Classroom Technology Refresh

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# Initiation Phase

## Project Background (1)

The goal of the project is to upgrade technology in university classrooms, especially the projection and sound systems. These systems are well known for being difficult for teachers to use in class, causing interruptions to lectures and distractions in limited class time.

We hope to replace these systems with intuitive, user-friendly, and reliable alternatives in order to reduce the instances of class interruption and improve the experience for both students and teachers.

A prior project has completed upgrades to about 30% of the university's classrooms. This project will build on the prior project and attempt to complete upgrades to the remaining classrooms where possible.

## 

## Scope Definition (1)

The scope of this work includes hardware and software upgrades to the classroom lecterns and associated systems. The project team will identify appropriate upgrades based on current classroom configuration. Scope includes physical modifications to or replacements of the lecterns, projectors, and sound systems, installation of software upgrades, and configuration of the in-room systems. This work includes superficial repairs such as drywall patching, repainting, or roof panel replacements in cases where projectors or speakers are replaced.

The upgraded systems should function correctly with minimal downtime.

Users should be able to use the new technology more efficiently and with fewer errors. We can measure success by a reduction in the number of service calls and by higher scores on user satisfaction surveys.

The project deliverables include a requirements document, project timeline, and the hardware and software upgrades to the classroom technology suites.

## 

## Assumptions (1)

* Rooms will be available to upgrade at scheduled times, in other words we can schedule around class schedules and provide enough time for the work
* Since some rooms have already been upgraded, there is a list of already-approved systems available
* Contracted workers will be able to access the building and rooms
* Classrooms can physically accommodate the upgrades, no major remodeling will be needed
* Existing classroom infrastructure (electrical, network, etc) infrastructure is sufficient
* New physical appliances will be available on time
* New physical appliances will be installed by third party contractors
* Information Technology Services (ITS) department will be available to provide advanced configuration, such as network integration
* Installation contractors will be available to work within the project schedule, including after-hours or weekends as needed
* Adequate funding will be secured and provided by the university, and the budget will not be lowered during the course of the project.
* Labor costs will not change during the project
* Replaced technology can be disposed of safely through established channels
* No brand new classroom setups will be in scope for this project
* Technology upgrades have already been piloted by an earlier project: we do not need to verify user acceptance, although we may incorporate limited user feedback
* Training lecturers to use the new appliances is out of scope for this project

## 

## Constraints (1)

Constraints include project scope, time, and cost. In order to have a successful project completion, we must consider these constraints:

* **Scope:**
  + Refresh technology suites in classrooms, including the podium equipment, monitor screens, computer software, and projectors.
  + There are over 700+ classrooms at UNCC, ⅓ of which have been upgraded by a previous project.
  + Start with a pilot program and then expand out to additional colleges.
  + Classroom Support handles the classroom setups but hires a company to assemble the podium.
  + Each equipment needs to be tagged and filed in the Classroom Support inventory.
  + Needs software updates on the touch panels that control the podium.
* **Time:**
  + The project must be completed within eight months
  + Most of the project work has to be done during summer, while the classrooms are available to workers and not filled with students
  + Each podium build and setup takes two days. Some equipment within the podiums will then need to ensure a connection with the university network. Forms will need to be sent out for IP addresses and need to be approved by the Information Technology Services (ITS).
  + The college departments (depending on buildings) and the Classroom Support director will approve of changes in the schedule.
* **Cost:**
  + Each classroom technology upgrade is approximately $20,000.
  + The project budget has been set at $10,000,000

# Planning Phase

## Activity Definition (5)

**1. Information gathering: classroom and technology inventories**

This work represents an important information gathering effort. The team needs specific information in order to effectively plan and schedule work. Because we are working on the tech inside the classrooms, we need information about the classrooms: where they are located, departmental ownership, special events scheduling, and specific information about the technology inside and the configuration and appliances in the classroom.

These inventories should include any other information useful to the effort, such as occupancy limits, room dimensions, specialized needs for special rooms (for example, labs), accessibility considerations, and so on. During the course of gathering information, we may also identify other useful information that should be included in the survey.

We also need information about the technology suites that classrooms currently contain. This information includes but is not limited to: technology capabilities, needs and room accommodations. Some classrooms may, for example, have multiple projector displays, larger or smaller screens, or more extensive sound systems, say, in large lecture halls.

We also need relevant infrastructural data. Although modifications to infrastructure are out of scope, we may be constrained in installing or upgrading technology by inadequate infrastructure, for example, some rooms in older buildings may be limited with regard to electrical, network, or other infrastructure.

Classroom scheduling data will be used to schedule the installations and testing of the upgraded technology suites.

We anticipate that we can partner with university departments (building/facilities management, IT Services) to collect some of this information, but that we may also need to physically visit rooms and buildings to update or confirm data where necessary. Prior technology upgrade projects may also have archived useful information.

We will also collect data on what technology is already available and in storage for use. It may be that prior upgrade projects purchased extra classroom technology that can be used before we buy more.

We expect to continue gathering data as the project proceeds and need arises.

Once we have gathered relevant information, we can continue onto the analysis phase in which we start to make decisions about what upgrades can and will be made.

**2. Develop an implementation timeline and coordinate scheduling**

The project team will implement a timeline for the duration of refreshing the classroom technology at UNC Charlotte. To organize the scheduling of the project, the services and necessary technology must be identified first.

The total amount of time given to complete the project is eight months. During the eighth months, the project team will be working with other specialists for assembling the classroom technology needed for teaching purposes.

First, when the technology components are decided on, the orders will be placed. Orders usually arrive within a week or two. Once the technology components have arrived, each item's information will be gathered in the inventory of Classroom Support.

Once the component information is filed in the inventory, the assembly of the classroom podiums must be completed by a contractor. While that is processing, the selected classrooms will be stripped of the older technology.

Another contractor agency will be hired for removing and setting up the new technology in the classrooms.

The older technology will then have to go through the inventory to ensure that the information on the sheets about the room number and building are accurate with the current time.

Since there are eight months to complete the refreshment of about 500 classrooms at UNC Charlotte, there should be 13 classrooms completed each week. This should be feasible with the amount of workers hired for the project.

There is no specific timing for each process. Instead, the project will be a cycle. From the inventory management, to assembling the podium equipment, to replacing all the classroom technology, back to the inventory and surplus, and onto testing the classrooms.

There will also be some deadlines and meetings every month to ensure that the project is going the right path. The deadlines will secure the goals and allow the project management to be flexible if there are any changes needed.

Once the classroom technologies are updated, there will be testing of the setups, quality assurance, and ensuring that the users are able to perform teaching tasks on the renewed technology.

