Bone & Joint Clinic of San Diego: Hardware Installation Project

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Abstract

The CEO of Bone & Joint Clinic of San Diego has come to a rental agreement with a major hospital campus owned by LBC Healthcare. The clinic will be a stand-alone business with its own space in the hospital but has become part of LBC Healthcare’s network and has access to its resources. The clinic space is brand new and has no IT infrastructure in place, which would seriously hinder the performance of the clinic. The CEO wants to prioritize the implementation of the IT infrastructure above all other tasks to set up the clinic. He hires a Project Manager to develop a solution to this problem and oversee the implementation. Because the hospital’s overall concerns will take priority over the implementation of the infrastructure, creating a functional structure and limiting the use of human resources, the project will have a focus on the hardware components while the software deliverables will be the focus of a separate, concurrent project which won’t begin until the hardware project is near completion. The Hardware Installation Project will focus on the acquisition and installation of the office workstations, access points, wiring, and switches. Thanks to the deal with LBC Healthcare, the clinic’s data will be stored in the hospital’s servers.

Stakeholders:

* CEO: Primary Sponsor and Key Stakeholder
  + Requires the installation of the IT infrastructure for the clinic to be operational and efficient
* Project Manager: Key Stakeholder
  + Develop the milestones, schedule, and budget for the project
  + Utilize the funds provided by the CEO to acquire resources as needed
  + Supervise the installation process and relay potential conflicts to the CEO for approval
  + Will communicate with the CEO regularly to maintain the scope of the project
* Office Specialists & Physicians
  + Needs to conduct customer check-ins and check-outs using the scheduling system
  + Serve patients by conducting MRIs, providing slings, conducting X-Rays, etc.
  + Update patient information, including medical insurance, for a conflict-free experience
* Patients
  + Will rely on the clinic to find out what problems they are having and how to treat them
  + Will come back periodically, if necessary, for long-term treatment of identified ailments

The installation of the hardware will take place during the IT team’s regular work hours, which limits the amount of time they can spend working on the design and implementation of the infrastructure per day. The outcome of this project will be the installation of a physical IT infrastructure composed of cost-effective, but efficient hardware components. Since the clinic is new, the successful operation and start of the clinic with this infrastructure will serve as its mark for success.

Table of Contents

**Abstract** 2

**Proposal Title** 6

**Needs Analysis** 6

**Problem and Causes** 6

**Impact on Each Stakeholder Group** 7

**Solution Alignment** 7

**Cost Analysis** 8

**Itemized Costs** 9

**Justification for Costs** 9

**Risk Assessment** 10

**Quantitative and Qualitative Risks** 11

**Cost-Benefit Analysis** 12

**Mitigation of Risks** 13

**Justification of Approach** 7

**Project Resource Management Plan** 14

**Resources** 14

**Justification of Resources** 15

**Resource Allocation Plan** 17

**Gaps and Impact on Other Projects** 17

**Project Plan** 18

**Scope** 18

**Assumptions** 18

**Project Phases** 18

**Timelines** 19

**Dependencies** 20

**Risk Factors** 20

**Important Milestones** 21

**Details of Project Launch** 21

**Strategy for Implementation** 22

**Documentation Deliverables** 22

**Hardware and Software Deliverables** 23

**Evaluation Framework** 23

**References** 25

# Introduction

Bone & Joint Clinic of San Diego needs a high-level IT infrastructure to operate. The clinic is empty and new with no prior infrastructure to build from. The CEO must provide the financial resources to acquire the monitors, desktops, switches, etc. The project manager will collect detailed information on the necessary components to create the infrastructure and the cost of the components that will make up the infrastructure.

After conducting research and cost analysis, the Project Manager will send the information to the clinic owner to accept or deny the proposed budget. The CEO will approve the budget and provide the cash to acquire the assets and begin the planning and design process of the infrastructure with the human resources acquired from the hospital’s IT department.

Due to this project focusing on the installation of hardware, the costs and schedule will serve as the only units of measure for success. Costs may fluctuate depending on price differences of the components as well as damaged or additional components needed. On the other hand, it’s important to meet the deadline. Running behind may cause increased costs as well as a delay of the clinic opening. Both scenarios need to be avoided at all costs.

**Needs Analysis**

**Problem and Causes**

The clinic is new with no infrastructure implemented. It won't be able to function like this not only because of how closely integrated technology has become with everyday life but because of the work that will be conducted in the facility. When working in health care very possible resources must be is provided for the simplicity of the patients, and this infrastructure is crucial to the success of this mission.

