Project Management

Implementing a Secure Network for Safeguarding Data (Phase 1 and Phase 2)

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Outline

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(WBS), outsourcing, time/cost estimate, network diagram (workflow), crashing project
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Module Four
Budget, status report, performance index, cost forecast
Module Five
Agile project management, product backlog, burndown charts, Kanban,
which type of project management (agile vs. conventional)
Summary

***Software** Microsoft Project Professional 2019 (Project Management) and Trello (Kanban)
****Reference** Project Management, The Managerial Process, by Erik W. Larson and Clifford Gray, 8th edition

A Note From the Author

This project serves as an example of collaborated works in my portfolio. The works shown in this presentation were completed by me and my teammates, Mary Aldana and Bob Xie, while we were taking the "Project Management" course at Loyola University of Chicago (LUC). I assumed the role of the team leader of this project. Here is the comment we received from Professor Channah Naiman at LUC, "Nothing left to say. Outstanding, comprehensive, well-reasoned, beautiful Kanban, and excellent application of the Agile Project Management." Also, despite Telemetry Inc. being a fictitious company created for the purpose of this project, companies like Telemetry Inc. exist in the real world. Hence, the concepts discussed in this presentation are applicable to those companies as well.

Executive Summary

This project applies the concepts of project management to manage the tasks that need to be completed during the first two of the six phases of implementing a secure network architecture at a remote patient monitoring services company, Telemetry Inc. Phase 1 deals with the making of the schematic of the architecture and Phase 2 handles the search for the components of the architecture. First, these phases were analyzed to define the tasks that are required to achieve the goal of these two phases. Then, the cost and time for carrying out these tasks were estimated and the workflow was mapped out. Outsourcing and crashing project were suggested to be the two means for expediting these two phases of implementation. The risks that this project could face were assessed and responses to those risks were recommended. Status reports were produced for tracking the progress of this project and for calculating the performance of the project. Using these data, a forecast was made for the total cost of the project to foresee the extent of the over budget situation. To explore the possibility of using Agile project management (Agile PM) for managing one or both phases, selected Agile PM activities were attempted. Characteristics of the tasks of the two phases were scrutinized to determine that the optimal type of project management for Phase 1 is Agile PM and that for Phase 2 is Conventional PM.

Phases of Implementing a Secure Network

(Six Phases)

**** The scope of this project is limited to Phase 1 and Phase 2.***

Phase 1 – Design and draft the infrastructure
Phase 2 – Determine the specifications of components and identify vendors
Phase 3 – Purchasing all components
Phase 4 – Install components, hardware and software
Phase 5 – Perform authorized, simulated cyberattacks to test the infrastructure
Phase 6 – Close the project

Introduction

This project is about managing part of the implementation of a secure network infrastructure. The infrastructure will safeguard the data of a remote patient monitoring company, Telemetry Inc. To Telemetry Inc., uninterrupted network connections and data security are vital for growing their business and complying with HIPPA (Health Insurance Portability and Accountability Act). The implementation process consists of six phases. This project covers the management of Phase 1 and Phase 2. Phase 1 is about creating a schematic of the infrastructure and Phase 2 is to locate the components of the infrastructure. The features of the infrastructure and rationale behind the design are detailed in another project in my portfolio, "Data Security —A Secure Network Architecture."

This project is divided into five modules: (1) An introductory module (2) Task related—work breakdown structure (WBS), outsourcing, network diagram of the workflow, estimate time/cost down to the level of each task, and tasks chosen for crashing the project (3) Risks associated with this project (4) Budgeting, monitoring, and forecasting of cost and time (5) Sample activities of Agile project management (Agile PM) and the selection of the type of project management (Agile versus Conventional) for the two phases. Microsoft Project was used to generate and revise forms needed for various purposes in this project, for instance, WBS, cost/time estimate, manpower assignment, and forecasting etc. Trello was used to produce a Kanban, a tool used in Agile PM, at a specific point during the tenure of this project. The Kanban allowed the project team to visualize the status of the project easily, facilitating the management of the workflow.

Module One

Preamble

This section briefly explains the following: (1) What type of company Telemetry Inc. is (2) What the proposed security network infrastructure looks like (3) Where this project stands in terms of priority and classification at Telemetry Inc. (4) Who the stakeholders are.

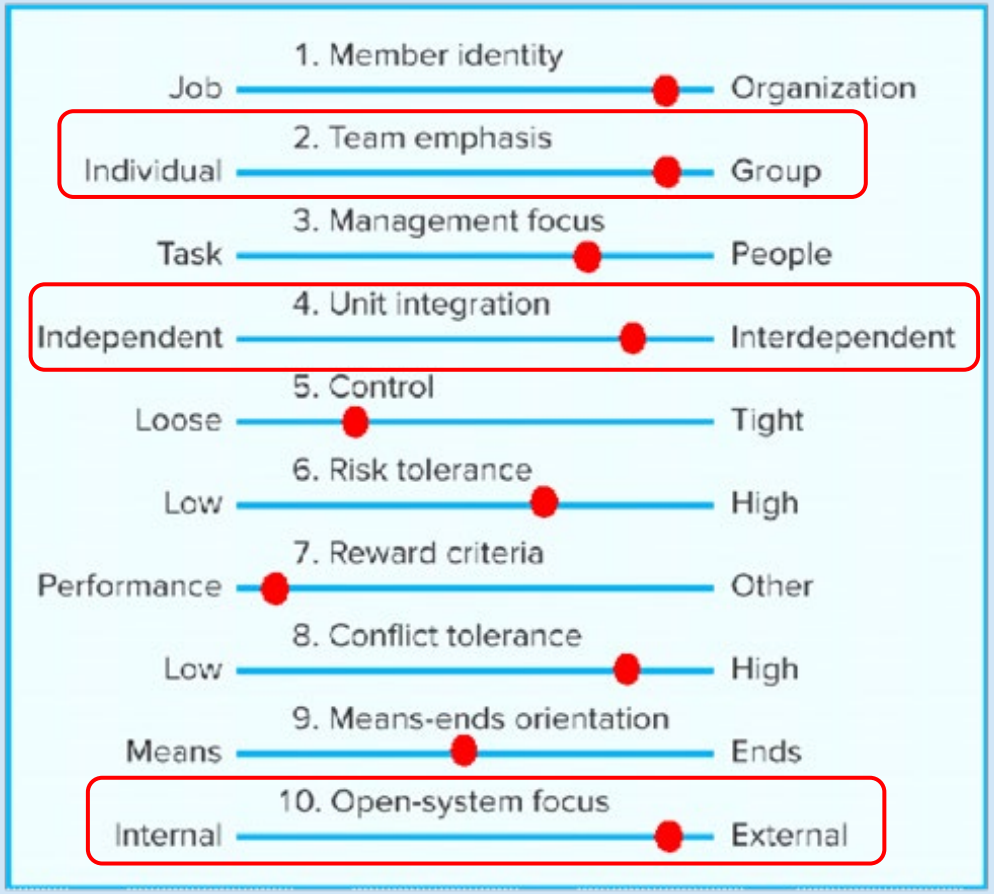
The Company

Telemetry Inc.

Business: Remote patient monitoring (RPM) products and services for patients with chronic conditions (Diabetes, Heart Disease, and Congestive heart failure, etc.)

Mission: To deliver the highest quality products and consistent real-time monitoring services to patients with chronic diseases and to serve as a reliable liaison between patients and healthcare providers.