**3. Identify and purchase appropriate upgrades**

This work represents a transition from information gathering to analysis and decision-making. Having gathered information about what equipment classrooms currently have, the team will need to identify appropriate upgrades for the targeted rooms. Different classrooms have different needs, and the goal of this project is mainly to upgrade, as opposed to reconfiguring classrooms. This will be accomplished by upgrading the room's technology suites appropriately: staying as close to the original configuration as possible, assuming no extenuating circumstances or departmental special requests.

A goal of this project is not to introduce more equipment than was already in place unless other directions are requested from the university, i.e., if a room was getting reports that it is hard to hear when using the speaker systems, the university may indicate that the room needs a better sound system. We expect the amount of special requests to be minimal as this is not the main goal of the project. Any departmental requests will need special approval before we proceed with ordering additional equipment and adjusting configurations.

The purchasing of the equipment will be another task required of the team, however, the team will be contacting the university to acquire a list of approved technology that has been purchased previously. There have been upgrades done to one-third of the current classrooms and this team would like to maintain consistency across all classrooms. This approved list will help to speed up the process of our project by lowering the amount of research time that would be required to find appropriate equipment. We anticipate that using a consistent set of technology will reduce maintenance costs in the future.

In cases where previously-approved technology is no longer available, we will identify appropriate and available replacements.

Once the list of approved products is acquired, the team will have to investigate which suppliers to use for the project. Our suppliers will need to be able to maintain constant access to the materials we need and equipment as we will need them. This consistency will be essential to maintain the schedule.

**4. Hire contractors; implement upgrades per approved schedule**

The project team will work with the University of North Carolina at Charlotte staffing department to identify approved contract agencies for technology installations and maintenance.

A request for quote including a statement of work and project timeline will be submitted to identified agencies. The request for quote will use a standard template provided by the University. The statement of work and timeline will be taken from project deliverables in previous steps. The request for quote will give the agencies seven business days to respond with a quote. The deliverable for this effort will be the completed request for quotes.

Once the quotes have been received from the contract agencies, the project team will choose the agency to award the project. The project team expects to receive a minimum of three quotes to choose from at this stage of the project.

The team will select the agency based on the lowest cost as well as the ability to work within the identified project scope and timeline. The contract used for this step will be a standard document provided by the University. The deliverable for this effort will be the contract signed and approved by the selected agency and representatives of the project team and the University of North Carolina at Charlotte.

Implementation will begin with a pilot classroom. The project team will work closely with the installation contractors to install the upgraded hardware and software components in the identified pilot classroom.

Once the pilot upgrade has been completed, the team will work to complete the testing, QA, and user acceptance testing steps on the pilot classroom. The deliverables for this portion include the completed pilot classroom upgrades, including verified testing, QA, and user acceptance for the pilot.

After the pilot classroom has been successfully upgraded and tested, the full implementation schedule will kick off. During the implementation phase of the project, the team will work closely with the installation contractors to monitor the on-going budget and timeline of the project. The deliverables for this phase include a weekly updated timeline and budget forecast.

**5. Testing, User Acceptance and Quality Assurance**

Once all the work of installing and configuring the new technology suites has been completed, we must perform testing and quality assurance tasks to ensure that the upgrades are functional and working as designed.

Once the technology has been installed, it must be tested. We will identify the best team or teams to do the testing, whether that means coordinating with campus IT services or sending members of the project team to perform tests.

The first phase of testing should be for general functionality. These tests should include basic tasks, such as starting and stopping the systems, ensuring that sound systems are able to broadcast and record, projector systems display properly and clearly, network services are in place, and so on.

If the systems are not working as designed, we will work with the installers, vendors, or university IT services to reconfigure or make physical fixes as needed.

The next phase of testing is User Acceptance Testing. To ensure that users are able to work with the new technology, we will identify a testing group and have them perform tests and gather their feedback. Feedback can be used to inform and refine training and documentation for other users. We can also provide this information to teams working on related projects, specifically any team preparing a training program for the new technology or for onboarding new lecturers.

A note on user feedback and testing: we assume that prior projects have done early pilots, so this pilot will not be a major milestone. In other words, user feedback will be incorporated in our work but will not define it.

This effort should also include general quality assurance. We should ensure that changes to the rooms (drywalling, painting) are done to satisfaction. Resolution of cosmetic defects will be handled by the appropriate teams: either the contractors or university classroom maintenance.

Technology systems should also be configured to be useful with minimal work from users. For example, default sound levels should be configured to be audible without being too loud. Projectors should be configured to be visible, etc.

Furthermore, we can identify potential pain points while using the technology and take steps to make last-minute changes to ameliorate them, such as tweaking configurations or identifying potential "quick tips" or step-by-step guides that will be useful to users.

This work may also include relatively small related tasks to increase usability of the new technology, such as placing stickers containing concise point-of-use documentation, performing last-minute configuration changes to meet usability goals, and so on.

We expect that other testing and QA needs will arise during the process and will be incorporated appropriately.

## Sequencing (5)

**Information gathering: classroom and technology inventories**

In order to build a useful and comprehensive inventory of classrooms (classrooms here meaning any room used for instruction, including labs of different kinds), we will first need a list of all the university's classrooms. We anticipate that we can obtain a complete list of classrooms from the appropriate department in the university, facilities management or IT services. This is an essential step and a prerequisite for virtually everything else in the project: we can't know what classrooms to upgrade if we don't know what classrooms are out there.

Having narrowed down our list, we need to ensure that it is comprehensive, up-to-date, and contains all the information needed. We cannot make accurate decisions without accurate information. If we identify gaps in the list, we will have to spend some time ameliorating those gaps, either by seeking more up-to-date sources or by finding the information ourselves. Again, we want accurate information and we anticipate that ensuring the accuracy of that information early will pay off by reducing rework later.

Following that, we must identify classrooms which have already been upgraded or are otherwise out of scope for this project. This is done early in order to reduce future analysis work. Parts of this step can be done concurrently with above tasks, as this will also necessitate developing criteria for considering a room out of scope.

Once we have obtained and vetted our comprehensive list, we will need to identify classrooms with standard and special configurations. Here, special configurations refers to classrooms with special technology requirements: large lecture halls, labs, and so on. Standard configurations means rooms with more basic or standard (on a university or building basis) configurations, like a single lectern, projector, and small (or no) sound system. This is done early in anticipation that it may spawn additional complexity and the project will be able to adjust its plans accordingly.

We will need to know what technology the classroom currently contains. We anticipate that obtaining, reviewing, and updating the classroom and technology information can be done concurrently, with some overlap and some exceptions. The list of classroom technology will also need to be vetted and updated as needed. We may even be able to get the classroom and technology lists together from IT services or facilities management and perform the data quality assurance and amelioration tasks simultaneously.

