

# *Implementing RFID for Medical Inventory Tracking at Purdue University Hospital*

Project Review – Group 5\_A

5/16/2025



# *Agenda*

1. Introduction
2. Executive Summary
3. Deliverable 1
4. Deliverable 2
5. Deliverable 3
6. Deliverable 4
7. Final Project Status
8. Q&A



# Introduction

## The Project

### ■ Description:

- Implement RFID to track medical inventory more accurately, reduce waste
- Optimize hospital supply management.

### ■ Objectives:

- Achieve a **30% reduction** in medical supply waste
- Improve accuracy in inventory tracking
- Complete project within **62 days**

### ■ Importance:

- Reduces operational costs
- Accelerates patient care delivery
- Streamlines hospital supply chain



# *Executive Summary*

## Key Achievements:

- RFID hardware installed in 10 high-traffic hospital zones
- Over 5,000 medical supplies tagged with RFID
- 40 staff trained on RFID system usage

## Progress Highlights:

- Completed initial pilot testing phase
- Integrated RFID tracking into hospital ERP system
- Successfully adapted to labor and material cost challenges

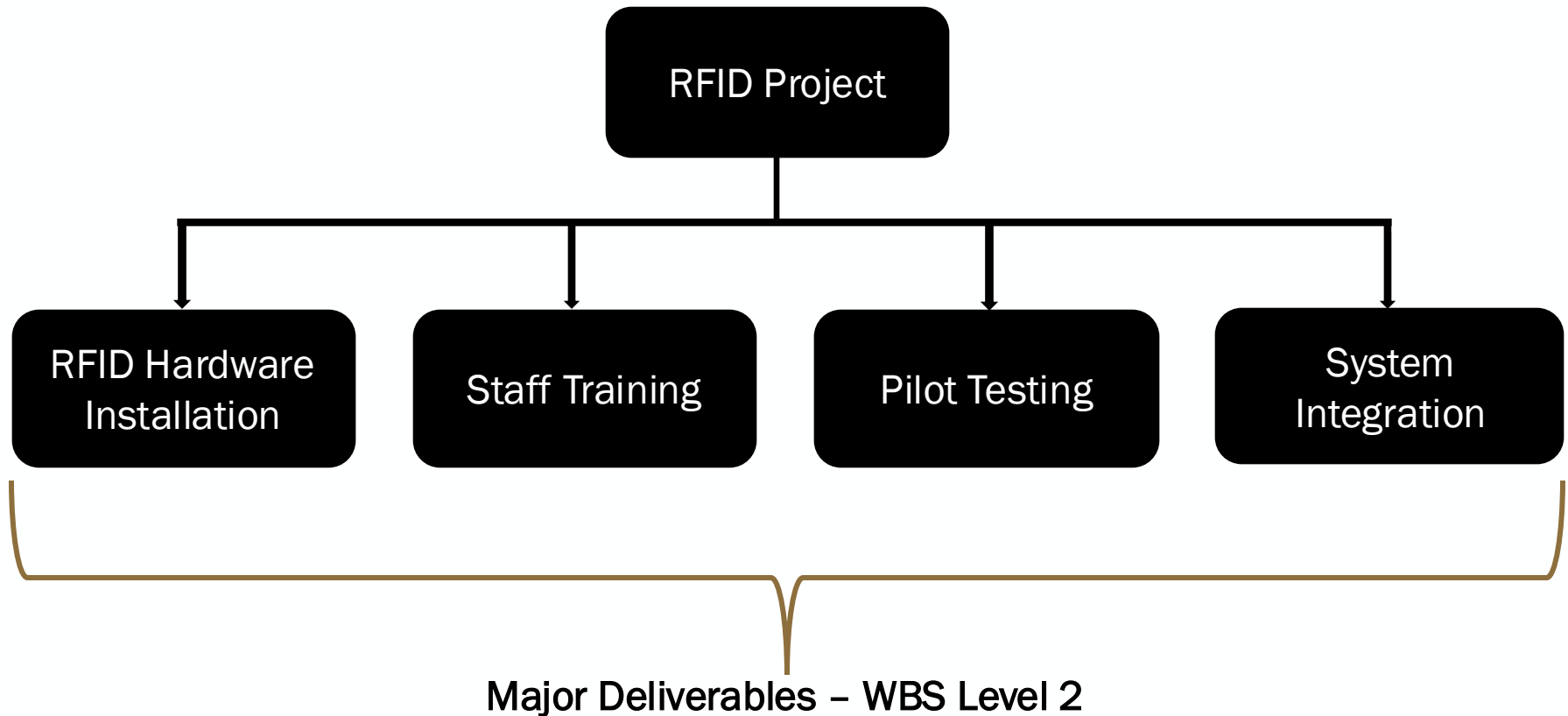
## Current Status:

- Project approximately **100% complete**
- **Minor** schedule adjustments accepted
- Positioned to achieve 30% waste reduction target

# *Requirement Analysis and Project Planning*

## WBS and OBS

Figma Link: [WBS & OBS](#)