**Impact on Each Stakeholder Group**

The CEO and owner of the clinic won't be able to open the clinic without this infrastructure in place. The clinic requires the installation of the IT infrastructure for it to be operational and efficient. Without the required technology, the CEO won't be able to serve his patients at all.

The project manager also serves as a key stakeholder by carrying out the project. The project manager must provide a detailed solution to the problem of the lack of an IT infrastructure in the clinic. If the project manager does not oversee this project as well as initiate, plan, implement, and closed the project, the clinic will not be successful or will take much longer to open.

The office specialists, physicians and patients will all suffer from the lack of IT infrastructure being implemented into the clinic. The specialists or physicians will not be able to properly serve and take care of the patients without this structure in place. Appointments cannot be booked, follow-ups won’t be made, and medical insurance information will not be properly documented. On the other hand, the patients will suffer because nobody will be able to help them with their ailments. To connect this difficulty with that of the specialists, if there is no effective way to store and monitor the medical insurance information for each patient, it will only cause delays and problems for the patients who may choose to not show up to the clinic again once they have a bad experience.

**Solution Alignment**

There are multiple health standards that we must take into consideration during this project. according to HealthIT.gov, we must send health information securely over the Internet when requested. Also, we must abide by the Health Level 7 (HL7) v2 messaging standard which will be used for patient administration, orders, results, etc. However, these details pertain more to the software component of the infrastructure. This project focuses solely on the physical component, so this is outside the scope of the project. There are no industry-specific regulations about the hardware that makes up a clinic’s infrastructure, but rather the practices of said clinic or practice.

# Cost Analysis

The assets required to install the hardware for the clinic come to a total budget of $11,065. Let's break this down further into the individual components that will make up the IT infrastructure. First, the clinic will require a total of 12 workstations for each office specialist or physician. Each workstation will require a dual monitor set up with a desktop PC tower. The cost of 24 individual HP monitors is $190 each ($4,560) plus 12 desktop towers for $400 each ($4,800). As a result, all the workstations in the clinic will result in a total of $9,360 making up the bulk of the required budget.

Most of the remaining expenses are relatively small in comparison. The next biggest expense is the cost of the TV displays that will be distributed throughout the clinic. These monitors will be used to show patients their MRIs, X-rays, and other imaging results during their time in the clinic. The clinic will use six TV monitors for six private rooms at $300 each, leading to a total of $1,800.

Lastly, we have the smallest group of expenses composing the budget. First, we have the wireless access point that will be utilized exclusively for the clinic patients during their waiting time until they're called for their appointments. This access point will have a cost $120. Next, we will have a wired access point that will be utilized exclusively for the office employees and physicians as well as a distribution hub or switch, that will cost $64 and $75 respectively. Lastly, we have a cost of $46 for a 12 pack of Ethernet ports that will be used to connect to the distribution hub to expand the network connection. As a result, these smaller expenses come to a total of $305. This brings the proposed budget for the required hardware components to a total of $11,465.

The research that was conducted showed that these costs were the most optimal options for the budget. At first, the grand for the budget was $12,715. The biggest difference between the initial budget and the final proposed budget is the cost of the desktop towers. At first, the towers selected will cost $550 each bringing that total to $6,050 in comparison to the $4,800 that was later chosen. Thanks to this change, there was a savings of $1,250 by changing this component.

**Itemized Costs +** **Justification for Costs**

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# Risk Assessment



There are a few risks to consider when carrying out this project. The first risk is the potential damage or stealing of the acquired hardware. To prevent this, the clinic will be locked after work hours each day. In addition, the only way to enter the clinic after hours is to enter a four-digit code on a pin pad on the secondary door for employees only. Without knowledge of this code, there is no other way to enter the clinic to steal the equipment. As a result, the risk of the material being stolen is low. However, if any of the materials were to be stolen, there would be a moderate consequence in the increased cost to replace said stolen equipment.

Next, there is the risk of the project running behind schedule. As mentioned before, this will be averted by providing more than enough time for the installation of the infrastructure by providing enough time for the human resources to still fulfill their daily responsibilities for the hospital, while carving out time to carry out the project. If the project was to run behind schedule, this would prove to be a major problem though since it would delay the opening of the clinic as well as the configuration project that would run concurrently with this project near its completion. Though this is a low risk, it would have a heavy consequence.