We will also need information about classroom technology inventory, if any, that the university has already purchased. It's possible that previous upgrade projects bought surplus inventory and have placed it in storage. This step does not require strict sequencing and can be done concurrently with the above steps.

**Milestone:** As the team collects information, they may uncover information that affects the project itself. Before wrapping up the information-gathering effort, the team will need to meet to discuss information gathered during the effort and any important findings that may alter the assumptions and constraints of the project.

Having compiled all necessary information and ensured that the project is still on-track, we will need to undertake final verification steps that we can identify in the course of collecting the information, as well as identify any needed but still missing information and make efforts to obtain it.

**Deliverable:** Information gathering should result in documentation listing the classrooms in scope for the project and categorizing them as standard or specialized, currently-installed technology information, available technology, and other related information

**Develop an implementation timeline and coordinate scheduling**

The project team will implement a timeline for the duration of refreshing the classroom technology at UNC Charlotte. To organize the scheduling of the project, the services and necessary technology must be identified first.

The total amount of time given to complete the project is eight months. During the eighth months, the project team will be working with other specialists for assembling the classroom technology needed for teaching purposes.

First, when the technology components are decided on, the orders will be placed. Orders usually arrive within a week or two. Once the technology components have arrived, each item's information will be gathered in the inventory of Classroom Support.

Once the component information is filed in the inventory, the assembly of the classroom podiums must be completed by a contractor. While that is processing, the selected classrooms will be stripped of the older technology.

Another contractor agency will be hired for removing and setting up the new technology in the classrooms.

The older technology will then have to go through the inventory to ensure that the information on the sheets about the room number and building are accurate with the current time.

Since there are eight months to complete the refreshment of about 500 classrooms at UNC Charlotte, there should be 13 classrooms completed each week. This should be feasible with the amount of workers hired for the project.

There is no specific timing for each process. Instead, the project will be a cycle. From the inventory management, to assembling the podium equipment, to replacing all the classroom technology, back to the inventory and surplus, and onto testing the classrooms.

There will also be some deadlines and meetings every month to ensure that the project is going the right path. The deadlines will secure the goals and allow the project management to be flexible if there are any changes needed.

Once the classroom technologies are updated, there will be testing of the setups, quality assurance, and ensuring that the users are able to perform teaching tasks on the renewed technology.

**Milestone:** The collected information regarding the class schedule will help with figuring out when and where the project team needs to refresh a classroom technology. The class schedule will become a foundation for working around those times to make as little interruption as possible to on-campus courses.

**Deliverable:** The finalized scheduling for the work that needs to be completed. This will allow the team to work more efficiently and more effectively with other contractor workers. The schedule will also define the right path for the project goals. It will ensure that the project team is on schedule and doing what needs to be done in a timely manner.

**Identify and purchase appropriate upgrades**

In order for the project team to identify and purchase appropriate upgrades for the classrooms, there is a series of stages that must take place in order. The order of these has been selected in a way that is intuitive and easy to follow as they build off of one another to complete a larger task. The stages begin with information gathering and follows with execution using the information that was acquired.

The first step to identify appropriate upgrades is to meet with The university to obtain a list of equipment that has been purchased in the past and is approved for campus use. This first task is important because one of the goals in this process is to make the upgraded rooms consistent with the previously upgraded ones. This list will also save time on research that would be required to find new equipment.

The next step will be to locate and assess the different suppliers that will be able to provide us with the equipment needed to complete these upgrades. This stage comes next because once the project team has narrowed down the equipment that will be used in the project, the team will need to find a reliable source to provide the equipment. This stage will be used to find a supplier that works within our time and cost restraints. This task will take longer as different suppliers will be compared against one another to find the best fit.

The next step will involve the project team reaching out to the university to identify any rooms that require special attention, these rooms will change the amount of equipment that will need to be ordered as these will be an addition to the work to be complete. This is the time that the project team will set the expectation that special requests are only on as needed biases and that customizing each room is out of the scope for this project. These special requests must only be more of a type of equipment for one room such as an additional projector, or speakers, no new types of equipment that did not exist prior will be available.

The next stage in the project will be to use the information gathered previously to begin to map out the quantity of equipment needed by class room per building. This stage will access the current state of the class rooms and allow for the amount of equipment that needs to be ordered to be quantified. By having the approved list of upgrades, the special requests, and suppliers we will be able to begin to home in on the specific details of each room's requirements.

The final stage for this area of the project will be to create the orders for equipment for the project itself. This is the last stage of this area because the information gathering is expected to be complete and ready to use for execution. Once the equipment is ordered the project team will be ready to move forward with the next stages in the project involving hiring contractors and scheduling.

**Deliverable:** The finalized lists of approved upgrades, reliable suppliers, and quantity of upgrades will serve as a key deliverable for this section of the document. These lists will help set a foundation for the scheduling section of the project to begin assigning contractors to class rooms.

**Milestone:** The documentation of ordered equipment will serve as a key milestone for this section of the project. Contractors will be able to be hired and scheduled to complete the work required as equipment arrives at the project site.

**Hire contractors; implement upgrades per approved schedule**

The project team can start the process of selecting and hiring the installation contractors after the implementation timeline, schedule, and upgrade scope have been determined. A full inventory of classrooms and an accurate upgrade scope are required inputs for this effort so an accurate statement of work can be provided in the request for quote.

The first step in this process is gathering a list of approved contract agencies from the University of North Carolina at Charlotte staffing department. This will begin once the upgrade scope has been determined.

After compiling a list of approved contractors, the project team will identify four to six agencies to send requests for quotes.

A formal request for quote must be generated for each identified contract agency. This will require inputs from the statement of work, timeline, schedule, and list of contract agencies.

The contract agencies will be given seven business days to respond to the request for quote. This allows sufficient time for each agency to generate a detailed and accurate quote for the scope of work requested.

Once the formal quotes have been received from the contract agencies the project team will work to select an agency to award the project to. A contract will be signed by the university and the contract agency detailing the work to be completed and any other legal requirements. This effort will require the completed quotes from the identified agencies, the statement of work, timeline, and schedule documents produced earlier in the project.

**Deliverable**: The signed and approved contract between the University of North Carolina at Charlotte and installation contract agency will serve as a key project deliverable. This document will allow the implementation phase of the project to kick off.

The implementation phase of the project will begin with an installation in a pilot classroom, including full testing, QA, and user acceptance.

**Milestone**: Once the completed pilot classroom has been fully tested, verified, and accepted by the project team, the team will stop to verify the project is still on track to meet all cost, scope, time, and quality goals.

After the pilot classroom installation has completed successfully, the project will move into the full installation schedule. Installations will occur per the approved schedule.

The project team will work to monitor the schedule and budget of the overall project during the installation phase.

**Testing, User Acceptance and Quality Assurance**

Testing and QA tasks should be performed in the sequence described below.