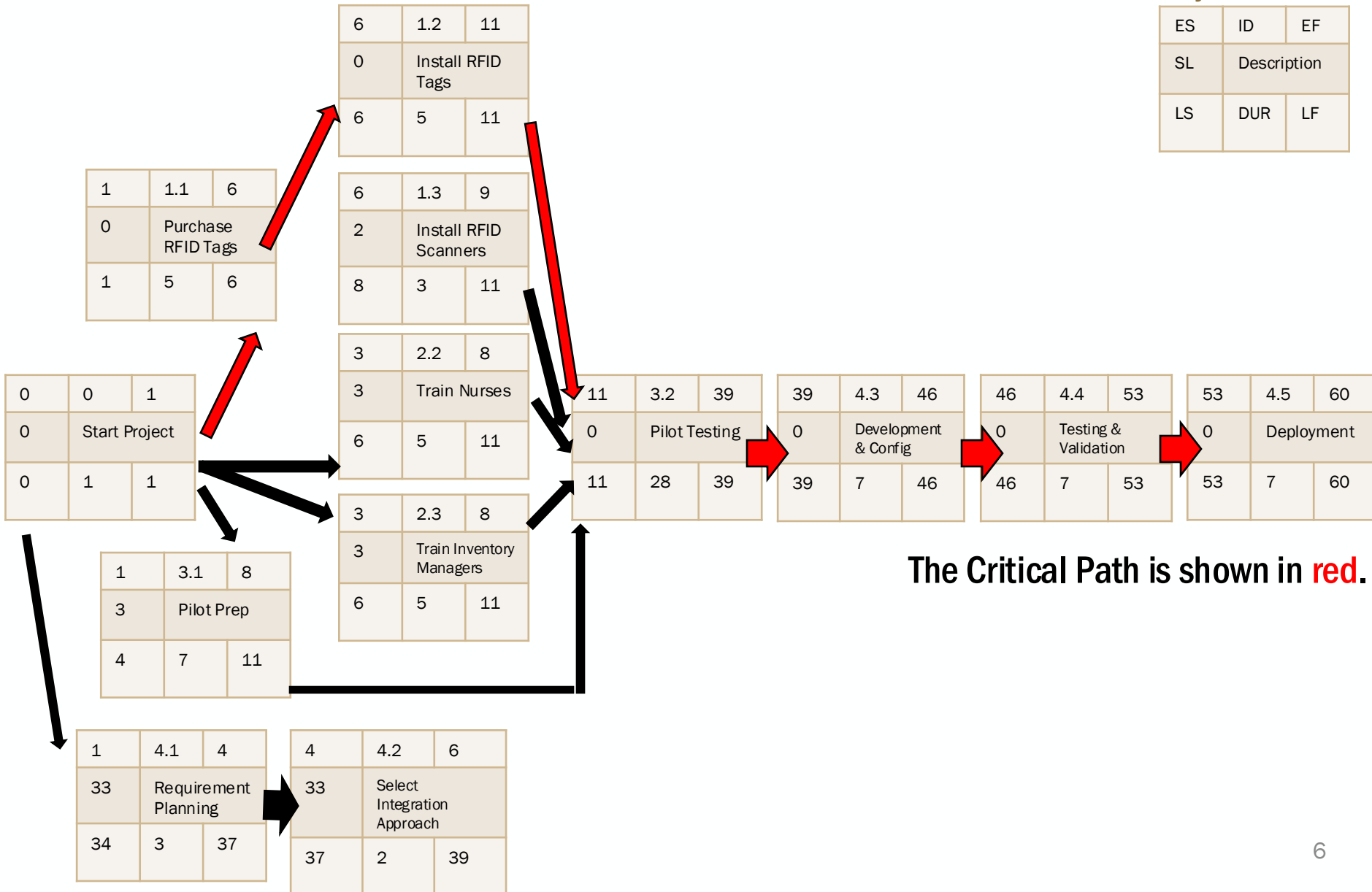


# Requirement Analysis and Project Planning

## Ideal Task Progression

Key:

ES	ID	EF
SL	Description	
LS	DUR	LF



# *Requirement Analysis and Project Planning*

## Project Budget

- Bottom-up approach was used to estimate project budget
- Costs were calculated based on resource requirements, labor availability, and hourly rates
- The WBS overlayed with the OBS helps identify the required cost-accounts
- Horizontal roll-up summarizes the budget by department or functional area in the OBS
- Vertical roll-up summarizes the budget required for each sub-deliverable
- This is used to make the time-phased budget

Cost Account Number	Department-wise budget
Project Management (PM)	\$ 0.00
Inventory Management (IM)	\$ 88,700.00
Nurse (N)	\$ 26,250.00
IT Staff (IT)	\$ 31,250.00
Supply Chain (SC)	\$ 0.00
Consulting (C)	\$ 196,800.00
Total	\$ 343,000.00