Lastly, there is the risk of the project increasing in cost. The likelihood of this happening is moderate because there is more than one way for this to happen. As mentioned above, the main way to increase the cost of the project is to replace the acquired material due to them being damaged or stolen, plus the need to purchase additional material that is required for the infrastructure. To prevent this, the $1,250 that was saved by recalculating the project budget will serve as a contingency reserve just in case any additional materials are required later. To reiterate, the acquired resources will be protected by locking the clinic once it's closed and by securing it further with a code to be entered on the pin pad on the door that is known only to employees and the clinic owner. Therefore, the likelihood of this risk occurring is low. Any further increase in the budget will be discussed with and approved by the clinic owner.

**Quantitative and Qualitative Risks**

The project schedule will be categorized as a qualitative risk. This is the decision because the project schedule is not used to come to any go/no-go decisions. In other words, the project schedule does not have a dollar amount attached to measure its importance to the project. Quantitative risks are used to come to decisions to either continue a project or to stop it altogether. While it would be bad for the project schedule to run behind, it wouldn't necessarily shut down the project it would simply be delayed. It would also create a problem for the human resources helping to install the infrastructure because if the project was delayed, it would mean they would have to dedicate a little bit more time from their daily activities to the project than initially planned. This may create problems with their managers who still need them for their full-time duties.

On the other hand, the acquired hardware, in the project costs at large, what both be categorized as quantitative risks. This is due to the simple fact that there is a monetary value attached to both categories. As discussed above, if any hardware was damaged or stolen in the process of completing this project, then the clinic owner would take a financial hit to acquire more resources to either replace them or simply acquire additional resources on top of what he already paid for. If these additional costs run too high, this may cause the clinic owner to decide to scrap the project altogether or find another way to implement the infrastructure even if it means doing it himself. This is the same logic that would apply to the project cost. If the cost of establishing the clinic runs too high, then the clinic may not open altogether or would be delayed indefinitely until more financial resources are required over time.

**Cost-Benefit Analysis**

As stated above, the project schedule running behind would not incur any additional costs by itself. As a result, the focus of cost-benefit analysis will focus solely on the hardware and the project cost at large. In the worst-case scenario, if all the hardware components were stolen or all damaged during this process, then the final budget of $11,465 would have to be reinvested to reacquire the same materials. It may even cause the clinic owner to want to reevaluate the budget by purchasing lower grade materials to lessen the financial blow, but still, achieve the resources necessary for the clinic to function. At worst, it may even push the clinic owner to pause the project indefinitely or scrap the project altogether until he can raise more funds to attempt the venture again.

Luckily, contingency plans were put in place before the project would begin. About the potential damage or stealing of the hardware, security measures have already been put in place. No one will be able to enter the clinic without using the passcode needed to unlock the door. If that code was to be used if the materials were to be stolen, that would instantly narrow down who could have had a hand in the theft and would make it much easier to conclude who was responsible for the crime. In addition, the hospital already has surveillance cameras throughout the entire building. Even if somebody was to break into the clinic even without using the passcode, they will be easily identified and dealt with.

In tandem with the hardware issue as discussed above, the project costs will most likely not fluctuate during the project. Since the materials are perfectly protected, is extremely unlikely that anybody would risk stealing the clinic’s hardware. While additional costs may come up later in the project, it would be unmitigated addition in comparison to having to replace all the materials that cost thousands of dollars in total before. Also, keep in mind that there is a contingency reserve in place that will not require the clinic owner's permission to be used.

**Mitigation of Risks**

To reiterate, contingency plans have already been implemented even before the project has started. Firstly, the schedule has been planned to allow plenty of room for the acquired human assets 2 fulfilled their daily tasks as required by the hospital and still allow them time to dedicate to the project when able. As a result, it's very unlikely that the project schedule will run behind due to the implementation of the infrastructure. The potential of the project costs increasing is a bigger risk than the project schedule running behind thus delaying the opening of the clinic altogether.

Again, to reiterate, the hardware materials acquired for this project are well protected in a couple of different ways. Firstly, the clinic will be locked per usual at the end of the business day. Next, the only way to enter the clinic after the end of the day is to use the pin code on the pin pad on the employee's only entrance. Since the clinic is not operating yet, the only people who have this code or the clinic owner, the project manager, and the two assets helping to install the equipment. If the equipment was to be damaged or missing overnight, our list is automatically shortened to these four individuals. In addition, the only other person who would have this information is the manager of the two human assets who would not enter the clinic without discussing it with the owner prior. Lastly, the hospital surveillance would pick up who would enter the clinic at any time of the day, but especially any time after the end of the team’s business day.