Once the upgrades have been physically installed in a classroom, the team will perform tests and quality assurance tasks.

To do so, the team will need to produce test "scripts" which will list the tests that a team member (or, possibly, service provider say from IT services) will have to perform in order to ensure basic functionality and expected behavior. This must be done before physical tests can be undertaken in a rigorous and uniform way, although the test plan may eventually change as needed in the course of testing.

Once the installation is complete, a team member should visit the classroom. The team member will first perform basic functionality testing, including making sure that the system turns on and functions as expected. This ensures that the systems are basically functional, including starting, and stopping.

Once "basic" testing is completed and it can be verified that, at a minimum, the systems turn on, the team member can perform more complex tests, such as checking special configurations. Here we can perform limited QA testing for extreme problems, for example, volume being automatically initially set to be either silent or painfully loud. Having tested, the team member can then identify and note any problems with functionality.

Furthermore, the tester should perform a visual inspection for quality of work: there should minimal exposed wiring and no cosmetic defects (painting, drywall, scratches, etc).

Basic and advanced testing can be done concurrently with quality inspections.

Once functionality is ensured, we should bring in our user test groups. These user test groups do not have to test every classroom, but they should be brought in for early installations as appropriate; for example, if a single building will have a standardized setup, the user group should be brought in to test one of the first installations in that building to ensure it meets their standards for usability. The user group's feedback will be recorded and analyzed.

**Milestone:** Early test groups will be a key milestone, a time for the project group to consider whether its work is being well-received by the users and whether or not it can even be considered an "upgrade" by users. If the project team finds that the users are extremely dissatisfied, it may have to reconsider its direction.

If necessary, user feedback can be incorporated and used to change software configuration specifications. This will require an extra QA task, that is, to adjust configurations in already-refurbished classrooms.

Further QA tasks will include producing limited documentation, based on user feedback and preferred software configurations, that can be placed at lecterns or elsewhere in classrooms to provide guidance for users at the point-of-use.

The documentation will need to be written and then edited for clarity, then printed, then distributed to rooms. Having completed the above tasks, the team will determine if there are any outstanding issues requiring additional QA or testing tasks and perform them as needed.

**Deliverable:** This work will result in two deliverables: the first is the documentation described above, which will be distributed to the classrooms, and the second is a document verifying that tests and inspections were performed and that the installations were completed to an acceptable level of quality.

## Time Duration Estimating (5)

**Information gathering: classroom and technology inventories**

IG-1. Obtain list of classrooms: 1-3 days. This may be a single-day, single-email task. If we can identify an authoritative source that already has this information and is willing to share it, then the job is done. It's possible that this may take longer depending on the time it takes to identify the proper source and receive a response.

IG-2. Obtain list of technology: 1-3 days. As in the prior step this may be a very short task depending on the availability of the data. It may even be the same source as the above information.

IG-3. Review classroom list data quality: 1-2 days. Although we hope that the data will be up to date and comprehensive, we may have to take additional steps to fill in gaps or update old data as needed. This task represents the time spent understanding and analyzing and understanding the quality of the data.

IG-4. Update and/or correct classroom list as needed: 0-5 days. This step may not be necessary if the data quality is good, but if the data is missing significant chunks or is out of data, we will have to spend time resolving it. We anticipate that this will not take too long, but that there's a somewhat low probability chance that it may take significantly longer if the team will be required to take steps toward surveying the classrooms themselves.

IG-5. Identify classrooms in/out of scope: 1-2 days. We estimate that it will take a relatively short amount of time to both define the criteria for out-of-scope rooms and then categorize accordingly.

IG-6. Update and/or correct technology list as needed: 1-5 days. This is similar to the above task, but for the list of technology instead of the list of rooms (assuming they are separate data sources).

IG-7. Identify specialized rooms: 2 days. This is time spent identifying and understanding what special rooms exist and how they need to be managed. This can be done concurrently with step 5 and to some extent 3 and 4.

IG-8. Reviewing direction (milestone discussed above): 1 day. The team, having gathered data and presumably knowing much more than when they started, will take some time to review the state of the data and any implications for the project itself.

IG-9. Final data quality assurance and analysis: 1-2 days. This represents the time spent on final data verification and the organization and publishing of this work activity's deliverable.

**Develop an implementation timeline and coordinate scheduling**

SC-1. Obtain a list of needed upgrades and classrooms: 5 days. This is the first step to start the project. The project team will email the supervisors and college departments regarding the plan of the project. There will be meetings set up to communicate clearly. The list of upgrades must be approved by the project team, supervisors, and college departments for budget purposes.

SC-2. Order newer technology: 10 days. Once the list of upgraded equipment is obtained by the project team, those items will be ordered. These ordered items could take about 1-2 weeks to arrive. There will need to have an extra area to store all the new components.

SC-3. Assembling classroom podiums with newer technology: 14 days. The new technology will be checked and tested before sending it to the contractors. Another contractor company will be hired to assemble the classroom podiums.

SC-4. Filing the new technology into the inventory: 5 days. Since there will be a huge amount of new technology, there needs to be multiple people ensuring that the information is clear and accurate for each classroom. This may take a shorter or longer amount of time.

SC-5. Removing all outdated technology in specified classrooms: 39 days. The project team needs to work around class schedules to make classroom changes. After all the preparations above, the project team will focus on removing all the outdated technology in specific classrooms. The process of refreshing the classroom technology will be faster when a team removes the older equipment and another team will come in to set up the newer technology. Note: There needs to be a bigger storage area to store these items.

SC-6. Setting up new technology: 39 days. Same as above. When a team removes the older technology, another team will come in to replace them with the new technology. This will create a cycle which will enhance the process of the whole project.

SC-7. Putting outdated technology to surplus: 5 days. The inventory people will remove the following items out of the inventory sheet to ensure an accurate and reliable source of technology in each classroom. The surplus workers will need to pick up the outdated technology more often to remove clutter in the storage area.

SC-8. Testing: 5 days. The project team will take its time going from building to building testing of refreshed technology in classrooms. The testing process will produce a final data quality assurance.

**Identify and purchase appropriate upgrades**

PU-1. Identifying and purchasing the appropriate upgrades for this project involves many stages that lead up to one another. Each stage has its own estimation on how long it will take to accomplish. The first step in this process will involve obtaining the list of approved technology from the university. The university has upgraded approximately one-third of the seven-hundred class rooms on campus. In an effort to maintain consistency our team will meet with the different colleges on this campus to compare the lists of approved technologies that were purchased. It is our estimation that this stage will take about one to two days to complete depending on the response times of the different leaders on campus.

