Smart Medicine Reminder Kit

Team 9

SCHOOL OF INFORMATICS
INDIANA UNIVERSITY
IUPUI

Project Overview: Background

6 in 10
Miss a dose

65 years and older

Prescription Medication Usage
90%

Medically Non-Adherent
50%

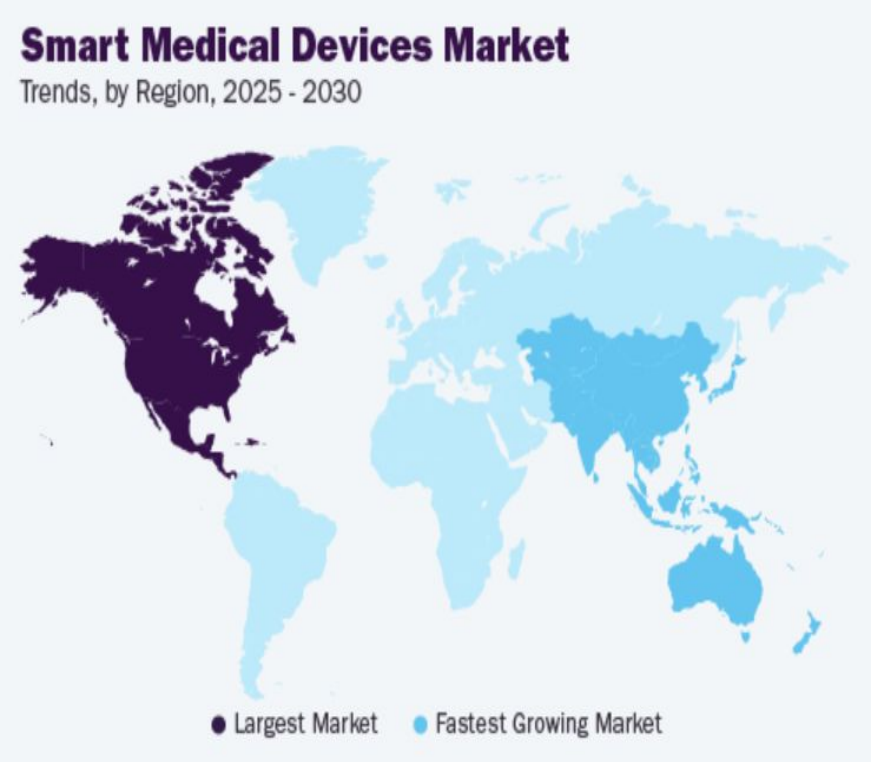
- Elderly patients often struggle with organizing and scheduling medications due to limited cognitive ability and decreased memory retention, which can lead to missed doses, overdoses or poor treatment compliance (Minaam & Abd-ELfattah, 2018).

- Lack of medication taken as prescribed accounts for around $100 billion in avoidable hospitalizations per year, as well as $310 billion in patients' out-of-pocket costs.

Project Overview: Market

- As healthcare systems transition to digital transformation, smart medical devices are becoming critical for reducing hospital stays, boosting overall care quality and improving patient outcomes.

- The global market for Smart Medical Devices was estimated at US$33.7 Billion in 2023 and is projected to reach US$67.4 Billion by 2030, growing at a CAGR of 10.4% from 2023 to 2030.



Source: www.grandviewresearch.com

Project Overview: Product

"**Smart Medicine Reminder Kit**" aims to assist individuals by helping them schedule the correct time and dosage for their medications. By providing timely alerts, the system helps prevent accidental overdoses or missed doses, ensuring patients remain on track with their prescribed medications and promoting better overall health.

Key Stakeholders

Sponsor	Professor David Francis
Project Manager	Hari Shivani Gudi
IT Manager	Kavya Chintala
Research Analyst	Naga Surya Ganesh Vankayala
Project Integrator	Oam Chandra Laasya Tummala
Capacity Planner	Sai Kumar Vemula
Risk Analyst	Vineeth Gangavarapu
Budget Analyst	Vivek Chandra

Scope

Product Based Deliverables:

- **Smart Pillbox:** 15-day storage with automatic pill refills and secure compartments to prevent missed doses and overdosing. Alerts sent to patients and caregivers for missed doses or overdose attempts.
- **Integrated Mobile App:** Real-time dose notifications, medication tracking and health vitals monitoring (heart rate, oxygen levels) with LED/voice reminders. Accessibility features and backup power ensure reliability.
- **Cost-Effective & Secure Design:** Scalable, budget-friendly solution with encryption, authentication, and HIPAA-compliant data management to ensure privacy and security.