Culture:



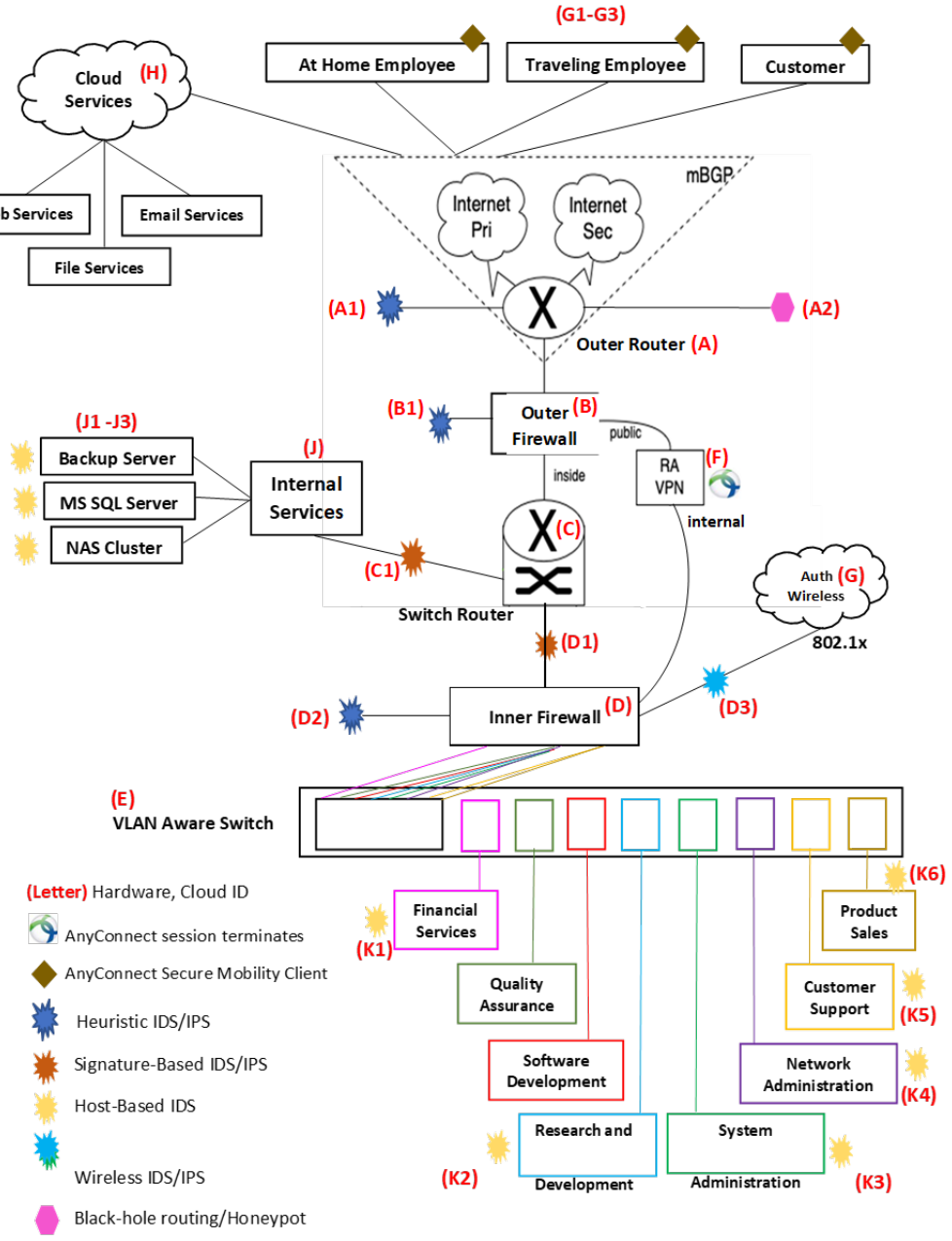
The Infrastructure

A Secure Network

- Block undesirable network traffic at edge
- Spin off some services to Cloud
- Establish first layer defense
- Selectively routing traffic
- Institute second layer defense
- Compartmentalize internal network traffic
- IPS/IDS: Signature, Heuristic, Wireless
- Install packet sniffers on devices/desktops handling confidential/sensitive information

**See the project "Data Security — A Secure Network Architecture" for the design of this infrastructure.*

Reference Infrastructure



The Project Classification and Weighted Score at Telemetry Inc.

Project 3 Implementation of a Secure Network (This project is Project 3 at Telemetry Inc.)

- Strategic and Operational
- Mission Critical – highest data security and reliable network communications
- Increase market share and stimulate sales growth
- A new competitive advantage
- High priority for Telemetry to devote resources to (see below: priority is based on weighted total)
- Project Score Matrix (see below, Project 3 has the highest weighted total of all.)

Criteria	Stay within core competencies	Stategic fit	Urgency	Enhance operations	Gain new customers	Gain new healthcare providers	ROI of 15% plus	Weighted Total
Weight	*1.0*	*1.5*	*1.5*	*1.0*	*2.0*	*2.0*	*1.0*	-
Project 1	10	30	10	25	5	5	15	**130.0**
Project 2	15	25	5	15	15	15	10	**145.0**
Project 3	5	15	10	10	30	20	10	**162.5**
Project 4	20	10	25	10	15	10	10	**142.5**
Project 5	10	5	20	15	15	15	20	**142.5**
Project 6	15	15	10	20	10	5	25	**127.5**
…								
Project n	15	20	35	15	5	5	5	**137.5**

Sum of Weight = 10
Sum of Score per Project = 100
Sample calculation: Weighted total (Project 3) = 1.0 * 5 + 1.5 * 15 + 1.5 * 10 + 1.0 * 10 + 2.0 * 30 + 2.0 * 20 + 1.0 * 10 = 162.5

The Stakeholders

Internal Stakeholders

Top management, project managers, functional managers (data management, technical support, customer services, claiming handling, accounting, R&D, etc.), the project team, project sponsors, administrative support groups.

External Stakeholders

Patients, healthcare providers, vendors of components of the proposed security infrastructure, vendors of medical devices used for collecting patients' data, patients' insurance companies, Medicare Administrative Contractors (MAC's - processing Medicare, Medicaid claims), consultants, and contractors.

Module Two

(File: MPP_Team 1.mpp)

Work Breakdown Structure
Outsourcing
Time/Cost Estimate
Network Diagram
Crashing Project

This section covers: (1) A work breakdown structure (WBS) which breaks down the project into individual tasks. Task Number or ID or Task ID are used interchangeably throughout this presentation to identify a specific task of this project. (2) The task to be outsourced (3) Time/cost estimate of each task (4) A network diagram, a workflow diagram based on activity-on-node (AON) method. (5) Activities selected for crashing the project when the situation arises.

Terminology Work Plan and Time/Cost Estimate

Work Breakdown Structure (WBS)
A hierarchical method that successively subdivides the work of the project into smaller detail.

Outsourcing
Contracting for the use of external sources (skills) to assist in implementing a project.

Time/Cost Estimate is the estimate of the duration and cost of each activity/task. Human cost is the only cost included in the estimate

Network Diagram is constructed using activity-on-node AON method for drawing project networks. The activity/task is on the node (rectangle).

Critical Path The longest activity path(s) through the network.

Crashing Project refers to expediting certain activities/tasks of the project to accelerate the progress of the project. The timing and the activities/tasks must be well-thought-out.

Development of WBS

Two Phases: (1) Design (2) Components Gathering

Phase 1 Design Infrastructure

(a) Network Environments
(Internal and external)

(b) Business Requirements
(accessibility, services, compliance)

(c) Sketch a Schematic and Seek Feedback
(components & placements,
customer meetings)