PU-2. The next task that will be completed will be locating a list of suppliers with the equipment we need in stock and have a reliable history of delivery of product. This will be a highly important stage as an unreliable supply can cause unwanted delays and interruptions to the overall project schedule. This stage is estimated to last seven to ten days. This will give the team ample time to compare and contrast the different suppliers and select the ones that best fit our needs.

PU-3. After a supplier is found we will begin to listen to special requests from the university on rooms that need upgrades outside of what already exists. These will be classrooms that are underfit with equipment and need more such as speakers near the rear of the class or an extra projector to increase visibility. We do not expect there to be many requests as this project at heart is not a custom class room project. Requests will need to be minimal and not add complexity to a class room. This stage should take about three days. This will be enough time to meet with the different college deans and receive these requests.

PU-4. The next stage in the project will be creating maps of which upgrades will be required for specific class rooms in each building. This will help to organize the equipment ships as they come in and ensure that extra work is not being created by routing extra equipment to the wrong places. These maps will be used for the next stage of ording the equipment. This stage is estimated to take seven days as each classroom will have detailed lists of requirements based on current configurations.

PU-5. The final stage of this major work will be to create the orders for equipment from the suppliers. The orders will have dates of delivery based on how the contractors are scheduled to work. This will minimize the cost of storage as equipment waiting to be installed will not be on site and will be in a future delivery.

**Hire contractors; implement upgrades per approved schedule**

IM-1. The project team will take one day to gather a list of approved contract agencies from the University of North Carolina at Charlotte staffing department. This work is not dependent on other deliverables and can be completed during the planning phase of the project.

IM-2. The project team must generate and submit requests for quote to the identified agencies. This is estimated to take one day. The team will use a standard RFQ document provided by the university for this effort, which will allow the team to produce the document faster than if they had to create one from scratch.

IM-3. Selecting a contract agency will take a total of nine business days. This includes the seven business days given to the contract agencies to respond to the request for a quote. Once the quotes have been received the project team will have two business days to select the company to award the project to.

IM-4. The pilot classroom installation effort will take three days. This will include the installation contractors completing the installation, as well as QA, testing, and user acceptance testing.

IM-5. The installation of the technology upgrades in individual classrooms accounts for the bulk of the time allocated for this project. The total time provided for this phase of the project is 39 business days. The project's aggressive schedule requires that the installation contractors work in discrete teams and complete multiple classrooms per week.

IM-6. Continuous monitoring of the project's progress will happen concurrently with the installation of the classroom upgrades performed by the installation contractors. The project team will continuously monitor the overall project budget and schedule throughout the lifecycle of the implementation and testing phases.

**Testing, User Acceptance and Quality Assurance**

QA-1. Basic functionality testing: 1 day. These tests can be performed after work on each classroom is completed. These tests are specifically designed to be for extremely basic functionality such as starting and stopping and should easily be performed in one day, if not one hour.

QA-2. Configuration and QA functionality testing: 1 day. Although these are marginally more complex tests, we anticipate that these tests should not be longer than 2 hours. Essentially, a project team member (or outside tester) should be able to visit a room, run the tests, and then continue to another completed room.

QA-3. Visual inspection for workmanship QA: 1 day. Similar to the above tasks, this is just an inspection for cosmetic damage or other workmanship mistakes made by the contracted installers. It should be completed on the same visit to the modified room as the tests.

QA-3. User Acceptance Testing: 2-3 days. In this case, UAT means taking some users of the technology (lecturers, students) through a few use cases of the technology and gathering their feedback. These sessions should last a few hours at max, though they may require some time in planning and scheduling. We also anticipate multiple user test sessions.

QA-4. Analyze user feedback: 2-4 days. This is time spent gathering, organizing, and reviewing user feedback in order to determine whether or not changes to the installed technology suites are required.

QA-5. Reconfiguration (as needed): 1 days. In cases where configuration was not done correctly, or for adjusting based on user feedback

QA-6. Workmanship touch-ups (as needed): 1-2 days. Time allocated for minor repairs on a per classroom basis. Since the installation takes two days, we estimate that relatively small repairs will take one day. Some few cases where the system may have to be totally reinstalled could potentially take two.

QA-7. Produce documentation: 2-3 days. This is time allocated for the team to develop, review and finalize the point-of-use documentation.

QA-8. Print user documentation: 2-3 days. Some time is built in for delays here from the printing provider.

QA-9. Distribute documentation to classrooms: 1 day. Assuming the documentation is created and printed before all classroom installations are complete, it can be distributed while testing takes place on later installations.

QA-10. Final walkthroughs: 3-5 days. The five days allocated here represent "final" walkthroughs, after all the installations and tests are completed for final inspections and QAs. We anticipate that dozens of classrooms can be completed a day, but understand that there are many buildings across multiple campuses.

## Calendaring (5)

The main concern when it comes to scheduling is the summer holiday. Although the university still offers summer classes and limited facilities, the volume of classes and utilization of classrooms is significantly reduced. We consider this the best time to do most of the in-classroom work of the installations and testing, simply due to the relative ease and flexibility of scheduling.

Additionally, in cases where mistakes are made or delays encountered, the work will be minimally disruptive to classes.

The project should kick off before the end of the 2021 spring semester. Although the academic calendar for 2021 is not yet published, we anticipate that final exams will conclude during the second week of May. The project, then, should formally start in mid-February of 2021. The project schedule takes into account holidays and weekends. "Months" are assumed to be about 20 working days.

We can consider the project essentially two phases:

The *planning* phase involves information gathering, analysis of technology needs, scheduling, and purchasing. This phase should begin and be mostly complete before the summer holiday begins, though some overlap is acceptable.

The *installation* phase involves the work of installing, configuring, testing, and QAing the upgraded systems into the classrooms. This phase should begin and end with the summer holiday.

After the phases, there will be a final QA "walkthrough" task, but this is not as significant a work effort.

Generally, we anticipate the planning phase to take about 3 months. This will include time to accommodate problems such as data gaps, scheduling problems, and purchasing delays as well as other complications. We think that allotting ample time to planning will pay off, as the summer holiday is a relatively small and concrete window in which to complete the upgrades.

The installations will take place concurrently with testing and QA. We anticipate that that shortly after work in any single classroom is completed, the project team can conduct the testing and QA tasks. This will occupy the team's time during the implementation phase.

The project work will begin with obtaining a list of classrooms. This will take two days and be completed on February 22nd and 23rd 2021.

Obtaining and compiling a list of current technology in the inventoried classrooms will take two days and be completed on February 24th and 25th.

Reviewing the inventories' data quality is expected to last one day. This will end the first week of the project and take place on February 26th.

Updating and/or correcting the classroom lists is expected to take three days, and will be completed on March 1st through March 3rd, 2021.

Identifying classrooms that are in and out of scope for the project will take two days and will be completed on March 4th and 5th.