**Budget Horizontal Roll-up**

# Requirement Analysis and Project Planning

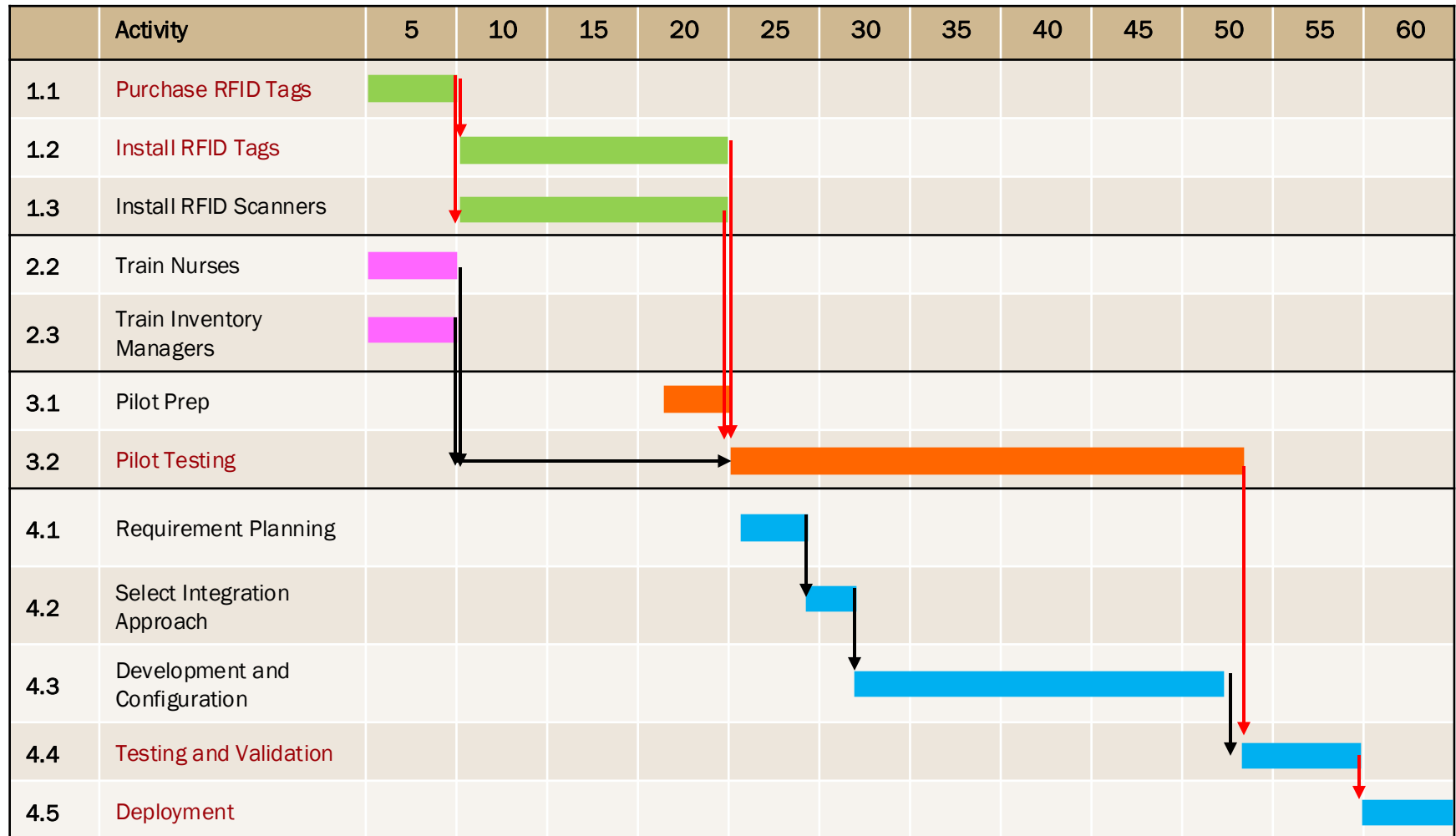
## Project Budget—Vertical Roll-up

WBS	Deliverables	Duration (Days)	Labor Cost	Resource Cost	Cost
<b>1</b>	<b>Implement RFID for Medical Inventory Tracking</b>	<b>60</b>	<b>\$ 243,000.00</b>	<b>\$ 100,000.00</b>	<b>\$ 343,000.00</b>
<b>1.1</b>	<b>RFID Hardware Installation</b>	<b>10</b>	<b>\$ 25,340.00</b>	<b>\$ 60,000.00</b>	<b>\$ 85,340.00</b>
1.1.1	Purchase RFID tags and scanners	5	\$ 4,375.00	\$ 60,000.00	\$ 64,375.00
1.1.2	Install RFID tags	5	\$ 15,925.00	\$ -	\$ 15,925.00
1.1.3	Install RFID scanners	3	\$ 5,040.00	\$ -	\$ 5,040.00
<b>1.2</b>	<b>Staff Training</b>	<b>10</b>	<b>\$ 37,050.00</b>	<b>\$ -</b>	<b>\$ 44,050.00</b>
1.2.1	Purchase Training Manual		\$ 50.00	\$ -	\$ 50.00
1.2.2	Train Nurses	5	\$ 27,250.00	\$ -	\$ 27,250.00
1.2.3	Train Inventory Managers	5	\$ 9,750.00	\$ -	\$ 9,750.00
<b>1.3</b>	<b>Pilot</b>	<b>35</b>	<b>\$ 22,410.00</b>	<b>\$ -</b>	<b>\$ 22,410.00</b>
1.3.1	Pilot Preparation	3	\$ 4,170.00	\$ -	\$ 4,170.00
1.3.2	Pilot Test	28	\$ 18,240.00	\$ -	\$ 18,240.00
<b>1.4</b>	<b>System Integration</b>	<b>32.1</b>	<b>\$ 158,200.00</b>	<b>\$ 40,000.00</b>	<b>\$ 198,200.00</b>
1.4.1	Requirement Analysis and Planning	3	\$ 12,000.00	\$ -	\$ 12,000.00
1.4.2	Select Integration Approach	1.25	\$ 8,000.00	\$ -	\$ 8,000.00
1.4.3	Development and Configuration	13.9	\$ 82,400.00	\$ 40,000.00	\$ 122,400.00
1.4.4	Testing and Validation	7	\$ 27,200.00	\$ -	\$ 27,200.00
1.4.5	Deployment and Post-market Feedback	7	\$ 28,600.00	\$ -	\$ 28,600.00