(d) Revise/Document the Schematic

Phase 2 Locate Component

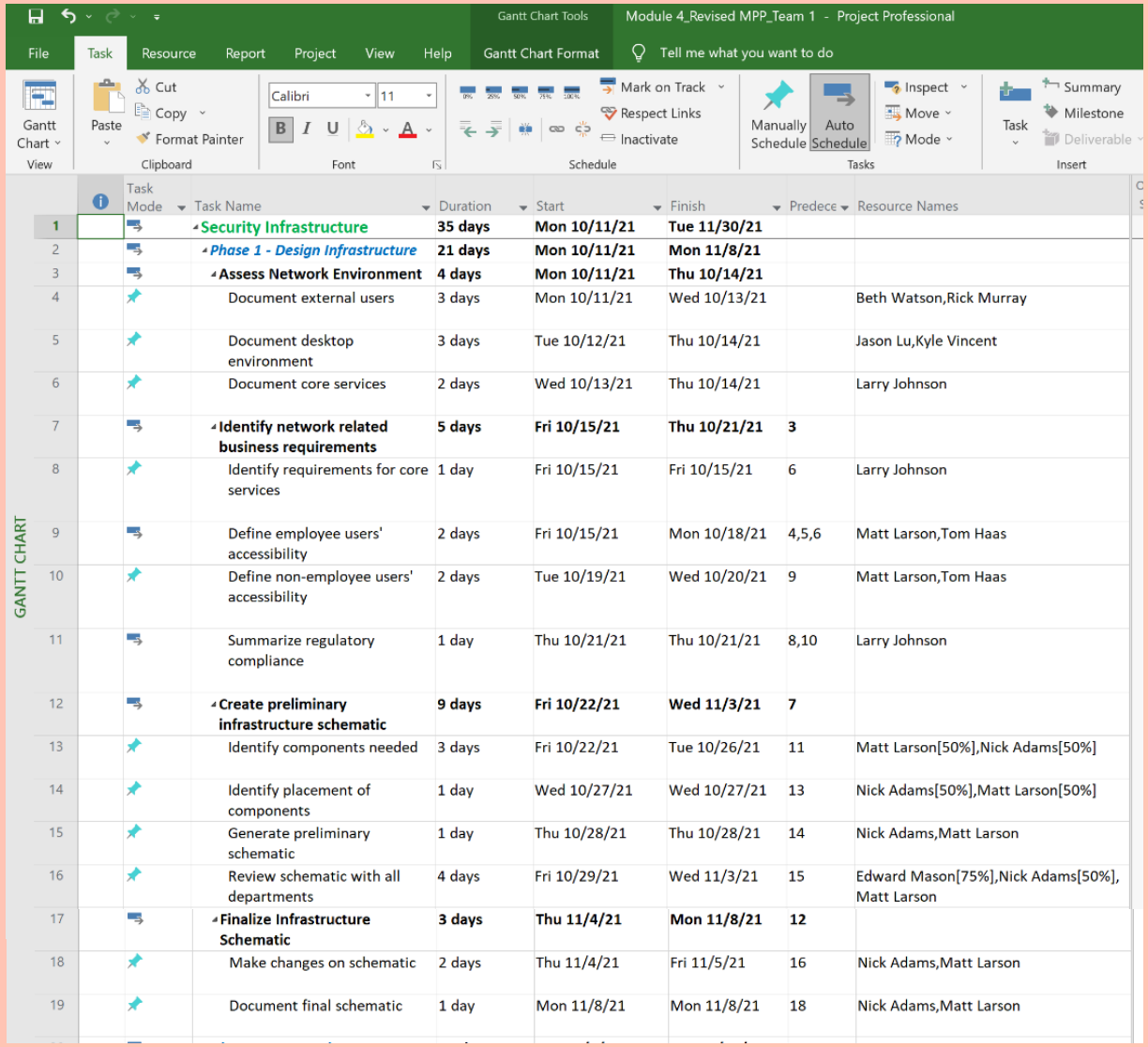
(a) Determine the features
(hardware software, Cloud services)

(b) Select vendors & service providers

(c) Negotiate prices and terms
(vendor agreement)

(d) Documentation and procurements
(reports, purchase requests)

Work Breakdown Structure



	Task Mode	Task Name	Duration	Start	Finish	Predece	Resource Names
1		**Security Infrastructure**	**35 days**	**Mon 10/11/21**	**Tue 11/30/21**		
2		***Phase 1 - Design Infrastructure***	**21 days**	**Mon 10/11/21**	**Mon 11/8/21**		
3		**Assess Network Environment**	**4 days**	**Mon 10/11/21**	**Thu 10/14/21**		
4		Document external users	3 days	Mon 10/11/21	Wed 10/13/21		Beth Watson,Rick Murray
5		Document desktop environment	3 days	Tue 10/12/21	Thu 10/14/21		Jason Lu,Kyle Vincent
6		Document core services	2 days	Wed 10/13/21	Thu 10/14/21		Larry Johnson
7		**Identify network related business requirements**	**5 days**	**Fri 10/15/21**	**Thu 10/21/21**	**3**	
8		Identify requirements for core services	1 day	Fri 10/15/21	Fri 10/15/21	6	Larry Johnson
9		Define employee users' accessibility	2 days	Fri 10/15/21	Mon 10/18/21	4,5,6	Matt Larson,Tom Haas
10		Define non-employee users' accessibility	2 days	Tue 10/19/21	Wed 10/20/21	9	Matt Larson,Tom Haas
11		Summarize regulatory compliance	1 day	Thu 10/21/21	Thu 10/21/21	8,10	Larry Johnson
12		**Create preliminary infrastructure schematic**	**9 days**	**Fri 10/22/21**	**Wed 11/3/21**	**7**	
13		Identify components needed	3 days	Fri 10/22/21	Tue 10/26/21	11	Matt Larson[50%],Nick Adams[50%]
14		Identify placement of components	1 day	Wed 10/27/21	Wed 10/27/21	13	Nick Adams[50%],Matt Larson[50%]
15		Generate preliminary schematic	1 day	Thu 10/28/21	Thu 10/28/21	14	Nick Adams,Matt Larson
16		Review schematic with all departments	4 days	Fri 10/29/21	Wed 11/3/21	15	Edward Mason[75%],Nick Adams[50%],Matt Larson
17		**Finalize Infrastructure Schematic**	**3 days**	**Thu 11/4/21**	**Mon 11/8/21**	**12**	
18		Make changes on schematic	2 days	Thu 11/4/21	Fri 11/5/21	16	Nick Adams,Matt Larson
19		Document final schematic	1 day	Mon 11/8/21	Mon 11/8/21	18	Nick Adams,Matt Larson

Phase 1

Phase 2

GANTT CHART

20	***Phase 2 - Determine specifications and identify vendors***	**14 days**	**Tue 11/9/21**	**Tue 11/30/21**	**2**	
21	**Determine required features of components**	**2 days**	**Tue 11/9/21**	**Wed 11/10/21**	**17**	
22	Determine desired features of hardware	2 days	Tue 11/9/21	Wed 11/10/21	19	Nick Adams,Larry Johnson [50%]
23	Determine desired features of software	2 days	Tue 11/9/21	Wed 11/10/21	19	Matt Larson,Ryan Fletcher
24	Determine desired features for core Cloud services	2 days	Tue 11/9/21	Wed 11/10/21	19	Rick Murray,Larry Johnson [50%]
25	**Identify vendors of components**	**5 days**	**Thu 11/11/21**	**Wed 11/17/21**	**21**	
26	Identify options for hardware components	3 days	Thu 11/11/21	Mon 11/15/21	22	Nick Adams
27	Identify opetions for software components	4 days	Thu 11/11/21	Tue 11/16/21	23	Oliver Smith
28	Identify options for core Cloud services	2 days	Thu 11/11/21	Fri 11/12/21	24	Rick Murray
29	Select vendor/model for hardware	1 day	Tue 11/16/21	Tue 11/16/21	26	Nick Adams,Tom Haas[50%]
30	Select vendor/version for software	1 day	Wed 11/17/21	Wed 11/17/21	27	Tom Haas[50%],Oliver Smith
31	Select providers for core Cloud services	1 day	Mon 11/15/21	Mon 11/15/21	28	Larry Johnson
32	**Document information on selected components**	**7 days**	**Thu 11/18/21**	**Tue 11/30/21**	**25**	
33	Negotiate Prices and Terms	3 days	Thu 11/18/21	Mon 11/22/21	29,30,31	TCI
34	Create a report on components	2 days	Tue 11/23/21	Wed 11/24/21	33	Larry Johnson ,Tom Haas
35	Prepare purchase requests	2 days	Mon 11/29/21	Tue 11/30/21	34	Oliver Smith[50%],Tom Haas[50%]

Outsourcing

Task: Task 33, negotiate prices and terms

Service Provider: Tech Consulting Inc. (TCI)

Specialty - Negotiating for technological products and services

Justifications

Tough Economic conditions - supply chain disruptions, labor shortage, inflation, etc. call for experienced and knowledgeable professionals to complete this task on schedule.

Benefits

Better prices and terms on the components
Shorter duration of the task and cost savings
Availability of Telemetry's resources for other projects

Development of Time/Cost Estimates

Bottom-up Approach

Parametric Procedure Applied to Specific Tasks Method

Conditions

- Cost of equipment is excluded from the cost of this project because it only involves Telemetry's existing properties.
- Cost of labor is the only source of the cost of this project.
- Hourly rates of labor are derived from local or national average
- Estimate of time is based on the nature and scale of the work.

