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Group #1 - Milestone 1 (Planning Phase)

1.) System Request - Service Personnel Management System (SPMS)

Project Sponsor:	- Thomas Tong, Expert Research Engineer of Agilent Technologies.
Business Need:	- SPMS has to be able to manage the training, scheduling and maintenance of service engineers.
Business Requirements:	- Be able to operate a database - Be available to students with proper developmental tools
Business Value: System is expected to greatly improve facilitation of training for the service engineers, as well as scheduling and management carried out by their respective field supervisors, as well as improve user interface for clients creating SOs. This will allow employees to handle more service orders, improve customer satisfaction and reduce costs by increasing overall efficiency of business processes within the company. Estimation of tangible benefits to the company after four years: - $5,000,000 increase in income from services - $1,000,000 saved from customer complaints - $2,000,000 saved from improved efficiency and integration of SE training program	
Special Issues or Constraints: - Students must have a basic knowledge of programming before learning how to use the system. - Deciding who can be granted full admin access	

2.) Feasibility Analysis

Technical Feasibility: Can We Build It?

This project will contain a low level of risk due to the advancement of technology in the recent years. Technology is advancing every year and the number of proficient technicians and

developers also increase. The IT department will recruit the employees that best fit our team and are well rehearsed with the technology we will be utilizing. The size of the project group would be around 5-6 people, so the project size is considered medium risk. Current size of the team makes it easier to communicate and integrate thoughts and ideas. Being able to communicate ideas effectively will make this project go smoother and make the group work together cohesively. We will avoid compatibility issues due to the fact we have a few employees that are familiar with the current technology and will be able to work effectively with the system.

Economic Feasibility: Should We Build it?

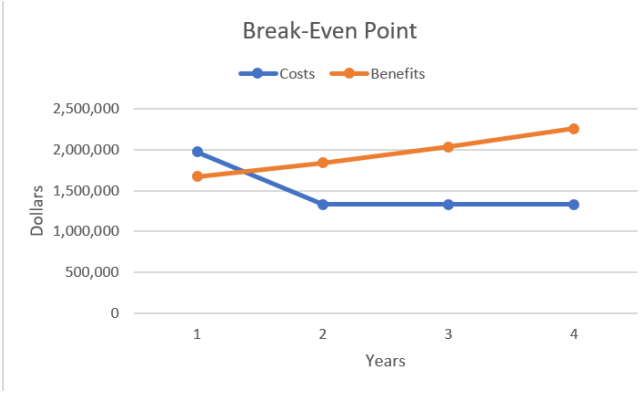
First, we must identify the costs and benefits (both tangible and intangible) of building the system:

Development Costs	**Operational Costs**
● Servers (Apache/NGINX) ● Domain Names ● Database License ● Application Development Labor	● Advertising ● Service Equipment (Tools) ● Office Supplies ● Rent ● Salaries - SE, FP ● Service Vehicles ● Travel Costs ● Utilities
Tangible Benefits	**Intangible Benefits**
● Increased Income from Services ● Reduction in Customer Complaints ● Reduction in Staff	● Knowledgeable/Skilled Employees ● Increased Customer Satisfaction ● Better System Reliability

As we can see, there are two main types of costs (“Development” - from building the SPMS software applications, and “Operational” - costs that come from actually servicing repairs/running the brick-and-mortar business).

Now we can begin to assign values to these costs. It is important to conduct thorough research to obtain accurate estimates on the values:

	2016	2017	2018	2019	Total
Increased Income from Services	920,000	1,058,000	1,216,700	1,399,205	
Reduction in Customer Complaints	210,000	241,500	277,725	319,384	
Reduction in Staff	543,194	543,194	543,194	543,194	
TOTAL BENEFITS:	1,673,194	1,842,694	2,037,619	2,261,783	
PV OF BENEFITS:	**1,624,460**	**1,736,916**	**1,864,710**	**2,009,565**	**7,235,651**
PV OF ALL BENEFITS:	**1,624,460**	**3,361,376**	**5,226,086**	**7,235,651**	
4 Servers @ $1,630	6,520	6,520	6,520	6,520	
4 Website domain names @ $15	60	60	60	60	
Database license	5,000	5,000	5,000	5,000	
Development labor	453,096	0	0	0	
TOTAL DEVELOPMENT COSTS:	464,676	11,580	11,580	11,580	
Advertising Expense	4,500	2,500	2,000	2,000	
Equipment Expense	30,000	3,000	2,000	2,000	
Office Supply Expense	12,000	4,000	2,500	2,000	
Rent Expense	288,000	288,000	288,000	288,000	
Salary Expense - SE	376,820	376,820	376,820	376,820	
Salary Expense - FP	166,374	166,374	166,374	166,374	
Salary Expense - Trainer	200,000	200,000	200,000	200,000	
Salary Expense - Schedulers	110,000	110,000	110,000	110,000	
Salary Expense - Misc.	150,000	150,000	150,000	150,000	
Vehicle Expense @ $30,000	150,000	0	0	0	
Travel Expense	10,400	10,400	10,400	10,400	
Utility Expense	12,000	12,000	12,000	12,000	
TOTAL OPERATIONAL COSTS:	1,510,094	1,323,094	1,320,094	1,319,594	
TOTAL COSTS:	1,974,770	1,334,674	1,331,674	1,331,174	
PV OF COSTS:	**1,917,252**	**1,258,058**	**1,218,670**	**1,182,731**	**5,576,712**
PV OF ALL COSTS:	**1,917,252**	**3,175,311**	**4,393,981**	**5,576,712**	
TOTAL PROJECT BENEFITS - COSTS:	**(301,576)**	**508,020**	**705,945**	**930,609**	
YEARLY NPV:	**(292,792)**	**478,858**	**646,040**	**826,834**	**1,658,939**
CUMULATIVE NPV:	**(292,792)**	**186,065**	**832,105**	**1,658,939**	
RETURN ON INVESTMENT:	**29.75%** *(1,658,939 / 5,576,712)*				
BREAK-EVEN POINT:	**1.61** *(break-even occurs in year 2; 478,858 - 186,065/478,858 = 0.61)*				
INTANGIBLE BENEFITS:	Knowledgeable/Skilled Employees				
	Increased Customer Satisfaction				
	Better System Reliability				



As we can see, this system is very cost effective/economically feasible. In year 2 we break-even and by year 4 we will make a profit of approximately $1.7M (that's nearly 30% ROI).

Cost-Benefit-Analysis Justifications & Sources:

- Increased Income from Services and Reduction in Customer Complaints are assumed to improve at a compound rate of 15% (employees will become more knowledgeable/skillful with each additional year of experience, thus increasing their operational efficiency and leading to less customer complaints).
- Since SEs are being trained as needed, we do not have to employ a specialist in each service field. We can reduce the number of Service Engineers by 50% (from 10 to 5). The average annual salary of an SE is $75,364 according to Glassdoor: https://www.glassdoor.com/Salaries/san-jose-field-service-engineer-salary-SRCH_IL.0,8_IM761_KO9,31.htm. Similarly, we can reduce the number of FPs by 50% (from 4 to 2) - we do not need have as many supervisors. Average annual salary of an FP is $83,187 according to Glassdoor: https://www.glassdoor.com/Salaries/san-jose-field-operations-supervisor-salary-SRCH_IL.0,8_IM761_KO9,36.htm
- Server costs were estimated from AWS (Amazon Web Services): https://aws.amazon.com/ec2/pricing/on-demand/
- Domain name costs were estimated from Namecheap: https://www.namecheap.com/
- Database costs were estimated from the MySQL website: https://www.mysql.com/tcosavings/
- Development cost was estimated by looking up salaries on Glassdoor:
    - https://www.glassdoor.com/Salaries/san-jose-senior-software-engineer-salary-SRCH_IL.0,8_IM761_KO9,33.htm

    - https://www.glassdoor.com/Salaries/san-jose-senior-database-administrator-salary-SRCH_IL.0,8_IM761_KO9,38.htm
    - https://www.glassdoor.com/Salaries/san-jose-full-stack-web-developer-salary-SRCH_IL.0,8_IM761_KO9,33.htm
    - https://www.glassdoor.com/Salaries/san-jose-junior-software-developer-salary-SRCH_IL.0,8_IM761_KO9,34.htm
    - *Note*: Dev. team consists of 4 total - 1 senior software engineer, 1 senior database administrator, 1 full-stack web developer and 1 junior software developer
- Salary expenses were also found on Glassdoor:
    - *Note*: Assuming SE team consists of 5 employees, FP team consists of 2 supervisors, training team consists of 2 trainers and schedulers.
- Rent expense was estimated for a 12,000 sq. ft. building in San Jose: http://www.loopnet.com/california/san-jose_office-space-for-lease/
- Travel expense was calculated from current gas price per gallon times filling 5 service vehicles once per week for 52 weeks.
- All PV calculations used a 3% interest rate.

Organizational Feasibility: If We Build It, Will They Come?

From an organizational standpoint, the project is low risk. The goals of the project is to make a system that makes it easier for the Field Supervisors to manage the Service engineers' training, scheduling, and maintenance. This project has a champion, Thomas Tong, Expert Research Engineer of Agilent Technologies. Tong will keep the project management updated and educated on the goals of the project. Since the request came because managing the service engineers was difficult. The new system will have allow field supervisors to see whether they need to train engineers more or hire more, so the user acceptance will be high seeing how it will improve the business' overall performance.