Scope

Project Management Based Deliverables:

- Project Plan outlining scope, schedule and budget
- Work Breakdown Structure (WBS) for task organization.
- Budget Plan detailing financial planning and tracking.
- Risk Analysis identifying and mitigating potential risks.
- Lessons Learned Document summarizing insights from the project.
- Status updates summarizing achievements and challenges, keeping stakeholders informed.

Scope

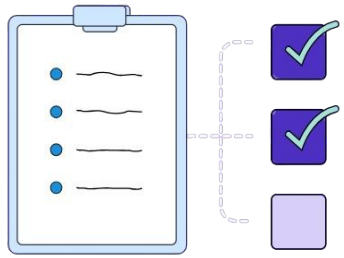
Out of Scope items:

- The kit will only track basic health vitals (e.g., blood pressure, temperature) and will not provide advanced medical diagnostics.
- The kit will not facilitate prescription management or automatic medication refills; users will need to refill their medications manually every 15 days.
- The system will provide alerts for medication dosages and changes in vital signs but will not offer complete remote monitoring capabilities.

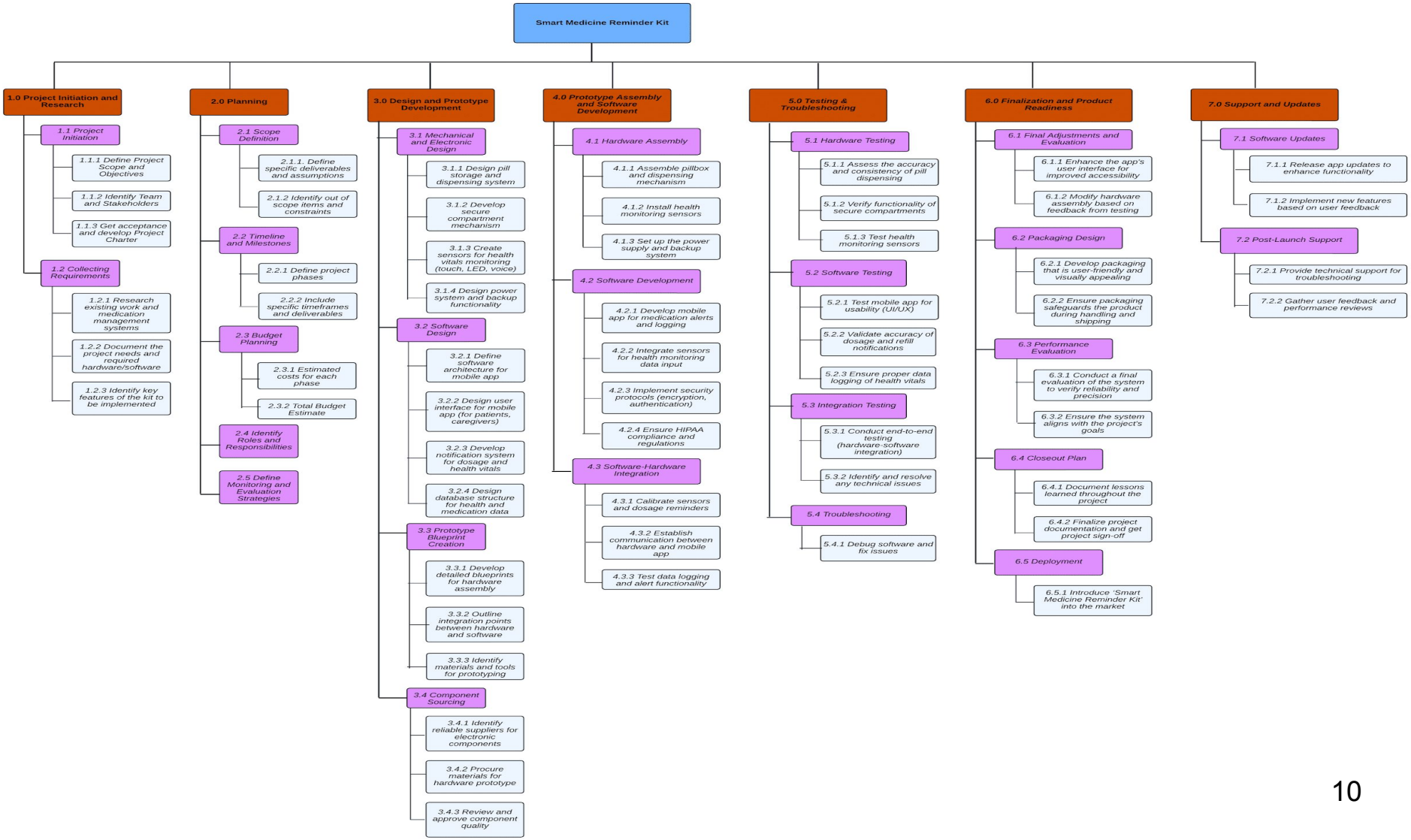
Scope

Acceptance Criteria:

- The smart medicine reminder kit must function reliably, with all medication doses dispensed accurately and timely.
- The app must seamlessly integrate with the pillbox, providing clear alerts, and notifications.
- Data privacy and security measures must meet HIPAA standards, ensuring the protection of user information.
- The product must be user-friendly, particularly for elderly users, and accessible in terms of interface and design.

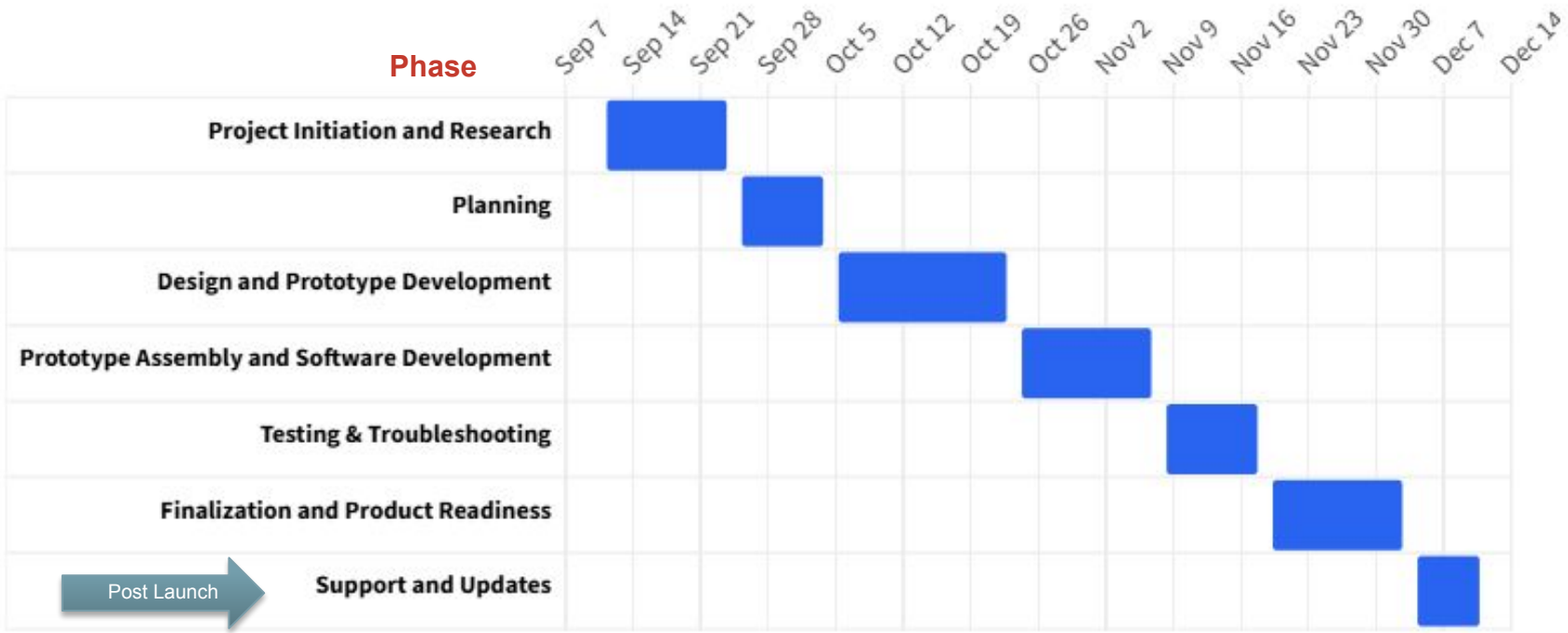


Work Breakdown Structure



Work Plan

Duration: 3 Months (12 September, 2024 – 5 December, 2024)