Time/Cost Estimate

Phase 1

Task Number	Task Name	Duration, days	Resource Names	Cost
1	Security Infrastructure	35		$ 26,289.12
2	*Phase 1 - Design Infrastructure*	21		*$ 15,416.72*
3	**Assess Network Environment**	4		**$ 3,596.80**
4	Document external users	3	Beth Watson,Rick Murray	$ 1,344.48
5	Document desktop environment	3	Jason Lu,Kyle Vincent	$ 1,485.12
6	Document core services	2	Larry Johnson	$ 767.20
7	**Identify network related business requirements**	5		**$ 3,881.44**
8	Identify requirements for core services	1	Larry Johnson	$ 383.60
9	Define employee users' accessibility	2	Matt Larson,Tom Haas	$ 1,557.12
10	Define non-employee users' accessibility	2	Matt Larson,Tom Haas	$ 1,557.12
11	Summarize regulatory compliance	1	Larry Johnson	$ 383.60
12	**Create preliminary infrastructure schematic**	9		**$ 5,844.24**
13	Identify components needed	3	Matt Larson[50%],Nick Adams[50%]	$ 1,047.12
14	Identify placement of components	1	Nick Adams[50%],Matt Larson[50%]	$ 349.04
15	Generate preliminary schematic	1	Nick Adams,Matt Larson	$ 698.08
16	Review schematic with all departments	4	Edward Mason[75%],Nick Adams[50%],Matt Larson	$ 3,750.00
17	**Finalize Infrastructure Schematic**	3		**$ 2,094.24**
18	Make changes on schematic	2	Nick Adams,Matt Larson	$ 1,396.16
19	Document final schematic	1	Nick Adams,Matt Larson	$ 698.08

Phase 2

20	*Phase 2 - Determine specifications and identify vendors*	14		*$ 10,872.40*
21	**Determine required features of components**	2		**$ 3,380.00**
22	Determine desired features of hardware	2	Nick Adams,Larry Johnson [50%]	$ 1,081.68
23	Determine desired features of software	2	Matt Larson,Ryan Fletcher	$ 1,466.56
24	Determine desired features for core Cloud services	2	Rick Murray,Larry Johnson [50%]	$ 831.76
25	**Identify vendors of components**	5		**$ 4,173.44**
26	Identify options for hardware components	3	Nick Adams	$ 1,047.12
27	Identify opetions for software components	4	Oliver Smith	$ 1,212.80
28	Identify options for core Cloud services	2	Rick Murray	$ 448.16
29	Select vendor/model for hardware	1	Nick Adams,Tom Haas[50%]	$ 563.80
30	Select vendor/version for software	1	Tom Haas[50%], Oliver Smith	$ 517.96
31	Select providers for core Cloud services	1	Larry Johnson	$ 383.60
32	**Document information on selected components**	7		**$ 3,318.96**
33	Negotiate Prices and Terms	3	TCI	$ 960.00
34	Create a report on components	2	Larry Johnson ,Tom Haas	$ 1,626.24
35	Prepare purchase requests	2	Oliver Smith[50%], Tom Haas[50%]	$ 732.72

Quality of Time/Cost Estimates

Overall Quality of Our Estimates

- Match the task with the expertise of team members.
- Research national and local hourly rates for team members' professions
- Assign resources on MS Project, no overloaded resources

Estimates in Doubt

- Task 4 Document external users

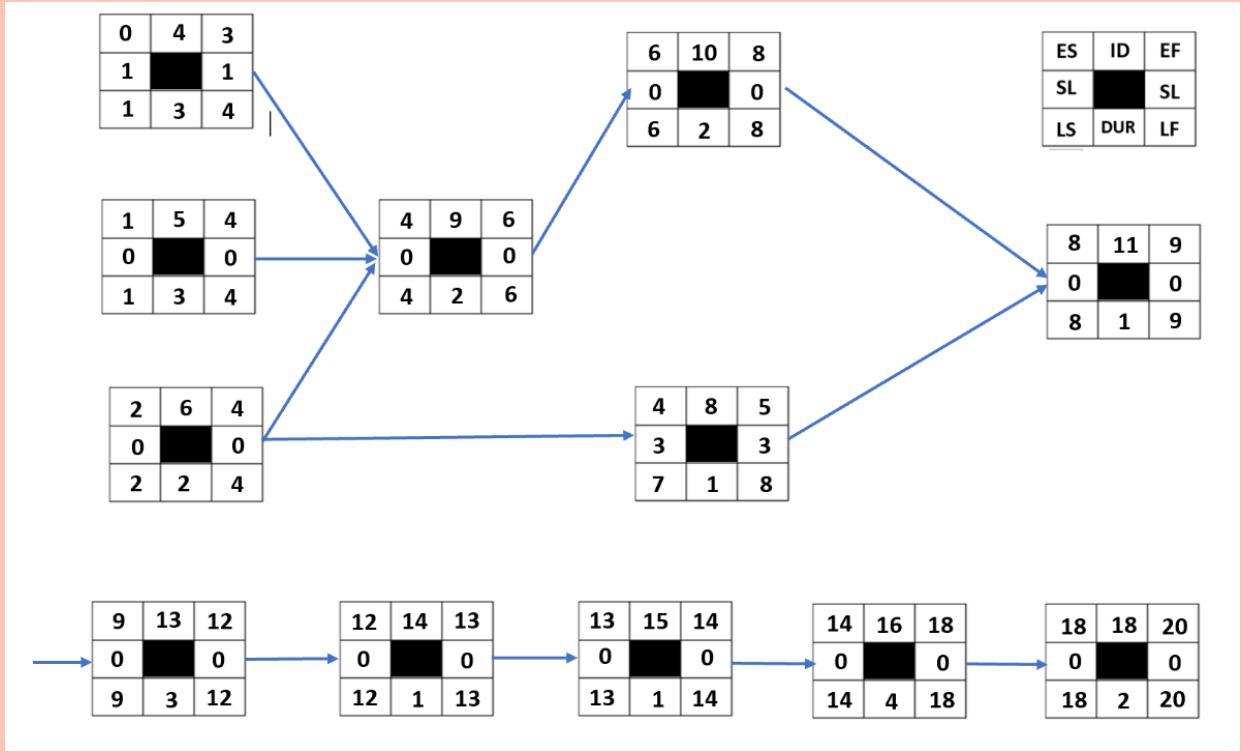
  Potential changes due to large variations in external network environment
- Task 11 Summarize regulatory requirements

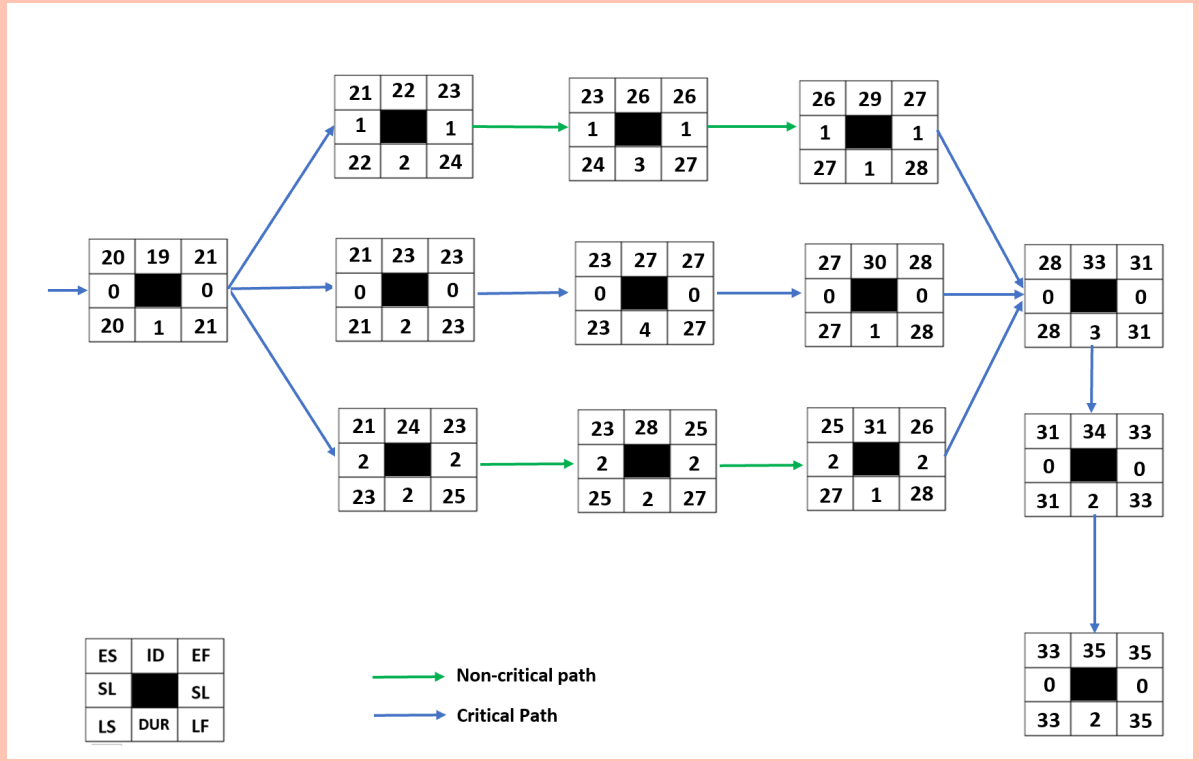
  Possible delay due to the availability of legal experts
- Task 16 Meeting with functional departments

  Unexpected delay due to special situations in their own departments

Network Diagram

Methods: Activity-on-node (AON) & Critical Path Analysis





*Project Management, The Managerial Process, by Erik W. Larson and Clifford Gray, 8th edition

** How to do Critical Path analysis? https://www.youtube.com/watch?v=b2eKBP77P1I

Crashing the Project

When

- Cyberattacks on the networks of peers in same industry
- Incident at Telemetry
- Suspicious network activities detected

Tasks to crash (selected via cost slope analysis)

- Task 6 - Document core services
- Task 13 - Identify components needed
- Task 26 - Identify options for hardware components
- Task 27 - Identify options for software components
- Task 35 - Prepare purchase requests

Consequences

- Quality and Performance of the Project could suffer.