3.) Work Plan

Work Breakdown Structure (WBS)

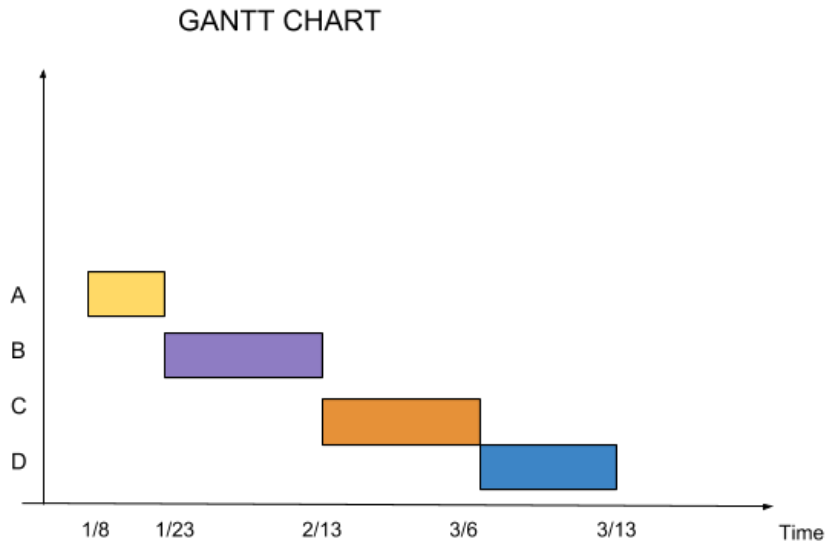
Task Number	Task Name	Duration (in weeks)	Dependency	Status
1	Milestone 1	2		Complete
1.1	System Request			Complete

1.1.1	Establish Project Sponsor			Complete
1.1.2	Determine business need			Complete
1.1.3	Determine business requirements			Complete
1.1.4	Determine business value			Complete
1.1.5	Determine special issue or constrains			Complete
1.2	Feasibility analysis		All sub parts in 1.1	Complete
1.2.1	Determine Technical feasibility			Complete
1.2.2	Determine Economic feasibility			Complete
1.2.3	Determine Organizational feasibility			Complete
1.3	Workplan		All sub parts in 1.1, 1.2	Complete
1.3.1	Create work breakdown structure			Complete
1.3.2	Develop a Gantt chart			Complete
1.3.3	Develop a project effort estimation			Complete
1.4	Staffing plan		1.1	Complete
1.5	Project monitoring		All sub parts in 1.1, 1.2, 1.3	Complete
2	Milestone 2	2	1	Complete
2.1	Develop an analysis strategy			Complete
2.1.1	Functional Requirements		1	Complete

2.1.2	Nonfunctional Requirements		1	Complete
2.1.3	System proposal Outline			
2.2	Create Functional, Structural, and behavioral models		All subtasks of 2.1	Complete
3	Milestone 3	4	1,2 and all subtasks	In progress
3.1	Design class and methods		2.2	In progress
3.2	Design data management layer			Open
3.3	Design human computer interaction layer			Open
3.4	Design Physical Architecture layer			Open
4	Final Milestone		1,2,3 and all subtasks	Open
4.1	Construct system			Open
4.2	Install system			Open
4.3	Put system into operation			Open

Gantt Chart

ID	Task name	Duration	Start	Finish
1	Milestone 1	2	1/8	1/23
2	Milestone 2	2	1/30	2/13
3	Milestone 3	4	2/14	3/6
4	Milestone 4	1	3/7	3/13



- Task A: Milestone 1
- Task B: Milestone 2
- Task C: Milestone 3
- Task D: Milestone 4

Project Effort Estimation
Unadjusted Actor Weighting table

Actor type	Description	Weight Factor	Number	Result
Simple	External system with well-defined API	1	1	1
Average	Protocol based interface system	2	2	5
Complex	Human	3	3	10
Unadjusted actor weight total (UAW)				16

Unadjusted Use Case Weight table

Use Case Type	Description	Weight Factor	Number	Result
Simple	1-3 transactions	5	1	5
Average	4-7 transactions	10	1	10
Complex	>7 transactions	15	1	15
Unadjusted use case wight total(UUCW)				30

Unadjusted use case points (UUCP)= UAW+UUCW 46 = 16 + 30
Technical Complexity Factors

Factor Number	Description	Weight	Assigned Value (0-5)	Weight Value	Notes
T1	Distributed system	1.0	5	5.0	
T2	Response time	1.0	5	5.0	
T3	End-user online efficiency	1.0	5	5.0	
T4	Complex internal processing	1.0	3	3.0	
T5	Reusability of code	1.0	3	3.0	
T6	Easy to install	0.5	3	1.5	
T7	Ease of use	0.5	5	2.5	
T8	Portability	0.5	2	1.0	
T9	Ease of change	1.0	3	3.0	
T10	Concurrency	1.0	3	3.0	