Finally, since the office hardware is well protected, it makes it very unlikely that the project costs will increase due to the replacement of these materials. The main way that the cost would increase is if additional materials are needed to complete the infrastructure. Even so, there is a contingency reserve in place that can be used anytime there is a demand for additional materials. This mitigates the chance of there being a major additional cost to the project which may lead to its delay or complete shutdown.

**Justification of Approach**

Since the project is the installation of hardware to develop the IT infrastructure of this new clinic, there's no need for any alternative approaches. There may be flexibility in the specific components that will make up the infrastructure, but the course of action will remain the same. As a result, there are no alternative solutions to present. In other words, the installation is the best way to solve the problem because the clinic will be incomplete without the infrastructure. You can’t install and configure the necessary OS without any hardware to configure it on nor can key clerical functions be possible without the installation of the hardware.

# Project Resource Management Plan

**Resources**

All the resources mentioned up until this point are necessary for the completion of this project. First, the monitors and desktop PCs are necessary to create the 12 workstations needed for the clinic to operate. Without these workstations, there would be no way to check-in patients, to follow up with them to confirm appointments, and no way to ensure the proper storage and accuracy of medical insurance information. Also, there will be no way to communicate with other branches or practices that we may need to get in contact with to retrieve patient information so we can help the patients to the best of our ability.

Next, is important that we have a wireless access point to be used by the patients. Whether for simple video streaming while waiting for their appointment, or to potentially complete schoolwork in the clinic, we must provide as many amenities as possible for the patients to not only sit and wait but to enjoy themselves while in the clinic. One of the tv monitors will be placed in the clinic waiting area for this reason as well. There will also be a wired access point that would be used exclusively by the clinic staff in a distribution hub to direct the Internet traffic.

In addition, the remaining TV monitors will be installed in the individual rooms that will be occupied by patients. This will be useful 2 show any MRIs, X-rays, and any other images that need to be shared with the patient. Since this pertains to the patient's experience of being taken care of and treated while in the clinic, this is crucial to the clinic’s success. To bring everything together, the Ethernet cords are needed for an obvious reason. The monitors and overall workstations will be useless if they are not able to connect to the Internet. Whether this is through the individual connection ports by each desk, or through the switch which will help expand the network connection throughout the clinic, the Ethernet ports are required for the clinic to function properly.

Lastly, we’ll have the 2 human resources, provided by the internal IT department, to assist us with the design and installation of the hardware. The project would not be complete without their assistance, so they’re crucial to this project being successful. While there are possibly other options to complete the project, it’s unnecessary when we have who and what we need right at home.

**Justification of Resources**

As stated above, monitors and desktop PCs are necessary to operate the workstations. Without these workstations, the clinic would be severely handicapped in functionality and efficiency. Simple tasks such as checking in patients, following up with them, and staying in constant contact with the other branches would prove unnecessarily difficult if not impossible. This alone would most likely lead to the clinic’s outright failure.

Next, we want to ensure that patients enjoy their time in the clinic while they’re waiting to be taken care of. This can also extend to children that may wait with them. Therefore, we see it necessary to install a TV monitor and Wi-Fi in the clinic waiting area to provide the most basic amenities for the patients so the time they spend with us is not dull in the least. On a more objective note, the remaining monitors will be placed in patient rooms so it’s easier to go over images and even certain documents with them in greater detail.

To reiterate, the project literally cannot be completed without the human resources provided to this project. There may be other options to explore, but since the clinic will be part of a bigger hospital, these people will be assisting us with no additional charge. The only caveat is they will prioritize their daily tasks and will slowly progress through the design and installation processes over time. This is well worth it as we have experts that will ensure this project is nothing less than perfect.

Lastly, the access point that will be used exclusively by clinic employees is important so there’s a separate network that can’t be utilized by clients at all. The distribution hub, or switch, will be used to extend the network to any workstations that may not be near any connection ports, so productivity does not suffer. The ethernet cords will bring this all together since none of this technology will be able to function and connect to the internet without them. Or at least, they may not work at the most optimal level. It’s better to have a direct connection, when possible, instead of relying solely on a Wi-Fi connection.