Module Three

Risk Assessment

This section includes the types of risk events associated with this project, analysis of those risks, responses to each type of risks, things to know should a risk event occur (responsibility, impact, and likelihood) and a risk matrix.

Types of Risk Events

Technical Risk

- Changes in network environments: *resulting from rapid advancement of Telemetry and their industry*
- Servers going down: *a chance event of normal business operation*

Operational Risk

- Loss of key personnel: *resignation, illness, reassignment*
- Schedule Clash: *Shift in priority, emergency*

Economic (Cost & Time) Risk

- Higher price and delayed delivery: *surged inflation, supply chain disruption, labor shortage*

Cyberattacks

- Malware, SQL injection attack, DoS, Phishing: *hackers aiming at confidential information and sensitive data as well as ransom payment*

Risk Analysis

Risk Event	Likelihood	Impact	Risk Response	Who is responsible
External network environment change	Low	Medium	Retaining: Accept risk	Project Manager
Desktop environment change	Low	Low	Retaining: Accept risk	Project Manager
Price inflation and term change (all components)	Medium	Low	Transferring: Request vendor agreement	Project Manager
Servers (Data, File, etc.) go down	Low	High	Mitigating: Perform server diagnostic	IT Manager
Loss of key project personnel	Medium	High	Retaining: Accept risk	Manager of Human Resources
Schedule clash	Medium	Medium	Mitigating: Negotiate priority, update schedule	Project Manager
Malware attack (include. Ransomware attack)	Very High	Very High	Mitigating: Perform website security audits regularly	Manager of cybersecurity Team
SQL injection attack	High	Very High	Mitigating: Avoid dynamic SQL; sanitize user inputs; limit database permissions and privileges	Manager of cybersecurity Team
Denial-of-service (DoS) attack	Medium	Very High	Mitigating: Monitor network traffic, regularly check the health of systems and applications	Manager of cybersecurity Team
Phishing	High	High	Mitigating: Filter suspicious attachments and malicious URLs	Manager of cybersecurity Team

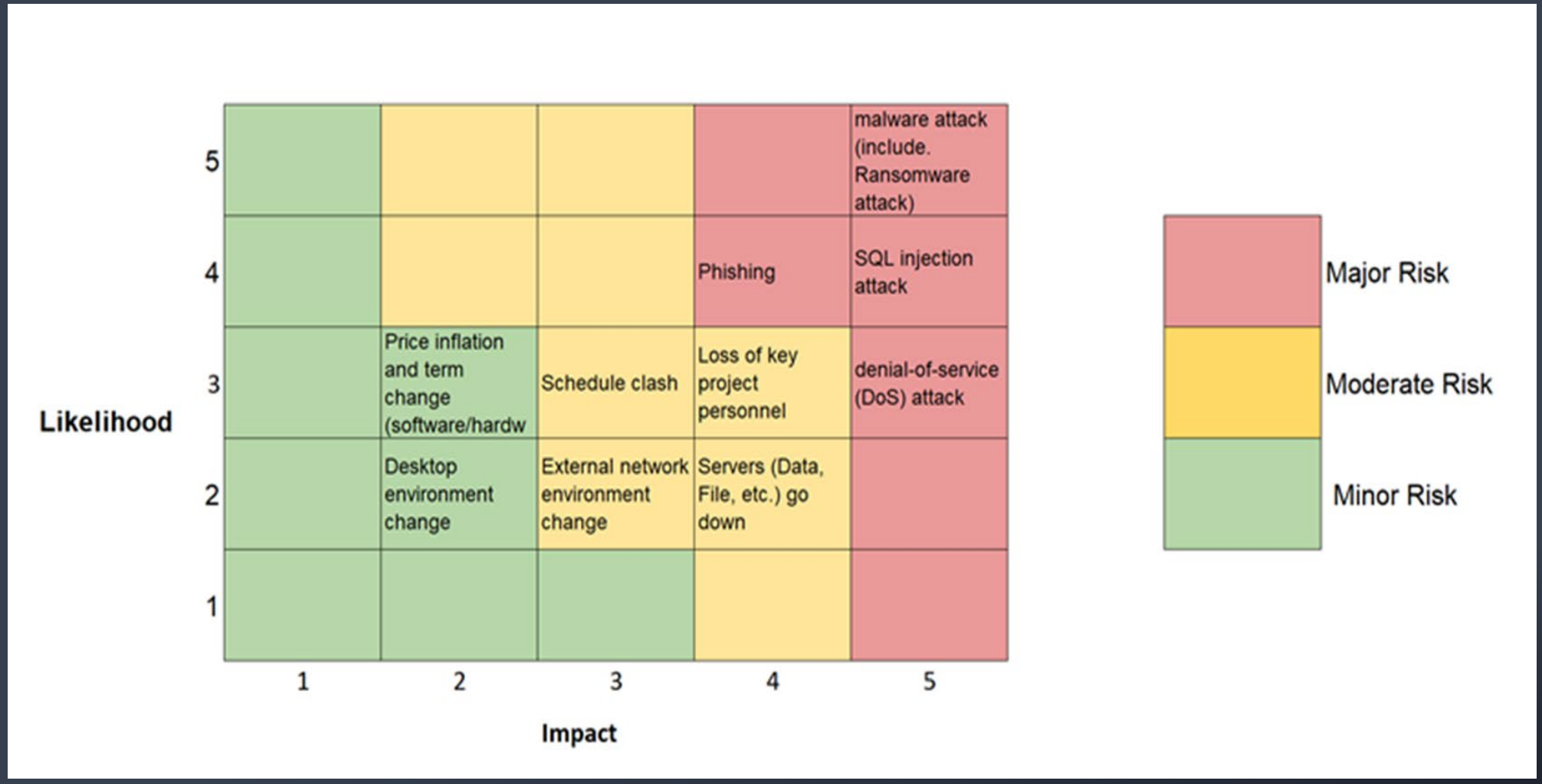
Risk Response

Risk Event	Risk Response	Inappropriate Responses
Price inflation and term change	Transferring: Request vendor agreement	Retaining; Avoiding
Loss of key project personnel	Retaining: Accept risk	Mitigating; Avoiding
Schedule clash	Mitigating: Negotiate priority, update schedule	Retaining; Avoiding
SQL injection attack	Mitigating: Avoid dynamic SQL; sanitize user inputs; limit database permissions and privileges	Retaining; Avoiding

Responsibility, Impact, and Likelihood

Risk Event	Likelihood	Impact	Who is responsible
Price inflation and term change	Medium	Low	Project Manager
Loss of key project personnel	Medium	High	Manager of Human Resources
Schedule clash	Medium	Medium	Project Manager
SQL injection attack	High	Very High	Manager of cybersecurity Team

Risk Matrix


Likelihood
5
4
3
2
1
malware attack (include. Ransomware attack)
Phishing
SQL injection attack
Price inflation and term change (software/hardw
Schedule clash
Loss of key project personnel
denial-of-service (DoS) attack
Desktop environment change
External network environment change
Servers (Data, File, etc.) go down
1
2
3
4
5
Impact
Major Risk
Moderate Risk
Minor Risk

Module Four

Budgeting Monitoring Forecast

In this section, first, a budget is created for the project. Then, several vehicles for monitoring the progress of the project: (1) status report for Day 7 (2) status report for Day 19 (3) performance report by Day 19 (4) forecast on cost are presented. The negative schedule variance (SV) and negative cost variance (CV) observed on Day 19 status report were validated. Overall, the conclusions derived from the works in this section are: (1) On Day 7, the project is both on budget and on schedule (in “dollar” term). (2) By Day 19, the project shows slight delay (in “dollar” term) and over budget. (3) The forecast for the cost of completing this project is $987.97 over budget.