T11	Security	1.0	5	5.0	
T12	Access for third parties	1.0	5	5.0	
T13	User training	1.0	4	4.0	
Technical Factor Value (TFactor)				46.0	

Technical complexity factor (TFC) = 0.6 + (0.01 * TFactor) 1.06 = 0.6 + (0.01 * 46)

Environmental Factors

Factor Number	Description	Weight	Assigned Value (0-5)	Weighted Value	Notes
E1	Familiarity with system development process	1.5	2	3.0	
E2	Application experience	0.5	2	1.0	
E3	Object-oriented experience	1.0	2	2.0	
E4	Lead analyst capability	0.5	2	1.0	
E5	Motivation	1.0	3	3.0	
E6	Requirements stability	2.0	2	4.0	
E7	Part time staff	-1.0	0	0	
E8	Difficulty of programming language	-1.0	2	-3.0	
Environmental Factor Value (EFactor)				11.0	

Environmental factor (EF) =1.4 + (–0.03 * EFactor) 1.07 = 1.4 + (–.03 * 11)

Adjusted use case points (UCP) = UUCP *TCF *ECF 52.17 = 46 * 1.06 * 1.07

Person hours multiplier (PHM) PHM = 20

Person hours = UPC * PHM 1,043.4 = 52.17 * 20

4.) Staffing Plan

Role	**Description**	**Assigned To**
Project Manager	Oversees the project to ensure that it meets its objectives in time and maximizes cost/benefit ratio	
Infrastructure Analyst	Oversees that the project has no technical issues. Documents the project appropriately.	
System Analysts	Focuses on the project's issues with Information Systems	
Business Analyst	Focuses on the project's issues with the Business to design the Information System	
Data Analytics Specialist	Interpreting data, analyzing results using statistical techniques.	
Programmer	Codes the Information System	
	Reports to	Everyone

-Reporting structure diagram goes here

5.) Monitoring the Project

	Duration	Dependency
I. Business Modeling A. Inception 1. Understand current Business Situation 2. Uncover Business process problem 3. Identify potential projects B. Elaboration C. Construction D. Transition E. Production		
II. Requirements A. Inception 1. Identify appropriate requirements analysis technique 2. Identify appropriate requirements gathering techniques 3. Identify functional and nonfunctional requirements 4. Analyze current systems 5. Create requirements definition a) Determine requirements to track b) Compile requirements as they are elicited c) Review requirements with sponsor B. Elaboration C. Construction D. Transition E. Production		 II.A.1, II.A.2 II.A.1, II.A.2 II.A.3, II.A.4 II.A.5.a II.A.5.b
III. Analysis A. Inception 1. Identify business processes 2. Identify use cases B. Elaboration C. Construction D. Transition E. Production		 III.A.1
IV. Design		

A. Inception 1. Identify potential classes B. Elaboration C. Construction D. Transition E. Production		III.A
V. Implementation A. Inception B. Elaboration C. Construction D. Transition E. Production		
VI. Test A. Inception B. Elaboration C. Construction D. Transition E. Production		
VII. Deployment A. Inception B. Elaboration C. Construction D. Transition E. Production		
VIII. Configuration and Change Management A. Inception 1. Identify necessary access controls for developed artifacts 2. Identify version control mechanisms for developed artifacts B. Elaboration C. Construction D. Transition E. Production		
IX. Project Management A. Inception		

1. Create work-plan for the inception phase 2. Create system request 3. Perform feasibility analysis a) Perform technical feasibility analysis b) Perform economic feasibility analysis c) Perform organizational feasibility analysis 4. Identify project size 5. Identify staffing requirements 6. Compute cost estimate 7. Create work-plan for first iteration of the elaboration phase 8. Assess inception phase B. Elaboration C. Construction D. Transition E. Production		IX.A.2 IX.A.3 IX.A.4 IX.A.5 IX.A.1 I.A, II.A, III.A IV.A, V.A, VI.A VII.A, VIII.A, IX.A, X.A, XI.A XII.A
X. Environment A. Inception 1. Acquire and install CASE tool 2. Acquire and install programming environment 3. Acquire and install configuration and change management tools 4. Acquire and install project management tools B. Elaboration C. Construction D. Transition E. Production		
XI. Operations and Support A. Inception B. Elaboration		

C. Construction D. Transition E. Production		
XII. Infrastructure Management A. Inception 1. Identify appropriate standards and enterprise models 2. Identify reuse opportunities, such as patterns, frameworks, and libraries 3. Identify similar past projects B. Elaboration C. Construction D. Transition E. Production		