# Requirement Analysis and Project Planning

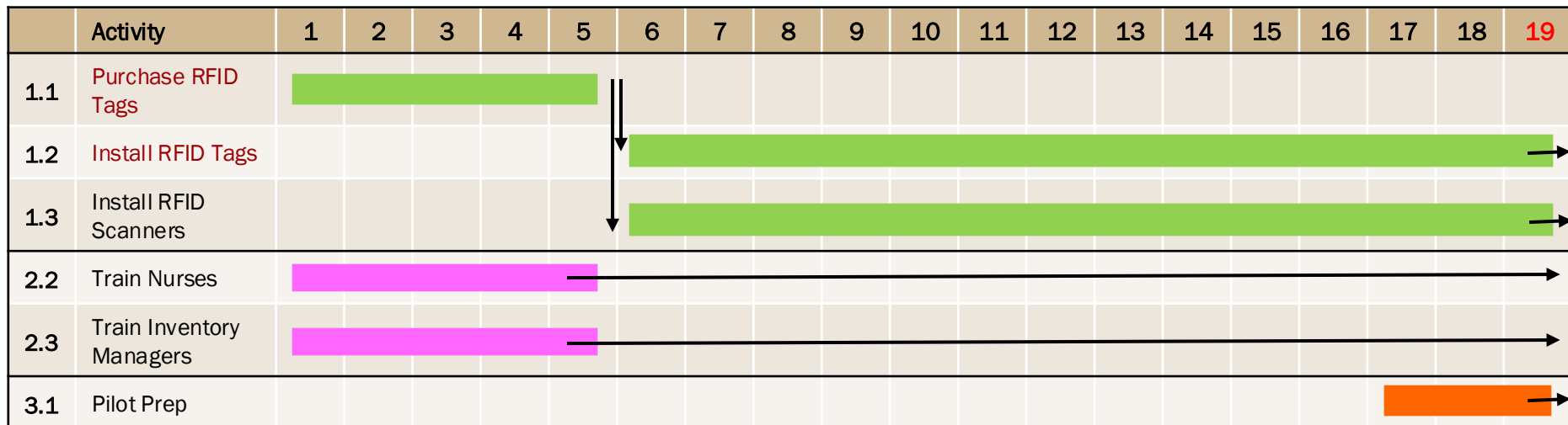
## Resource Planning and Resource-leveled Timelines



# Project Checkpoint – 30% Completion

## Resource Reallocation—Reacting to Layoffs

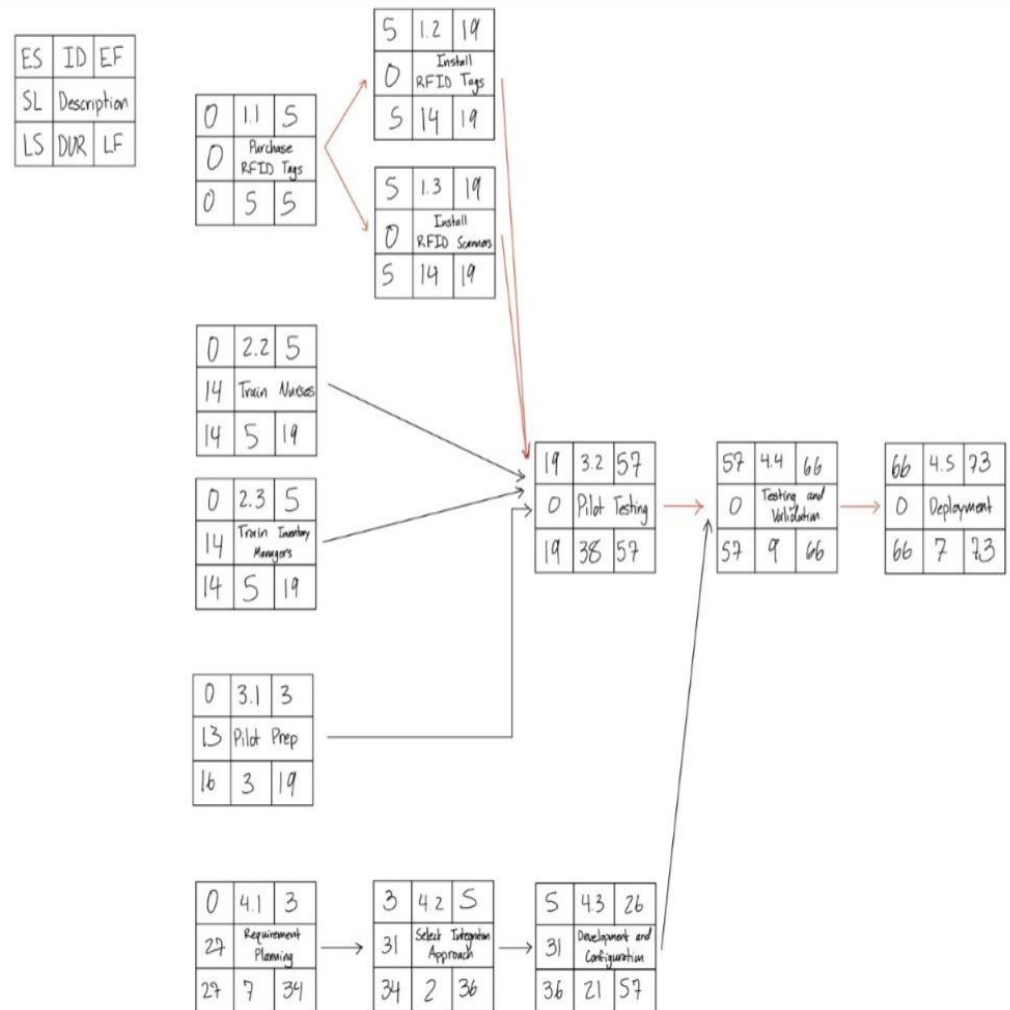
- Surprise! You are 30% through the project schedule and there is a shortage of labor due to a company layoff.
- According to our original plan, the duration of entire project is 60 days.
- 30% through --> 19 days passed