Updating and correcting technology lists is expected to take four days. This will be completed from March 8th through March 11th.

Identifying specialized rooms that may require unique upgrades will take one day. This effort will be completed on March 12th.

Additional information gathering may be needed before finalizing the information-gathering portion of the project. The project schedule includes two days for this work, to be completed on March 15th and 16th.

The project schedule includes one day to stop and review the project direction, goals, scope, and budget before moving forward. This will take one day and will take place on March 17th.

Final data quality assurance is expected to take two days. This will be completed on Match 18th and 19th.

Obtaining a list of needed upgrades will be a complex effort, requiring five days to complete. This is scheduled for March 22nd through March 16th. We must communicate clearly with the college departments and all kinds of supervisors that will be involved or affected by the changes.

Ordering and receiving the new technology equipment for the project is expected to require ten days to complete. This is scheduled for March 29th through April 9th.

Developing the implementation timeline and scheduling the classroom upgrades will require significant time investments from all members of the project team. This work will take 14 business days to complete and will be completed from April 12th through April 29th.

Moving forward towards the implementation phase of the project, contractor identification will kick off in late April, 2021.

Identifying approved contract agencies through the UNCC staffing department will take one day and be completed on April 30th.

Generating and submitting requests for quotes to the identified contract agencies will take one business day. This is scheduled for May 3rd, 2021.

Selecting the contractor for the project and signing the contract will take nine business days. This includes the seven days given to the agencies to respond to the requests for quotes and two days for the project team to select the contractor. This will take place from May 4th through the 14th.

The implementation phase will take place during the summer break to minimize the impact to instructors and learners. This is important because there are ongoing classes on campus that consistently meet up every day during the summer sessions. Our project team's goal is to accomplish tasks that will not interrupt classes or events on campus.

Assembling classroom podiums with new technology is expected to take 14 days to complete. This is scheduled for May 17th through June 4th. This schedule takes into account the Memorial Day holiday on May 31st, 2021.

Filing the new technology into the University of North Carolina at Charlotte's IT inventory system will take five days to complete. This work is scheduled for June 7th through 11th.

Removing all outdated technology in identified classrooms and setting up the new technology will be the longest efforts in this project and account for the bulk of the project time and expense. These two efforts will be conducted consecutively, taking a total of 39 business days in total. This will be completed from June 11th through August 6th, 2021. This takes into account the Independence Day holiday, which will be observed on July 5th, 2021.

Sending outdated technology to surplus will take five days to complete. This work will be completed from August 9th to August 13th.

Final testing will be conducting consecutively with the previous step and also take five business days. This will be completed from August 9th to August 13th.

The project team will work to continuously monitor the project schedule and budget throughout the implementation phase of the project, which takes place from May 17th through August 13th, 2021.

The project schedule is very aggressive because the implementation phase must be completed during the summer break. To accommodate this requirement, the classroom upgrade installations are condensed into an eight-week schedule, running from early June 2021 through early August, 2021.

The eight-week implementation phase of the project forms the basis of the entire schedule. Working backwards from that point dictates the schedule that the rest of the project must accommodate in order to successfully complete the project while minimizing impact to classroom instruction or class scheduling.

The project is expected to encounter some delays but the preparation in the beginning should prevent major mistakes to happen. There are also agreements in the contracts with the contractors that will hold them responsible for replacing missing workers to ensure that work flow is good and smooth.

The scheduling will consist of constant updates from all the working teams, as well as the departments and colleges where work is being done. Communication is very important when it comes to meeting deadlines. Making sure that everyone is on the same page and working together efficiently.

The proper planning of the preparation before June 2021is a crucial part of the project because it will allow a smooth transition from phases to phases.

The planning phase will also determine the scheduling for the rest of the project which is important when deciding the dates of those different phases.

See **Appendix 2** for the project calendar in table format.

## Risk Management Plan (5)

In considering our risks, we first categorize them as internal or external risks. Internal risks come from shortcomings within the team whereas external risks come from factors outside our control.

**External Risks**

External risks are largely outside our control, but may have significant effects on project completion (or even prevent it entirely!) In considering our external risks, we find:

1. Classroom data unavailable - it's possible that the data we need for planning the project is not available, out-of-date, inaccurate, or otherwise not effectively usable, necessitating a comprehensive data gathering effort. This would delay our planning and likely the rest of the project.
2. Classrooms unavailable - If, for some reason, we struggle to access the classrooms we need to upgrade, it will delay our project.
3. Availability of Upgrade Components - If we cannot get the components, we need to install in order to upgrade software, our project will be delayed. This is possible in case of shipping delays or stock shortages.
4. Availability of Installers - If we are unable to hire enough contractors to get the work done in the summer time we have allotted, the project is likely to experience delays and either be suspended until next year, or run long into the school year, creating additional complications.
5. Availability of Supporting Services - It's possible that campus IT services or other partners at the university have summer plans of their own and won't have the capacity to assist in our project.
6. Other classroom enhancement priorities - There is a chance that the classrooms need to be modified in some other way over the summer and the work cannot be done concurrently. Examples include infrastructure replacement, furniture replace, and other remodeling efforts.
7. Campus security incidents - Campus security incidents including fires, threats, or otherwise may introduce significant delays in the work. Even a few days' delay could significantly affect the schedule.
8. Inclement weather conditions - Weather events may necessitate the temporary suspension of work, introducing delays.
9. Conflicts with other events - large, previously scheduled events (such as continuing education, conventions, or academic conferences) may introduce complications such as classroom reservations, building access restrictions, or campus road blockages.
10. Previously-approved or proscribed technology is low quality - We have assumed that the products we used for the upgrades were previously reviewed, tested, and approved by a prior project. There is a risk that this technology is poor quality, unreliable, or otherwise counterproductive.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **External Risks** | | | | |
| Likelihood of happening | High |  |  | 2, 5 |
| Medium | 10 | 8, 9 | 3, 4 |
| Low |  | 1, 6 | 7 |
|  | | Low | Medium | High |
| Impact to the project | | |

