the emphasis on regulatory compliance, technological integration, and operational transparency (CannaSecure Tech, 2026). My intention is to leverage this opportunity to develop new technical, managerial, and ethical skills that will not only advance my career but also deliver tangible societal benefits.

Developing New Skills

This project provides a fertile ground for acquiring and refining a diverse set of skills. First, I aim to deepen my technical proficiency by working hands-on with cutting-edge technologies such as blockchain, cloud computing (AWS), and IoT devices (RFID/barcode scanners), as described in the GreenTrack Solutions model. Blockchain offers immutable audit trails, which are particularly valuable for regulatory oversight and data integrity (hChain 4.0). By architecting a secure, scalable backend using PostgreSQL and Node.js, and designing an intuitive React.js frontend, I will strengthen my full-stack development abilities.

Moreover, adopting Agile project management methodologies, as recommended in the sample texts, will enhance my skills in iterative development, sprint planning, and stakeholder communication (Agile and Adaptive Project Management, n.d.). I also anticipate growing my understanding of legal and ethical frameworks governing health data, such as HIPAA and other privacy regulations, by collaborating with compliance experts and integrating privacy-by-design principles into the system.

Societal Impact and Contribution

The positive societal impact of this project is multifaceted. Firstly, by ensuring rigorous, end-to-end traceability of medical cannabis products, the tracking system will support public health goals and enabling regulators and providers to ensure product quality, safety, and authenticity. Patients and healthcare practitioners will benefit from increased confidence in the supply chain, knowing that every product is traceable from seed to sale.

Additionally, the system's transparency and automated compliance reporting could lower operational costs for cultivators and distributors, making medical cannabis more accessible to patients in need. Supporting legal compliance also helps de-stigmatise the industry and promote its legitimacy, which in turn may encourage responsible consumption and broader acceptance of medical cannabis therapies.

On a broader scale, the skills I gain specialty in cybersecurity, regulatory technology, and ethical data management, will be transferable to other domains facing similar compliance and transparency challenges, such as pharmaceuticals and agri-tech.

Risks, Challenges, and Mitigation Strategies

Despite its promise, the project faces several significant risks and challenges:

Regulatory Uncertainty: The legal framework for cannabis is in flux, with possible federal rescheduling and shifting requirements. To mitigate this, I will build flexibility into the system architecture, enabling rapid adaptation to new compliance rules. Regular consultation with legal experts and ongoing monitoring of policy changes will be essential.

Data Privacy and Security

Handling sensitive patient and product data introduces risks of data breaches and non-compliance with privacy laws. I will employ state-of-the-art encryption, role-based access controls, and conduct regular security audits, following best practices from the healthcare IT sector.

Resource Constraints

As with any start-up-like initiative, there may be limitations in funding, technical expertise, or time (GreenTrack Solutions SWOT). I plan to pursue strategic partnerships with established cultivators and apply for innovation grants, as well as adopt Agile practices to prioritise features and deliver value incrementally.

Integration Challenges: Ensuring seamless integration between hardware (RFID/barcode) and software components can be complex. Early-stage prototyping, thorough testing at partner cultivation sites, and close collaboration with hardware vendors will help minimise technical setbacks.

Conclusion

This project represents a unique opportunity to bridge advanced technology with pressing societal needs. By focusing on regulatory compliance, data integrity, and patient safety, I aim to develop both practical skills and ethical awareness while contributing to a more transparent and trustworthy medical cannabis industry. The lessons learned and the systems developed through this initiative could have lasting benefits, not only within the cannabis sector but across other regulated industries where trust and traceability are paramount.

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