Work Plan

TASK NUMBE	STATUS	PRIORITY	TASK NAME	OWNER	START DATE	END DATE	Duration	Predecessors	% COMPLETE
1	Complete	HIGH	**Project Initiation and Research**	Shivani	**09-12-24**	**09-25-24**	**14**		**100%**
1.1	Complete	HIGH	Project Initiation	Shivani	09-12-24	09-15-24	4		100%
1.1.1	Complete	HIGH	Define Project Scope and Objectives	Laasya	09-12-24	09-13-24	2		100%
1.1.2	Complete	MED	Identify Team and Stakeholders	Vivek	09-14-24	09-14-24	1	1.1.1	100%
1.1.3	Complete	HIGH	Get acceptance and develop Project Charter	Kavya	09-15-24	09-15-24	1	1.1.2	100%
1.2	Complete	MED	Collecting Requirements	Kavya	09-16-24	09-25-24	10	1.1	100%
1.2.1	Complete	HIGH	Research existing work and medication management systems	Ganesh	09-16-24	09-20-24	5	1.1.3	100%
1.2.2	Needs Review	MED	Document the project needs and required hardware/software	Shivani	09-21-24	09-22-24	2	1.2.1	100%
1.2.3	Complete	MED	Identify key features of the kit to be implemented	Ganesh	09-23-24	09-25-24	3	1.2.3	100%
2	Complete	MED	**Planning**	Laasya	**09-26-24**	**10-05-24**	**10**	**1**	**95%**
2.1	Complete	MED	Scope Definition	Laasya	09-26-24	09-29-24	4	1.2	100%
2.1.1	Complete	HIGH	Define specific deliverables and assumptions	Laasya	09-26-24	09-27-24	2	1.2.3	100%
2.1.2	Complete	HIGH	Identify out of scope items and constraints	Sai	09-28-24	09-29-24	2	2.1.1	100%
2.2	Complete	MED	Timeline and Milestones	Vivel	09-30-24	10-01-24	2	2.1	100%
2.2.1	Complete	MED	Define project phases	Vineeth	09-30-24	09-30-24	1	2.1.2	100%
2.2.2	Complete	LOW	Include specific timeframes and deliverables	Kavya	10-01-24	10-01-24	1	2.2.1	100%
2.3	Complete	MED	Budget Planning	Vivek	10-02-24	10-03-24	2	2.2	100%
2.3.1	Complete	MED	Estimated costs for each phase	Vivek	10-02-24	10-02-24	1	2.2.2	100%
2.3.2	Complete	MED	Total Budget Estimate	Vivek	10-03-24	10-03-24	1	2.3.1	100%
2.4	Complete	LOW	Identify Roles and Responsibilities	Shivani	10-04-24	10-04-24	1	2.3	100%
2.5	In Progress	MED	Define Monitoring and Evaluation Strategies	Vineeth	10-05-24	10-05-24	1	2.4	50%

This project plan provides a detailed breakdown of project tasks, their status, owners, start and end dates, duration, dependencies and completion percentage.