Terminology Budgeting Monitoring Forecast

Time-phased Baseline Budget is a budget that has a cost baseline derived from the WBS and project schedule. The budgeted costs are distributed to mirror the project schedule.
BAC Budgeted cost at completion. The total budgeted cost of the baseline or project cost accounts.
EAC Estimated cost at completion
AC Actual cost of the work (a task) completed.
EV (Earned value) for a task is the budgeted value of the work accomplished.
PV (Planned Value) The planned time-phased baseline of the value of the work scheduled. Previously this was called budgeted cost of work scheduled (BCWS).
Cost Variance (CV) The difference between EV and AC (CV = EV − AC). Tells if the work accomplished cost more or less than was planned at any point over the life of the project.
Schedule Variance (SV) The difference between the earned value and the baseline to date where SV = EV − PV. Schedule variance contains no critical path information.
Status Report a snapshot of a project at a specific time. The status report uses EV at work package level to measure schedule and cost performance

Terminology Budgeting Monitoring Forecast

Performance Indices

Scheduling Performance Index (SPI)
The ratio of work performed to work scheduled (EV/PV).

Cost Performance Index (CPI)
The ratio of work performed to actual costs (EV/AC).

Percent Complete Index Budgeted Costs (PCIB) (EV/BAC)
The amount of work accomplished based on project budget (EV/BAC).

VAC (Cost variance at completion) indicates expected actual over- or underrun cost at completion.

Cost Variance (CV) The difference between EV and AC (CV = EV − AC). Tells if the work accomplished cost more or less than was planned at any point over the life of the project.

EAC_f forecasted total cost of completion

VAC_f forecasted cost variance at completion

Time-phase Baseline Budget

(BAC = $26289.12)

ID	Budget ($)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
4	1344.48		448.16	448.16	448.16																
5	1485.12			495.04	495.04	495.04															
6	767.20				383.60	383.60															
8	383.60						383.60														
9	1557.12						778.56	778.56													
10	1557.12								778.56	778.56											
11	383.60										383.60										
13	1047.12											349.04	349.04	349.04							
14	349.04														349.04						
15	698.08															698.08					
16	3750.00																937.50	937.50	937.50	937.50	
18	1396.16																				698.08
19	698.08																				
*BAC =	26289.12																				
**	denotes those tasks (Task 11 and Task 13) that were made to cost more than the budget to create the scensrio of "over budget" for Day 19 Status Report.																				
***	Task 11 was made to have taken 2 days instead of 1 day as planned to start the scensrio of "behind schedule" for Day 19 Status Report																				

Conclusions:

- **Tasks, Behind Schedule:** Tasks 11 and 13, both took one extra day to complete.
- **Tasks, Over Budget:** Task 11, from $383.50 to $500; Task 13, from $1396.16 to $1047.12

Status Report

Day 7

Status Report: End of Day 7								
Task	**Actual % Complete**			**EV**	**AC**	**PV**	**CV**	**SV**
4		Finished		1344.48	1344.48	1344.48	0.00	0.00
5		Finished		1485.12	1485.12	1485.12	0.00	0.00
6		Finished		767.20	767.20	767.20	0.00	0.00
8		Finished		383.60	383.60	383.60	0.00	0.00
9		Finished		1557.12	1557.12	1557.12	0.00	0.00
10		50%		778.56	778.56	778.56	0.00	0.00
11		0%		0.00	0.00	0.00	0.00	0.00
Cumulative Total				6316.08	6316.08	6316.08	0.00	0.00

Conclusion: At the end of Day 7, our project is on budget and on schedule on the dollar.

Status Report

Day 19

Status Report: End of Day 19								
Task	Actual % Complete		EV	AC	PV	CV	SV	
4	Finished		1344.48	1344.48	1344.48	0.00	0.00	
5	Finished		1485.12	1485.12	1485.12	0.00	0.00	
6	Finished		767.20	767.20	767.20	0.00	0.00	
8	Finished		383.60	383.60	383.60	0.00	0.00	
9	Finished		1557.12	1557.12	1557.12	0.00	0.00	
10	Finished		1557.12	1557.12	1557.12	0.00	0.00	
11	Finished		383.60	500.00	383.60	-116.40	0.00	
13	Finished		1047.12	1396.16	1047.12	-349.04	0.00	
14	Finished		349.04	349.04	349.04	0.00	0.00	
15	Finished		698.08	698.08	698.08	0.00	0.00	
16	75%		2812.50	2812.50	3750.00	0.00	-937.50	
18	0%		0.00	0.00	698.08	0.00	-698.08	
19	0%		0.00	0.00	0.00	0.00	0.00	
Cumulative Totals			12384.98	12850.42	14020.56	-465.44	-1635.58	

Conclusion: At the end of Day 19, our project is $465.44 over budget and **$1635.38** behind schedule.

Performance Indexes

Performance Indexes Summary										
Day					EV	AC	PV	SPI	CPI	PCIB
7					6316.08	6316.08	6316.08	1.00	1.00	24%
19					12384.98	12850.42	14020.56	0.88	0.96	47%
*BAC =	26289.12									
**SPI = EV / PV = 12384.98 / 14020.56 = 0.88 (Day 19)										
***CPI = EV / AC = 12384.98 / 12850.42 = 0.96										
****PCIB =EV / BAC = 12384.98 / 26289.12 = .47 or 47% (Day 19)										

Conclusion: On Day 19, SPI < 1.00 indicates that the project is behind schedule. the cost at completion will be over budget. In addition, CPI < 1.00 means that the project is over cost. Moreover, PCIB = 47% confirms that the work accomplished represents 47% of the total budgeted (BAC) dollars to date. Recall that on Time/Cost Estimate slide, the budgeted days for the project is 35 days. So, on day 19, it has passed midpoint of the project, but less than 50% work is done. This is another sign that the project is **behind the schedule by day 19.**

Forecast

Cost at Completion

Forecast: Cost at Completion									
					EAC_f	**VAC_f**			
					27277.09	-987.97			
*EAC_f = (BAC – EV) / (EV/AC) + AC = (26289.12 - 12384.98)/(12384.98/12850.42) + 12850.42 = 27277.09									
**VAC_f = BAC - EAC_f = 26289.12 - 27277.09 = -987.97									

Conclusion: Based on the forecast, the cost at completion will be $27277.09 (compared to $26289.12, budgeted cost). Thus, the project will be overbudget by $987.97 at the closing of the project.

Does Status Report Reflect the Reality?

Day 19 Status Report *Does this status report accurately reflect the reality?*

- Negative CV and SV => Over budget and behind schedule, in "$"

(I) SV (Schedule variance)

Does delay in "dollar" indicated by negative SV also mean the project is delayed in "time"?

- Relationship of cost and time, not one-on-one → Negative SV not always means behind schedule in "time"
- Both behind-schedule tasks on critical paths → Behind schedule, in "time"
- Negative SV **accurately captures** this project being **behind schedule**.

(II) CV (Cost Variance)

Does a negative CV (overbudget) on Day 19 also mean the project is truly over budget by then?

- CPI, most reliable, stable index from 20% complete point
- Day 19: PCIB = 47% complete → CPI = 0.96 (< 1) → confirm that the project is over budget
- Negative CV **accurately captures** this project being **over budget**.

Module Five

Project Management

(Conventional vs. Agile)

This section begins by introducing the elements of Agile Project Management (Agile PM, see description on the Terminology slide). To apply Agile PM concept, this project was first divided into four sprints. Then, the product backlogs were created for the start of the project and the beginning of Sprint 3 to show the progress up to the time when Sprint 3 started. Also, two sprint backlogs were generated, one, when Sprint 3 began and the other, after three Scrum meetings have taken place during Sprint 3. The latter identified one task behind the schedule. Next, the release burndown chart shows the remaining work by sprints while the Sprint 3 burndown chart of expected remaining work vs. actual remaining work indicates that more actual work remaining than planned. Moreover, a Kanban was constructed to prioritize and manage the workflow. Lastly, this section ends with the conclusion that the better type of project management for Phase 1 and Phase 2 are Agile PM and Conventional PM, respectively.

Terminology Agile Project Management

- **Agile Project Management (Agile PM)** A family of interactive, iterative, incremental development methods for completing projects. The project is divided into sprints (iterations) and daily scrum meetings are held to review current sprint. Product and sprint backlogs are created to track the progress of the project and the sprint. Release and sprint burndown charts are plotted to visualize the status of the project and sprint in terms of “time.”
- **Conventional Project Management (Conventional PM)** uses waterfall method to complete projects by finishing one task/activity before starting the next one.
- **Scrum** A scaled agile technique that offers a way to connect multiple teams who need to work together to deliver complex solutions
- **Sprint** a fixed length of time (between 1-4 weeks) allocated to a team to complete specific tasks and achieve goals. A sprint represents an iteration in Agile PM.