**Internal Risks**

1. Inability to collect data - The team may need assistance in accessing, interpreting, and organizing data concerning the current state of classrooms. If this data is formatted or otherwise unavailable, getting the necessary support may be time-consuming
2. Inability to analyze data in a timely manner - The project team may not have the resources or skillsets required to analyze the data within the time constraints of the project timeline.
3. Inability to decide new upgrades - The team may have to make judgment calls about previously-approved upgrade components that are no longer allowed or preferred. This may take longer than expected or the team may not have the experience or expertise to make these decisions.
4. Inability to organize upgrade scheduling - Upgrade scheduling complexity is very high due to the variation in classrooms, classroom ownership, availability of classroom owners during summer vacation, the number of classrooms involved, and other factors. It will be difficult for the team to schedule the installations and organize that information, which may lead to mix-ups and delays.
5. Project team member availability - Project team members may become unavailable during the life of the project for a variety of reasons, including FMLA leave, illness, or career change.
6. Inability to sign contractual agreement with installation contract agency - The project team may not be able to come to terms with the selected contact agency, which would put the installation phase of the contract in peril.
7. Classroom upgrade failures - The project team may experience failures or setbacks while implementing the classroom upgrades across the campus. Any failures or setbacks could result in difficulties meeting the project schedule and deadlines.
8. Inability to meet upgrade schedule - The team may not have the resources to complete the classroom upgrades at the pace required of the aggressive project schedule.
9. Inability to adequately test classroom upgrades - The project team may have issues adequately testing the classroom upgrades once they have been implemented.
10. Mistakes with acquiring data on equipment - They may be mistakes made when taking information from the upgraded equipment during the inventory processes that will affect how accurate it is with the actual technology in the classroom.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Internal Risks** | | | | |
| Likelihood of happening | High |  |  | 7 |
| Medium | 9 | 5, 8 | 1 |
| Low | 10 | 3, 6 | 2, 4 |
|  | | Low | Medium | High |
| Impact to the project | | |

**Risk Responses**

Availability of Classrooms - Access to the classrooms is essential to the project. If we do not have consistent access, we simply cannot enter to do essential work, including information gathering, installation, and quality assurance.

To guarantee that we will have at least much access as we need, we will pursue a **mitigation** strategy in order to minimize the chances that we won't be able to use the classrooms, and, if necessary, to reduce the impact of disruptions in access to the rooms.

One of the early steps the project can take is to gather information from supporting university sources (central offices, planning, department heads) about what other demands may be made for the classrooms over the summer and if they will be significant obstacles. It's possible that there will not be significant obstacles to accessing the classrooms, but in case there are obstacles, we need to find this information early in the project so that we can plan accordingly. This is a way to reduce the chances of the risk occurring, or at least, to become aware of whether or not it will occur.

Having gathered information, we can schedule around times when specific classrooms or buildings are unavailable. This will reduce the impact of classroom unavailability.

In cases where we learn that classrooms will be intermittently unavailable, we can prioritize these classrooms to be worked on as early as possible to reduce the risk of delays late in project execution and give ourselves a buffer of time to work on them.

In other cases, we may learn that classrooms will be entirely unavailable. These classrooms can be removed from the scope of the project early so that time is not wasted in analysis or scheduling on out-of-scope rooms.

Additionally, we will want to reduce delays from contractors unable to access buildings, so we can work early to secure necessary access tools: correctly-configured temporary key fobs and so on. This will reduce the risk of delay due to access restriction. This includes ensuring access to parking and access for larger work or delivery trucks as needed.

There are miscellaneous events which may also restrict or delay access to classrooms. There may be other summer projects doing refurbishing, conferences, continuing education events, etc. We will also pay attention to large events that may be scheduled for the summer which may restrict traffic. Our best strategy to deal with these is to gather as much information as possible and take steps to schedule around these or otherwise clear obstacles.

Availability of Upgrade Components - Similar to classroom access, it is absolutely essential that we can get the components, such as projectors, sound systems, assorted construction materials, wiring, and so on. Without these components, we simply cannot accomplish the work of upgrading the classrooms.

In order to minimize the risk and impact of not being able to attain the components and materials we need, we will pursue a **mitigation** strategy. We will attempt to avoid the problem not having the materials, or if we can't avoid the problem, at least reduce the impact so the project can proceed.

First, we can contact our anticipated suppliers early in the project to learn about anticipated availabilities for the products we are most likely to use. This is a key information gathering effort: if our suppliers do not anticipate shortages, we can be reasonably certain that the risk is mitigated.

If our primary suppliers are anticipating stock shortages or delays, we can take steps to contact alternative suppliers. Ideally, we will want to learn this as early as possible in case there are additional complications when it comes to working with university-approved suppliers and what (we presume) is a lengthy government-contracting process.

We may also need to place early orders. In this case, we will have to make arrangements to store the materials securely and safely until the project can get underway.

As a last resort, we may have to identify substitute products to be used in cases where the pre-approved components are unavailable. This will introduce additional evaluation and testing steps into the project which may lead to delays. In the best case, we can simply buy different but still close versions of the approved products. In the worst case, we will need to expend significant effort in evaluating and testing products from different manufacturers, and may even necessitate some serious re-thinking of the viability of the project.

Furthermore, we will also have to consider cost ramifications of using different products, storing purchased products and the time spent in evaluating substitutes.

There may be ways that we can employ a **transfer** strategy in order to get help from other university departments to find substitutes or additional supplies.

Availability of Installers - If the project team is unable to hire enough contractors to get the work done in the summer time we have allotted, the project is likely to experience delays and could either be suspended until next year, or run long into the school year, creating additional complications.

The project's success is highly reliant on having a sufficient number of competent classroom technology installers available throughout the University of North Carolina at Charlotte's summer break. The project is operating on a very aggressive schedule, so any delays or personnel shortages will have wide reaching consequences for the project deadlines.

Successfully mitigating the risks associated with installer availability is key to this project's success. If the project installers are unavailable for any reason significant setbacks could occur, up to and including failure of the project as a whole.

Risk response strategy: **Mitigation** - Risk mitigation reduces the impact of the risk by lowering the risk's probability of occurrence. A common way to mitigate risk in a project is to ensure that an activity is performed by competent personnel.

If necessary, the project team will work with either the university subcontractor/staffing office or a general construction contractor to delegate the hiring and scheduling of the installation contractors.

Assigning this work to a general contractor could increase the cost of the implementation phase of the project, but would allow the project team to mitigate the risk by having a group with more experience in this area perform this critical project work. A third party is likely to have the expertise and reach needed to get additional resources if needed, which may not be possible for the project team members.

The availability of individual installers will also be mitigated by the signing of an approved contract with an installation contractor. The installation contractor will be responsible for staffing the project's installers on a personnel level. This again mitigates risk by transferring critical work sub-tasks to experts in this field, instead of relying on the project team members' little experience in this area.

Classroom upgrade failures - The project team may experience failures or setbacks while implementing the classroom upgrades across the campus. Any failures or setbacks could result in difficulties meeting the project schedule and deadlines.

There may be issues with the equipment when it first arrives after shipping. There may be unnoticed damages to these devices that could potentially lead to system failure when doing the classroom upgrades.

If this was to happen, the team will have to test and check each component of the classroom upgrade to identify which is causing the failure.

There may also be issues with assembling the classroom podiums and other technology. There could be cabling problems such as not connecting to the correct ports or having a broken cable.