# Project Checkpoint – 30% Completion

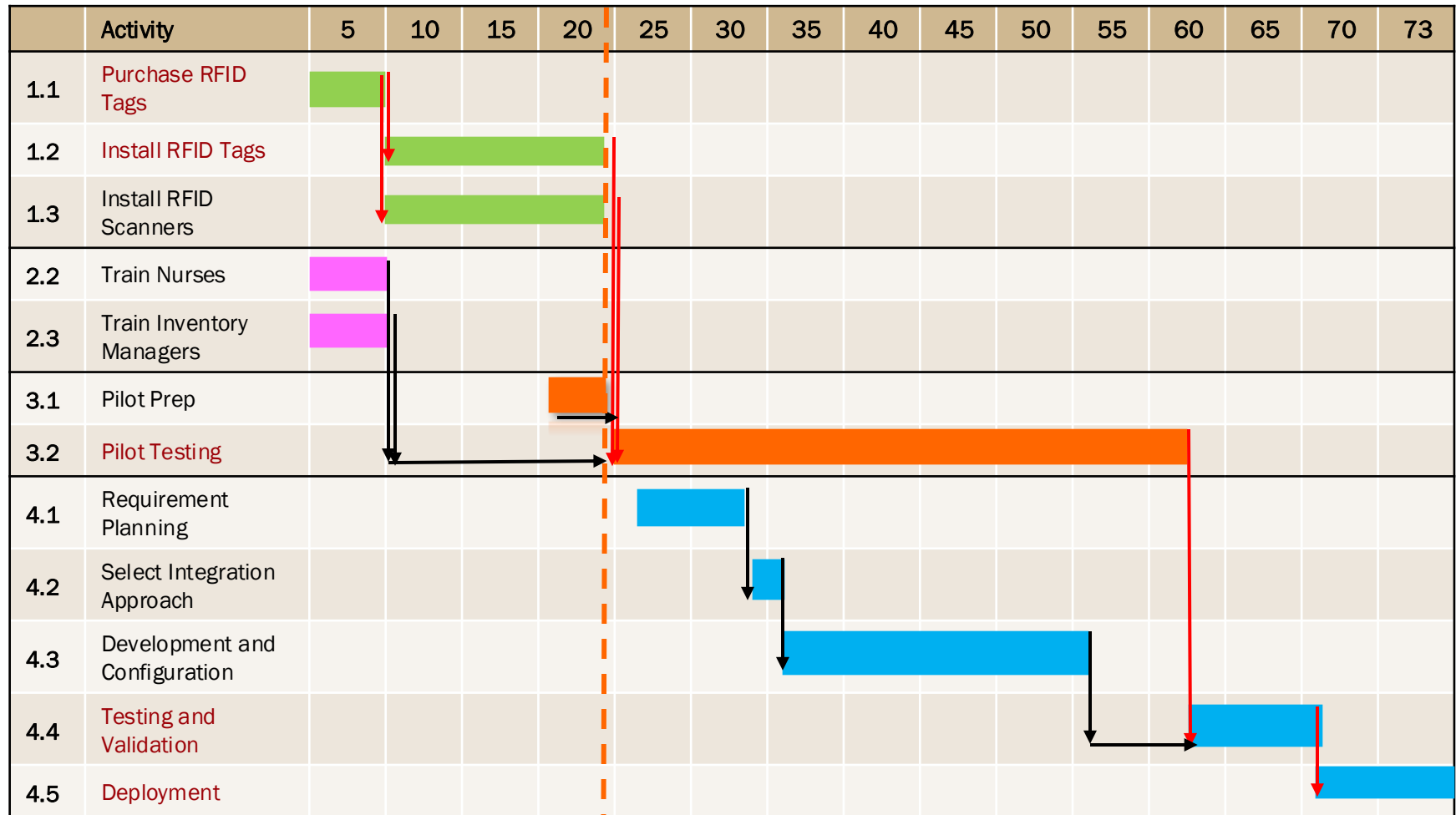
## Company Layoff Reaction Plan

- Replan for the rest of work
  - Calculate the total work resources starting from day 20
  - Set the resources per day to 20% less than originally planned
  - Distribute the modified resources per day until the number matches up with the total work resources and extend days if needed
  - Project duration extended to **73 days**
- Cost related changes
  - RFID Tags increased by **\$20,000**
  - RFID Scanners increased by **5%**
  - Integration costs reduced by **\$9,000**
  - New total budget is **\$357,210**