Terminology Agile Project Management cont'd

- **Product Backlog** A prioritized list of project requirements with estimated time to turn them into complete product functionality.
- **Sprint Backlog** A list of tasks that defines a Scrum team's work for a sprint. Each task identifies those responsible for doing the work and the estimated amount of work remaining on the task on any given day during the sprint. All tasks listed on the sprint backlog must be completed to deliver a functional feature.
- **Release Burndown Chart** The trend of work remaining across time. In a release or product, the source of data is the product backlog with work remaining tracked on the vertical axis and number of sprints on the horizontal axis.
- **Sprint Burndown Chart** The trend of work remaining across time in a sprint. The source of data is the sprint backlog with work remaining tracked on the vertical axis and days of a sprint on the horizontal axis.
- **Kanban** A Japanese lean management approach that helps a team prioritize and manage the workflow.

Sprints

Sprint is a fixed length of time allocated to a team to complete specific tasks and achieve goals. A sprint is an iteration on Agile PM. In this project, a sprint is defined ranging from 7 days to 12 days.

Project: Network Security Infrastructure

Description of Sprints

ID	Product	Sprint	Estimated Days
3	Network Environment Assessment Record	1	4
7	Report on Network Related Business Requirements	1	5
12	Preliminary Infrastructure Schematic with Feedbacks	2	9
17	Final Infrastructure Schematic	2	3
21	Report on Required Features of Components	3	2
25	Report on Vendors Identified for All Components	3	5
32	Report on all Information about selected components	4	7

Product Backlog

Project: Network Security Infrastructure
Initial Product Backlog

ID	Product	Priority	Status	Estimated Days	Actual Days
3	Network Environment Assessment Record	1	Not started	4	0
7	Report on Network Related Business Requirements	2	Not started	5	0
12	Preliminary Infrastructure Schematic with Feedbacks	3	Not started	9	0
17	Final Infrastructure Schematic	4	Not started	3	0
21	Report on Required Features of Components	5	Not started	2	0
25	Report on Vendors Identified for All Components	6	Not started	5	0
32	Report on all Information about selected components	7	Not started	7	0

Initial

Project: Network Security Infrastructure
Product Backlog, at the beginning of Sprint 3

ID	Product	Priority	Status	Estimated Days	Actual Days
3	Network Environment Assessment Record	1	Complete	4	5
7	Report on Network Related Business Requirements	2	Complete	5	5
12	Preliminary Infrastructure Schematic with Feedbacks	3	Complete	9	10
17	Final Infrastructure Schematic	4	Complete	3	4
21	Report on Required Features of Components	5	Not started	2	0
25	Report on Vendors Identified for All Components	6	Not started	5	0
32	Report on all Information about selected components	7	Not started	7	0

Sprint 3
(Beginning)

Sprint 3 Backlog

Project: Network Security Infrastructure
Sprint Backlog, at the beginning of Sprint 3

Task ID	Sprint Description	Responsibilities	Actual Days	Remaining Days	Not yet started	In Progress	Finished
22	Determine desired features of hardware	NA, LJ		2	x		
23	Determine desired features of software	ML, RF		2	x		
24	Determine desired features for core Cloud services	RM, LJ		2	x		
26	Identify options for hardware components	NA		3	x		
27	Identify options for software components	OS		4	x		
28	Identify options for core Cloud services	RM		2	x		
29	Select vendor/model for hardware	NA, TH		1	x		
30	Select vendor/version for software	TH, OS		1	x		
31	Select providers for core Cloud services	LJ		1	x		

At the Beginning of Sprint 3

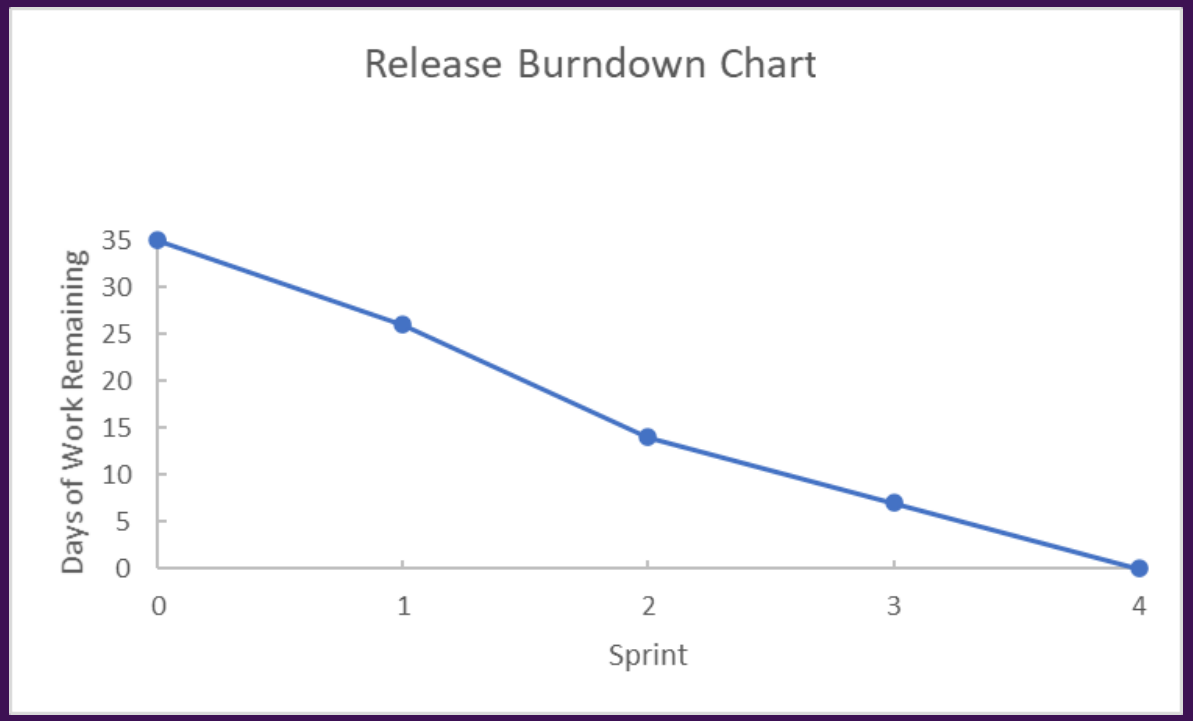
Project: Network Security Infrastructure
Sprint Backlog, Sprint 3, after three Scrum meetings

Task ID	Sprint Description	Responsibilities	Actual Days	Remaining Days	Not yet started	In Progress	Finished
22	Determine desired features of hardware	NA, LJ	2	0			√
23	Determine desired features of software	ML, RF	2	0			√
24	Determine desired features for core Cloud services	RM, LJ	1	1		x	
26	Identify options for hardware components	NA	1	2		x	
27	Identify options for software components	OS	1	3		x	
28	Identify options for core Cloud services	RM		2	x		
29	Select vendor/model for hardware	NA, TH		1	x		
30	Select vendor/version for software	TH, OS		1	x		
31	Select providers for core Cloud services	LJ		1	x		
behind							