**Resource Allocation Plan**

The internal IT personnel provided by the hospital will take charge of the design and installation of the project. To prevent delays in the hospital’s operations, the project manager will acquire two human resources to execute the installation of the hardware. This provides no problem since the project is small and more than enough time has been provided for the resources to contribute to the project while still carrying out their regular daily tasks.

These same resources will also assist with the installation of the necessary OS and applications that will provide communication and functionality to the clinic. However, this will act like a separate project that won't run concurrently with the hardware installation project until it's nearly complete. This is due to the limited resources; allocating them to two separate projects from the beginning may slow down the schedule unnecessarily.

**Gaps and Impact on Other Projects**

As mentioned above, the time of the acquired resources will be limited due to their responsibility to their daily tasks. As a result, they will not be allocated to both the hardware installation project and the software installation projects from the beginning. The hardware installation project will take priority and the software installation project will not begin until the first project is near completion. Only then well the software installation project began to run concurrently with the hardware installation project.

Therefore, the completion of the hardware installation project will allow the software installation project to be carried out smoothly. In addition, as one of the resources wraps up the first project, they can immediately begin working on the second project; creating a scenario where “the candle is lit on both ends” per se. Allowing the second project to be completed slightly faster.

# Project Plan

**Scope**

The scope for this project is relatively simple. The goal is to acquire and install the necessary components of a physical IT infrastructure. Does successful completion of the project will allow the team resources to segue into the software installation project; those completing the entire IT infrastructure. The first requirement is to identify cost-effective components, but of good quality to ensure efficient functionality of the clinic. Once these hardware components have been acquired, the acquired resources will design and execute the installation. Lastly, testing will be conducted to ensure that the infrastructure is up and running with no immediate problems to the infrastructure.

Any tasks that pertain to the installation and configuration of the OS is out of the scope of this project. This project will focus solely on the hardware installation. While the software installation is the other half of the equation, it will be considered a separate project altogether due to the limits on the acquired resources. The installation of the routers, monitors, desktops, ethernet cables, and distribution hub are all in the scope for this project. The installation and configuration of the OS and needed applications to perform respective clinical functions are out of the scope of this project.

**Assumptions**

This project's assumptions include the following: the equipment will be paid for by the CEO, the installation will be handled by the in-house resources, and equipment ordered online will arrive on time. In addition, additional financial resources for additional hardware components or replacements to the hardware will be provided by the clinic owner.

**Project Phases**

The first phase of the project will be the planning phase. The clinic owner and project manager will plan the project and decide what equipment is necessary for the clinic to be functional. The project manager will conduct the research for the necessary components, analyze the costs, and forward their analysis to the CEO who will make the final decision with the required components hence the budget. After this step, the resources provided by the hospital will assist in the design phase of the project.

These resources will assist with drawing out the best layout that satisfies the owner's needs while also creating an efficient design for the clinic. The installation will ensue upon approval from the CEO.

Once the design has been approved, the team resources will install the required hardware. Enough time has been calculated into the plan to make up for the limited manpower. After confirming the functionality of the hardware, configuration and testing will take place in a separate project. Along with approval from the CEO, this will mark the end of the hardware installation project.

**Timelines** (*See Table 1A)*

The project has an extended timeline to make up for the limited resources and to provide more than enough time for corrections, if necessary, before the clinic is scheduled to open. 18 weeks is the allotted amount of time to complete the project. Due to this open schedule in the simplicity of the project, there will be no overlap of installation tasks.

Planning and design of the infrastructure will take no longer than eight weeks to complete. This project will follow a functional structure, so the project will not remain the top priority of the required resources. This has been taken into consideration while developing the schedule.

Installation of the infrastructure has been scheduled for eight weeks for the same time concerns. Also, it was necessary to provide enough time to cover the possible replacement or additional purchases of equipment. This will end the installation of the equipment.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | September | October | November | December | January |
| Planning  (Sept. 1 – Oct. 27, 2021) | Plan with CEO and determine resources needed. Securing funding | |  |  |  |
| Design & Acquisition  (Sept. 1 – Oct. 27, 2021) | Have team resources assist with the design of infrastructure and acquire hardware resources | |  |  |  |
| Implementation  (Oct. 27 – Dec. 22,2021) |  |  | Team resources will install hardware components. The software project will begin near completion with approval from the CEO. | |  |
| Documentation  (Dec. 22 – Jan. 5,2022) |  |  |  |  | CEO will approve hardware installation. Document and close project. |

*Table 1A*

**Dependencies**

Though small, there are still dependencies for this project. First, installation of the infrastructure can't begin until the materials are confirmed and acquired. Second, though a separate project entirely, the software installation and configuration project can't begin until this project is complete to bring the clinic to full functionality. Lastly, documentation that the hardware is fully functional can't happen until installation is complete and approved by the CEO.