# Project Checkpoint – 30% Completion

## Replanned Resource and Resource-levelled Timelines



Day 19

# ***Project Checkpoint – 50% Completion***

## Crash Costs

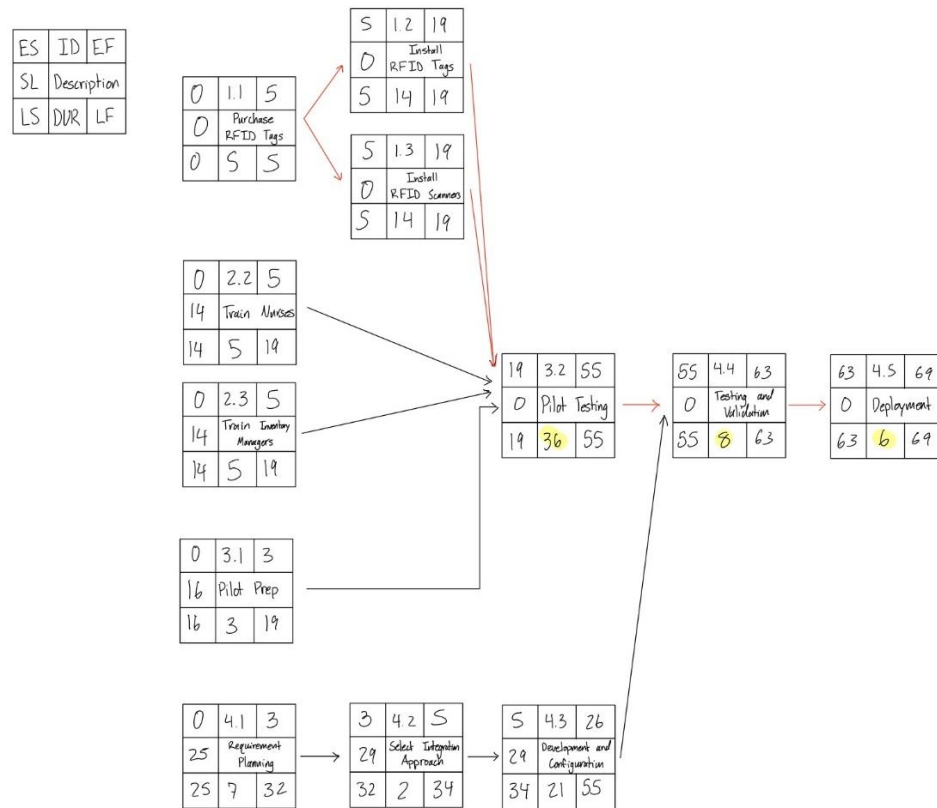
- Project to be completed ASAP, consider crashing
- Indirect overhead costs = \$100/week or \$14.28/day

Activity ID	Activity Description	Slope (\$/day)	Max Crash Time (Days)
1.1	Purchase RFID Tags	10	2
1.2	Install RFID Tags	20	1
1.3	Install RFID Scanners	20	2
3.2	Pilot Testing	55	2
4.4	Testing and Validation	60	1
4.5	Deployment	50	1

# Project Checkpoint – 50% Completion

## Crashing the Project—Prioritizing Duration

- Tasks on the critical path (CP) were determined and crashed according to which task would yield the lowest crash cost
- It was assumed that the additional labor costs associated with crashing an activity are bundled into the crash costs given per activity.
- The activities were crashed in the following order: 4.5 -> 3.2 -> 4.4
- Project duration is reduced from 73 days to **69 days**.