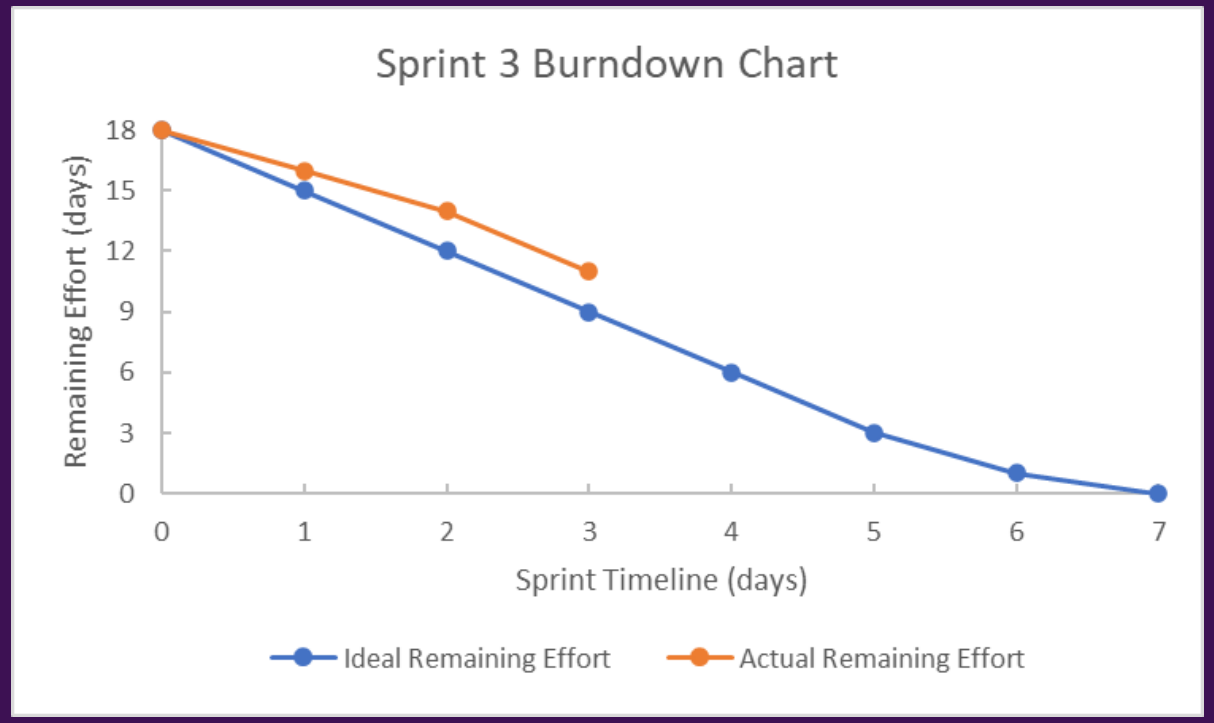
After 3 Scrum Meetings
Task 24 is behind schedule!

Burndown Charts

- **Release Burndown Chart** The trend of work remaining across time. In a release or product, the source of data is the product backlog with work remaining tracked on the vertical axis and number of sprints on the horizontal axis.
- **Sprint Burndown Chart** The trend of work remaining across time in a sprint. The source of data is the sprint backlog with work remaining tracked on the vertical axis and days of a sprint on the horizontal axis.
- **Sprint 3** is behind the schedule with more work than planned remaining.



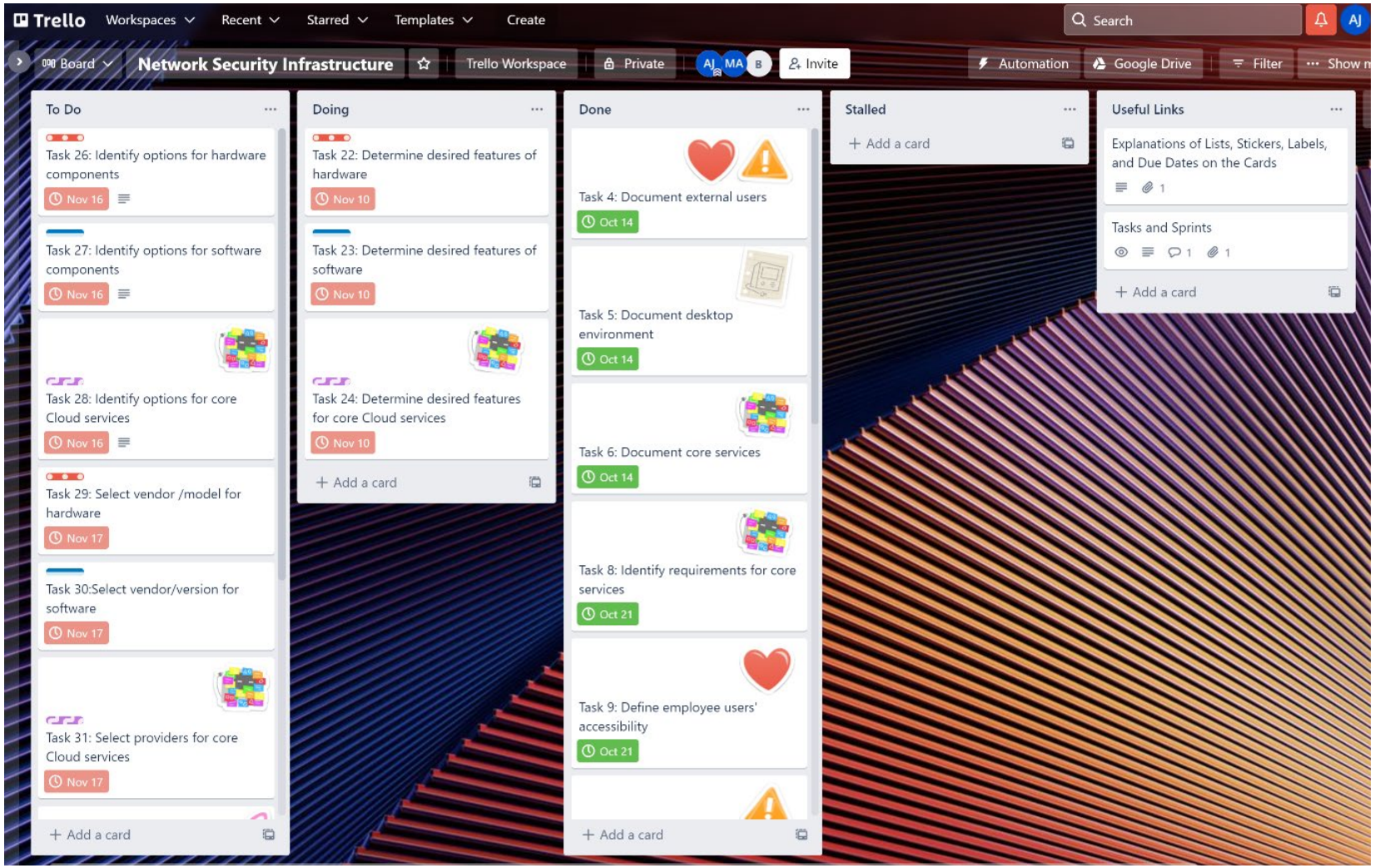
Release Burndown Chart



Sprint Burndown Chart
(Sprint 3)

Kanban

Sprint 3
(Beginning)



Optimal Type of Project Management by Phase

Phase 1 *Agile PM*

Justifications

- Dynamic internal and external network environments
- Gradual refinement of design as requirements are modified
- Easy detection of problems to facilitate fine-tuning the design

Phase 2 *Conventional PM*

Justifications

- A logical order to complete the tasks
- Product cycles of all components longer than lifespan of this project
- A steady pool of vendors of all components needed
- Minimum customer feedback required

Summary

A work breakdown structure (WBS) was built for Phase 1 and Phase 2. In this WBS, Tasks like accessing internal and external network environments, drafting the infrastructure schematic, and revising it according to the feedbacks are in Phase 1. Tasks such as determining the features of the infrastructure, communicating with the vendors of the components, negotiating purchase agreements, documenting all information about components, and submitting procurement requests are in Phase 2.

A budget of $26,289.12 was calculated based on the cost/time estimates of all tasks. The two phases were expected to take 35 days. To save time and reduce cost, the negotiation with vendors on the terms and conditions was recommended to be outsourced. In addition, it was suggested that modifying certain tasks could further accelerate both phases.

As for the risks, technical, operational, economic, and cyber risks were assessed. Risk events were analyzed by likelihood, Impact, response, and staff in charge. In the risk matrix, cyberattacks like malware, SQL injection, denial-of-service, etc. were classified as the major risks while internal operational risks and economic risks were placed in the minor risk category.

Summary cont'd

The progress of the project was monitored by examining status reports generated for Day 7 and Day 19. The Day 7 report indicated the project being on track. However, the Day 19 report revealed $465.44 over budget and $1635.38 (delay in "dollar" term) behind schedule. These led to the performance indices (SPI and CPI) being < 1 (performance index = 1 means on budget and on schedule). Also, 47% (< 50%) of work was completed by Day 19 when the project had passed the midpoint. Moreover, the forecast shows that the project would be over budget by $987.97 at the completion.

To demonstrate how Agile PM can be applied to this project, four sprints were defined. Sprint 3 was chosen to model the activities of Agile PM. Product backlog and Sprint 3 backlogs were created. In the Sprint 3 backlog recorded after three daily Scrum meetings, Task 24 was found to be behind schedule. The corresponding Sprint 3 burndown chart also shows more work remaining than anticipated. The Kanban generated in this project depicts where the project was at the beginning of Sprint 3. Finally, considering the nature of the tasks in Phase 1 and Phase 2, it was justified that Phase 1 should be managed with Agile PM in preparation for numerous potential changes while Conventional PM is the better way to manage the tasks in Phase 2.