Communication Plan

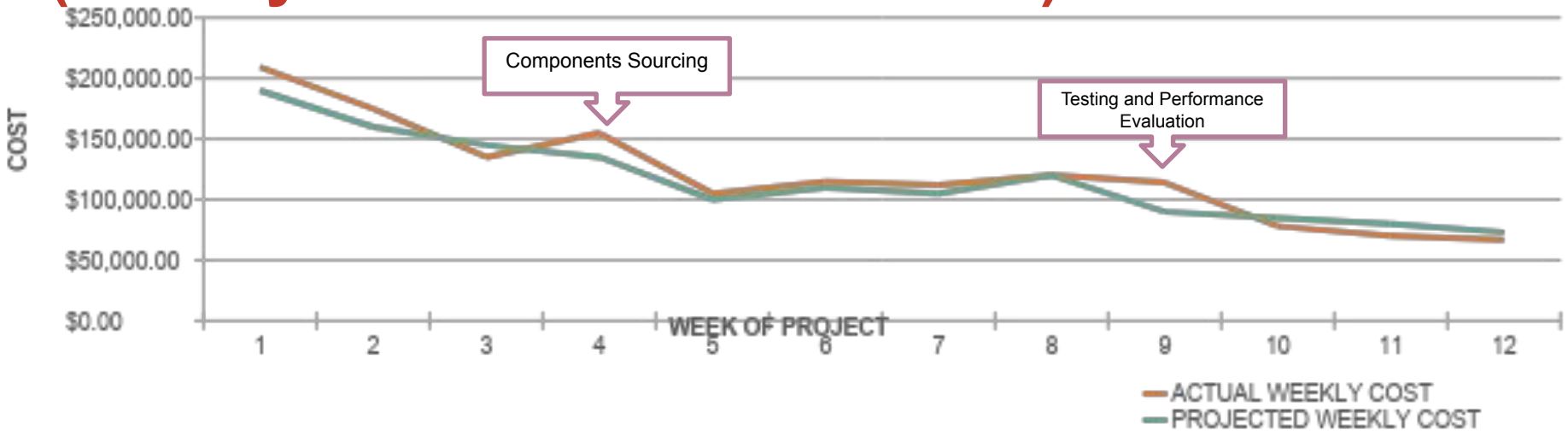
What	Who/Target	Purpose	When/Frequency	Type/Method(s)
Initiation Meeting	Functional Leadership	Gather information for the Initiation Plan.	First, before project start date	Meeting
Project Kick-Off Meeting	Entire Project Team	Communicate project roles, responsibilities, and stakeholder expectations.	At or near project start date	Meeting
Status Reports	All stakeholders, Project Sponsor	Update stakeholders on project progress, milestones, and challenges.	Bi-weekly, or ad hoc if needed	In Class
Weekly Team Meetings	Functional Leadership Team	Strategy planning, issue resolution, project management, and risk management.	Weekly	Meeting
Functional Team Meetings	Functional Teams (Technical, Design, etc.)	Provide technical input, ensure project deliverables meet requirements, and verify milestones.	Bi-weekly	Meeting
Risk Assessment Reports	Project Manager, Risk Analyst	Identify and address potential project risks, discussing mitigation strategies.	Weekly	Email
Budget Review Meetings	Project Manager, Budget Analyst	Review budget updates, discuss financial adjustments, and prevent cost overruns.	Monthly	Meeting
Project Closing Meeting	Entire Project Team	Review project outcomes, key learnings, and project performance against goals.	End of project	Meeting, Final Presentation Submission

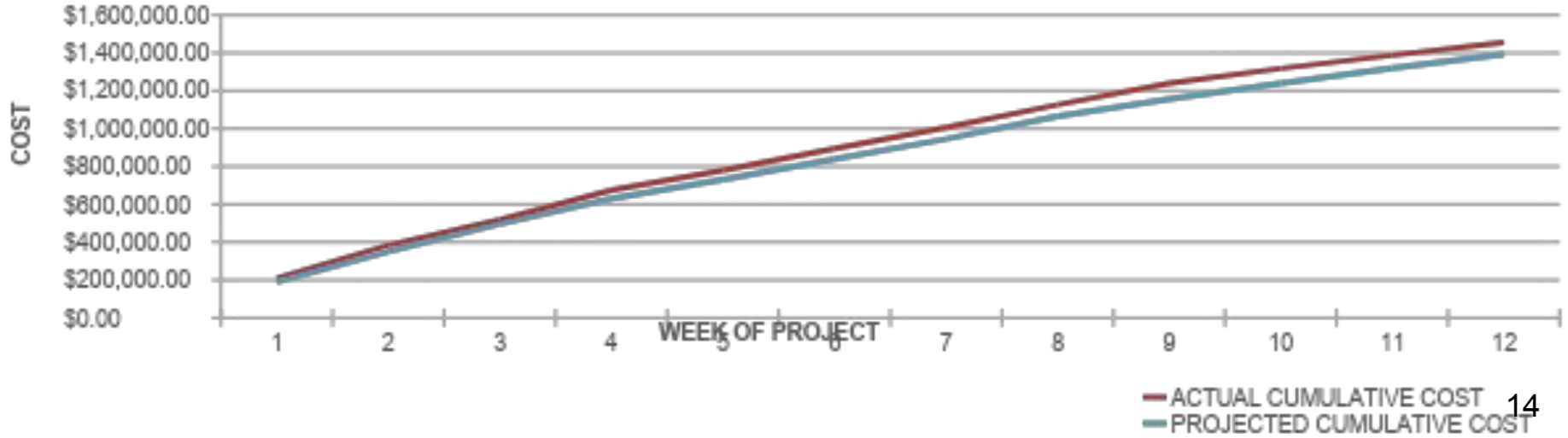
Meeting Channels

Documentation Channels

Update Loop

Project Budget
(Weekly and Cumulative Costs)