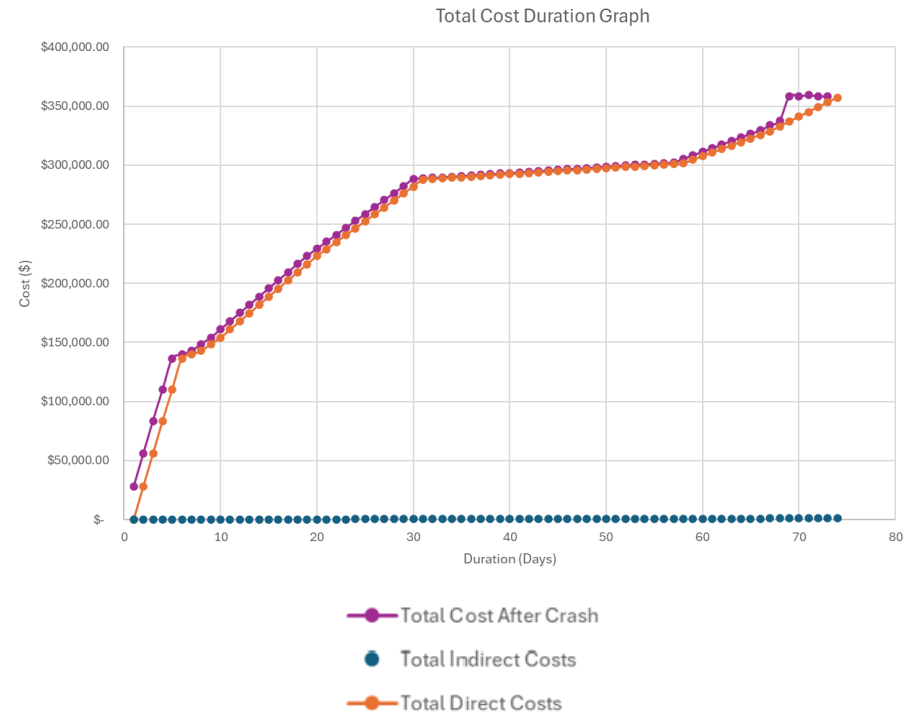


Final AON Network

# Project Checkpoint – 50% Completion

## Crash Point

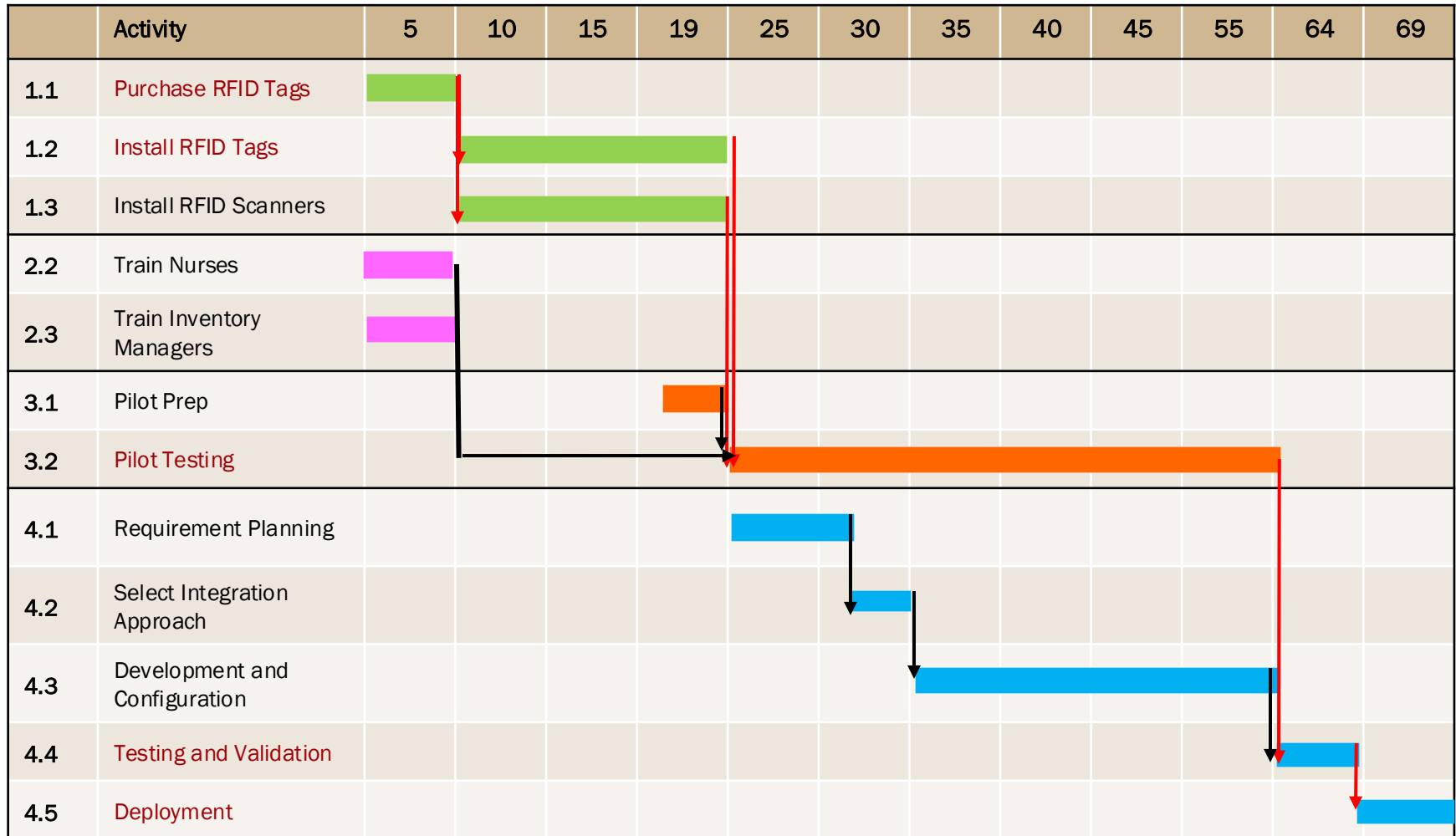
- Even with crashing the network to 69 days, the cost-optimum point remains at **73 days** with a cumulative total cost of **\$358,287.14**
- Crashing to **69 days** only increases the cost by \$162.86 to a total cost of **\$358,450**.
- Crashing the project might be worthwhile!



Day	69	70	71	72	73
Cost (\$)	358,450	358,404	358,364	358,323	358,287

# Project Checkpoint – 50% Completion

## Crashed Project Timeline





# *Completed Project*

## Project Summary and Retrospective

With the given information and constraints, we :

- Drafted the WBS with a top-down approach
- Drafted budget with bottom-up approach
- Created the AON network based on the WBS tasks, with durations being derived from task complexity estimation.

	Initial Plan	30% Completion	50% Completion	100% Completion
Changes Made	-	20% workforce layoff	Project crashed	No further changes
Duration (days)	60	73	69	69
Total Cost (\$)	\$343,000	\$357,210	\$358,450	\$358,450

# Completed Project

## Conclusions and Closing Remarks

Following the necessity to complete the project at the earliest, it was crashed.

At 100% progress, the project was completed in 69 days at a cost of \$358,450.