**Risk Factors**

There are risks to every project. Some are common while others are unique to the project. For this project, the biggest risks are the damage of the hardware as well as them being stolen. While these are deemed as everyday concerns, there is a direct threat to the core of the project.

There's also the risk of faulty installation by the team resources. Though unlikely, it's possible that the hardware won't be installed properly, which will cause the rework of the process or task. Luckily, this won’t likely incur increased costs or affect the schedule of the project

**Important Milestones**

There are a few milestones for this project. First is the acquisition of the hardware resources. This is important since the CEO wants the best, yet most cost-effective materials for this clinic, so a good amount of research will be conducted before acquisition. From the start day of the project, which is September 1st, 2021, this milestone is expected to be reached no later than the end of the planning and design phase which is October 27th, 2021.

Next is the installation of the infrastructure or hardware. This will provide the configuration project to begin running concurrently towards the end of this project. Picking up from October 27th, 2021, this milestone is expected to be reached no later than December 22nd, 2021.

Lastly, the documentation will be the final milestone. It marks the completion of the project. This milestone will serve as a reference point for the IT department and the CEO in the future when potential issues arise. Picking up from December 22nd, 2021, this final milestone is expected to be reached no later than the project completion date of January 5th, 2022.

**Details of Project Launch**

The CEO will ultimately determine when the project is complete. Once the owner signs off on the completion of the project, the closing process will be able to move forward. The project will be considered complete when all deliverables and milestones have been met. The project manager will close out the project when the CEO signs off on it, allowing the software installation project to be the sole focus of the team resources.

**Strategy for Implementation**

Upon meeting with the owner and clarifying their needs for the clinic, the project manager will record details of the meeting. The next step is to meet with the acquired assets to discuss the design of the clinic by the owner's demands. Any conflicts with the details of the design will be discussed whether the owner. Once a solution to the potential conflicts has been reached, the installation will begin.

The planning phase will include developing the project schedule, milestones, deliverables, and acquisition of the resources needed. As in the previous stage, the CEO will be made aware of this phase in case any changes must be evaluated. If there are no changes that must be made, this will lead to the installation phase.

This is the final phase of the project. The team resources will finally begin to install the components needed for the infrastructure. Completion of this phase will lead to the documentation of the project, marking its completion.

**Documentation Deliverables**

First, the project will produce a project schedule. Naturally, the schedule will be used to keep track of the overall progress of the project to ensure that everything will be completed and implemented by the project closed dates up until September 5th, 2022. It’ll also be used to track the individual milestones that should be completed by the end of their respective phases. Next, is the project plan which highlights all the key points that will make up the project. This includes the acquired assets, the hardware components necessary to complete the infrastructure, as well as the strategy of implementation. All these details and more will be covered in the project plan for reference for the project manager as well as the clinic owner.

The risk register will also serve as a deliverable of the project. This will help evaluate the individual risks that come with attempting this project, their level of severity, and the contingency plans that we have in place to either avoid these risks or to mitigate them to the best of our ability. Lastly is the project timeline which illustrates each task of the project, how long they will take, and the final date of completion for the project overall. These will all serve as documentation deliverables of the hardware installation project.

**Hardware and Software Deliverables**

The main deliverables of this project are all hardware. The ultimate deliverable is the complete installation of the hardware infrastructure. The software deliverable will be the result of the configuration of the clinic OS combo which will run as a concurrent project. This is where the testing process and approval of the CEO of the entire infrastructure will take place.

**Evaluation Framework**

The final output of the project will simply be the confirmed functionality of the IT infrastructure. Since the clinic is new, there is no sales information to use as a metric to measure past performance in contrast with current performance. The success of the clinic after opening, both financially and qualitatively, will serve as the initial baseline that will be compared later to track performance and success.

Because of this fact, surveys and questionnaires will be passed out to office specialists, physicians, and patients to receive feedback on clinic performance. This will alert the owner to any potential issues that currently affect its operations. They will also be able to keep track of possible upgrades that will need to be made to increase overall performance. The clinic should operate for three months before receiving feedback. This is a suitable checkpoint to establish a baseline that can be compared after an additional three or six months.

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