Project Budget

Actual Project Budget: $ 1,454,900
Estimated Project Budget: $ 1,393,060
Cost Overrun: $ 61,840 (4.44%)

- Experienced major cost overruns in **Week 4** due to **component sourcing issues**, exceeding the projected cost by **$20,000**.
- In **Week 9**, **final testing and evaluation** caused a **$24,000** overrun due to increased resource needs.
- Overall cost control improved in later weeks, keeping the **total overrun** to **$61,840** (4.4%).
- **Corrective Actions:** optimized resource allocation, reduced non-essential spending, streamlined testing protocols and negotiated better rates
- **Improved cost control in the final phase**, with actual costs falling below projections, showing that corrective actions were effective in managing expenses and mitigating further overruns.

Risk Analysis

1. High-Risk Areas (RPN = 48)

- **Software and Hardware Development & Integration**:
  - Prototype Delay: Component sourcing issues
  - Hardware Assembly Defects: Mechanical component malfunctions
  - Software-Hardware Integration Failure: Data sync issues

2. Moderate-Risk Areas (RPN = 36)

- **Interface Design and Usability**:
  - User Interface Design Issues: User confusion due to poor design
- **Data Security**:
  - Data Privacy and Security Breach: Risks to HIPAA compliance

3. Low-Risk Areas (RPN = 18–24)

- **Calibration and Accuracy**:
  - Sensor Calibration and Accuracy Risk: Inaccurate health monitoring readings
- **Budget and Technology Obsolescence**:
  - Budget Overrun: Unforeseen software and hardware costs
  - Technology Obsolescence: Using outdated technologies

Risk Mitigation Strategies

Development and Integration risks:
Collaborated across hardware and software teams, expedited component sourcing, implemented quality control checkpoints, continuous testing, and enhanced cross-functional collaboration.

User Adoption and Usability risks:
Conducted user training sessions, provide step-by-step manuals, ensured an accessible interface for elderly users and gathered user feedback to iteratively improve the design and usability.

Data Security and System Reliability risks:
Implemented robust security measures like end-to-end encryption and multi-factor authentication, used automated backups and version control, and conducted thorough system testing to ensure data accuracy and integrity.

Research, Innovation, and Budget risks:
Performed regular peer reviews and market analyses, consulted with experts to stay updated with technological advancements, closely monitored budget spending, and ensured sensor calibration accuracy through multiple testing rounds.

Lessons Learned

- Importance of defining a clear scope and breaking down complex tasks into manageable phases for better execution.
- **Balancing technical complexity with user-friendly design:** Focusing on user needs and medication adherence barriers showed how important empathy and user-friendly design are in healthcare project settings.
- **Creating workable and efficient solutions requires a thorough understanding of user challenges:** The significance of evidence-based development was emphasized by the insights gained from gathering and evaluating user feedback, which helped to build the Smart Pillbox's features.
- **Budget Overrun:** Allocate contingency funds to address unforeseen costs during critical phases. Establishing strong supplier relationships and negotiating contracts early can help mitigate cost overruns due to delays or price fluctuations.

Final Takeaways

- **Successful Product Launch:** Delivered a high-quality product that meets all scope requirements.
- **Accurate and Reliable:** Achieved excellent performance and accuracy during testing and evaluation.
- **Effective Teamwork:** Strong collaboration and efficient task delegation contributed to project success.
- **Adaptability is Key:** Flexibility and contingency plans helped tackle unforeseen challenges.

References

- Minaam, D. S. A., & Abd-ELfattah, M. (2018). Smart drugs:Improving healthcare using Smart Pill Box for Medicine Reminder and Monitoring System. Future Computing and Informatics Journal, 3(2), 443–456. https://doi.org/10.1016/j.fcij.2018.11.008

- Medication dispensing systems: how payers, providers, and pharmacies can boost adherence. (n.d.). Hero. https://herohealth.com/blog/medication-adherence/medication-dispensing-systems/

Questions?