Scheduled 60 days -> **Completed in 69 days**

Scheduled \$500,000 -> **Completed for \$358,450**

## Project: Implementing RFID for Medical Inventory Tracking at Purdue University Hospital

**Project Managers:** Anna Christina Urias, Armaan Varma, Franklin Hanyu Wu, Jayendran Ravindran, Nikhil Bhardwaj, Xincheng Zhang

**Status as of: April 27<sup>th</sup>, 2025 | Project Progress: 100%**

### Earned Value Figures:

PV	EV	AC	SV	CV	BAC
\$178,605.00	\$178,605.00	\$179,225.00	\$0.00	-\$620.00	\$357,210.00
EAC	VAC	EAC <sub>t</sub>	CPI	PCI <sub>B</sub>	PCI <sub>C</sub>
\$358,450.00	-\$1,240.00	\$358,450.00	1.00	0.5	0.5

Project Description: Reducing supply waste and improve inventory accuracy by implementing RFID-based medical inventory tracking at Purdue University Hospital.

Status summary: At the 50% completion mark, the project was crashed to complete as quickly as possible and was finally crashed down to a total timeline of 69 days. The project is now complete and did not see any changes beyond what were scheduled at the 50% completion mark the final estimated actual cost of completion now sits at \$358,450, which is just an overrun of \$1240.

Explanation: The initial project duration was projected to take 73 days before crashing the network. The only relevant costs are the costs associated with tasks on the critical path, as that will shorten the length of the total project duration and thus reduce the indirect overhead costs. Indirect overhead costs are \$100/week, or \$14.29/day. Since it is assumed that we are already 50% of the way through the project schedule at this point (assumed to be at 30 days for a 60-day schedule), some activities will already have been completed. As a result, the only activities on the CP that can be crashed are 3.2, 4.4, and 4.5. Crashing these 3 activities by their maximum amount would result in a project duration reduction of 4 days (69 days instead of 73).

Major changes since last deliverable/report: Company has requested the project is completed ASAP, with a consideration of crashing the project with a \$100/week indirect overhead. The extra training suggested earlier has been preferred to be excluded from the plan.

Cost changes: \$100/week of indirect overhead charges for project crashing consideration.

Estimated cost at completion (EAC<sub>t</sub>): \$358,450.00. This shows an overrun of \$1,240, with the CPI being 1.00.

Risk: Risks related to completion timeline going beyond originally stated 60 days (actual final completion is 69 days).

# *Assumptions*

## What we considered

With the given information and constraints, we assumed the following:

- Project manager team does not have a labor allocation/shortage during layoffs. PMs are assumed to always be available for the project.
- Remainder/Leftover budget diverted for contingency/management reserves
- The duration taken to complete the training program (scheduled 5-day program) and the pilot testing (28-day pilot) is unaffected by the labor constraints.
- Labor shortages of 20% impacted all departments including consultants.
- Budget does not include the labor cost for project manager team.
- The cost changes during the layoffs have been incorporated as fixed resource cost changes.
- The project was crashed only considering resources already available on the project. Outsourcing was excluded from the project crashing considerations.

# *Thank You*

Q&A



# *Appendix*

Contents for Q&A support:

1. Risk Matrix
2. Outsourcing considerations

# *Risk Matrix*

Likelihood: 1 (Rare) to 5 (Certain) & Impact: 1 (Negligible) to 5 (Catastrophic)

Risk Category	Specific Risk	Likelihood (L)	Impact (I)	Risk Priority Number (RPN = L x I)
<b>Budget</b>	RFID hardware costs exceeding \$500k due to tag/scanner price volatility	3	4	12
<b>Technical</b>	ERP integration delays due to interoperability issues	3	5	15
<b>Technical</b>	RFID signal interference from medical equipment/liquids	3	4	12
<b>Staff Training</b>	Low nurse participation in training due to shift conflicts	4	3	12
<b>Data Security</b>	Patient/data privacy breaches from unsecured RFID systems	2	5	10
<b>Scheduling</b>	Pilot delays due to IT technician availability constraints	4	3	12
<b>Operational</b>	Inaccurate waste reduction metrics from RFID read errors	2	4	8

# *Outsourcing Considerations*

Additional resources anticipated to help with the project, not otherwise considered

## **Labor Resource Requirements**

### **1. RFID Systems Specialist**

- Required for 15-20 hrs/week, during installation & testing stages, for their technical expertise on RFID system design & optimization.
- Outsourcing: Yes, RFID implementation in healthcare environments requires specialized expertise. A temporary external specialist can transfer knowledge to the internal team.

### **2. Quality Assurance Tester**

- Required for up to 30 hrs/week primarily during testing phases for system testing, error identification & validation protocols knowledge.
- Outsourcing: Partially Yes, since core testing should be internal, but load testing could be outsourced - internal staff would understand workflows better, but specialized performance testing requires technical tools and expertise.

# ***Outsourcing Considerations***

Additional resources anticipated to help with the project, not otherwise considered

## **Materials & Components Requirements**

### **1. Mounting Hardware & Network Cabling**

- Required for custom mounting surfaces to route network to junction boxes.
- Outsourcing: No, items can be purchased through standard procurement.

## **Equipment Requirements**

### **1. Signal Testing Environment**

- RFID signal strength analyzers, interference detection tools and segregated network environment to test ERP integration required throughout the duration of the project.
- Outsourcing: Yes, specialized equipment is expensive and needed temporarily.

## **Software Requirements**

### **1. RFID Middleware Software**

- Software to process (clean) RFID data before ERP integration for reduced load on ERP system.
- Outsourcing: Yes, as a SaaS option - middleware would work better as an externally managed service to ensure updates & security patches.