Cabling is a very important part of the system upgrade. If one cable does not properly work, it could lead to bigger problems. To ensure that this does not happen often, when doing the tests in the technology upgrade, each tester needs to ensure that all components are turning on and running as it should be.

Another classroom upgrade failure could be the lack of instructions. Other teams working in some classrooms might be doing all the necessary work while the other team could be lacking in some areas of the work. This would definitely lead to confusion and delay in work. There may be instances where the classrooms have different setups but there should still be clear instructions for each specific work.

To ensure that this does not happen, the project team needs to have a clear communication throughout the project timeline. It needs consistent planning to make sure everyone is on the same page. Contract workers need to have a very good understanding of what work needs to be done for each specific task.

Lastly, having testing and quality assurance at the end of the project is a must. Testing will ensure that all components in the system are working and running smoothly. It will also identify what is needed to be adjusted or done to better upgrade the classrooms.

Availability of Supporting Services

Mitigation: Confirm early in the project that the necessary support will be available from the university. We may also consider a transference strategy such as hiring a third party to provide support for necessary integration tasks.

The project team will have the responsibility of securing the majority if not all of the funding for the project before attempting to perform the upgrades. This will be done through formal meetings with the leaders of the university.

If proper budgeting can not be secured to fund the entire project, the project team will communicate with the university to set the expectation that work will only be completed as funded.

There may also be issues with contracting companies not fulfilling the quality of work that is expected for the project. In these instances the project team will have back up contractors that can be mobilized to fill the role of the previous team. This will help ease strain on the project if necessary to implement.

Another way to mitigate the risk of improper integration with current university standards is to work in partnership with the university information technology team. This will increase the quality of work completed as the university teams will have consistent oversight of the upgrades and provide assistance where needed.

There will also be a schedule that the supporting services need to follow. Schools and departments run on a semesterly schedule with the expectation that classrooms will be available for use. It will be important that departments are kept aware of class room downtime to allow proper planning by the university. To mitigate the risk of downtime, the project team will work with the different departments to ensure key classrooms are prioritized and ready for the school year.

It is understood that some workers may need days off, however, it is the responsibility of the contractors to be able to have substitutes or replacement for the number of workers needed to be present every day. This will be monitored by the project team to ensure that a specific contractor has enough staff available.

# Executing Phase

## Quality Plan (5)

The "leverage points" discussed here are characteristics of the installed classroom upgrades that are important to quality. Essentially, they relate to how the classroom technology enhances the learning experience for students and lecturers.

1. Utility - refers to the efficacy of using the technology to promote learning. Essentially, the utility of the classroom technology is how well it helps students learn as opposed to distracting them or getting in the way of a lecturer's lessons. How useful the technology is can be understood by asking questions like, "does projecting the slides help students understand the material better and faster than writing on a whiteboard would?" or "Does the PA system help students hear the lecture better, or is it echoing or unclear?"

When the work is done well, the classroom technology complements the experience and goals of the students and teachers. Lectures can be projected onto highly-visible screens with good picture clarity. Sound systems can be heard clearly from anywhere in the room. In cases where the rooms are equipped for it, lectures can be recorded or streamed live with clear video and sound quality. There are no extraneous product features ("bells and whistles") which are, in practice, distractions.

Quantitatively, we can measure picture clarity by video resolution. Though it would be possible to measure audio volume and clarity with advanced tools, we don't anticipate requiring that level of precision.

We can also measure quality by incorporating questions about the upgraded classroom technology in end-of-semester surveys. We can compare this data to prior years and derive a fairly good indication of whether or not the upgrades are improving the experience for students and teachers.

To ensure that quality is high, we can review the technology we decide for its ability to project or record at the desired resolution and/or volume. That will handle the quality at the point of the technology; to ensure that it meets required levels of quality, we will incorporate subjective tests into our QA processes. We can include projector clarity tests, volume tests, or other tests as needed into the test and QA scripts.

Additionally, we will incorporate limited quality reviews with our early user acceptance tests. We can use this feedback to ensure the best initial configuration and make small adjustments as needed.

1. Ease-of-use - refers to the ease with which someone can start using the technology without training. For example, lecturers and students should be able to quickly connect their laptops or other devices and begin projecting material, playing media at an appropriate volume, connecting to the internet, and so on.

When the work is done well, the systems can be used without training and with an intuitive understanding of how the simplest and most common tasks can be accomplished. For example, it should be obvious where a user can plug in his or her laptop and obvious how to project the laptop's screen to a projector in order to give a presentation. The system should automatically output sound from the laptop to make it simple and easy to play media. Buttons to start and stop the system, raise and lower projector screens, adjust volume, and so on should be clearly labeled and visible. The system may also be configured with automatic on and off timers, so it will be ready for classes and won't be damaged or otherwise wasteful if left on.

Essentially, if a user has to consult documentation for anything but advanced functions, the system is not easy enough to use. We may eventually discover that some training will be necessary, but this is an appropriate and ambitious quality goal even if it is not 100% accomplishable.

Quantitatively, we can measure our accomplishment of this goal by looking at service calls from the upgraded classrooms before and after the upgrade. If the calls from the classrooms for help on how to use the systems are reduced after the upgrade is complete, then we can be confident we have achieved the goal.

Furthermore, as we will do with measuring utility, we can review feedback from end-of-semester surveys or work with university partners to incorporate relevant questions on these surveys.

To ensure ease-of-use, we can take a few steps: we can incorporate the user feedback received from early demos, produce and distribute "point-of-use" documentation such as stickers and helpful hints, and we can configure the systems for ease of use. Although generally we want to make the system easy enough to use that no specialized training is required, we can produce limited training materials (though that is largely out of scope for this project) for users who want it.

1. Dependability refers to systems that work well consistently and only rarely experiences problems when performing common tasks such as connecting to the Internet. It also refers to how gracefully the technology fails: if a system crashes, does it restart and work on the first try? Or does it require a technician to visit the classroom and perform specialized service?

The success of the classroom technology upgrade project is heavily contingent on the dependability of the lecterns, projectors, sound systems, and related equipment installed in the classrooms. This dependability can be defined qualitatively in a number of ways:

Lecterns and projectors reliably connect to the University of North Carolina at Charlotte's network without manual troubleshooting needed by lecturers or support staff.

Lectern screens and projector images are clear and easy to read, do not have to be adjusted regularly to focus projector images or screen resolutions.

Sound systems work reliably, no issues with static or volume occur with any regularity. Lecturers and support staff should not have to frequently adjust or troubleshoot sound issues during classroom instruction, labs, or other activities.

If failures with any system occur there should be automated troubleshooting and error reporting in place to minimize impact to classroom instruction or other activities.

Dependability can also be defined quantitatively, defining in hard number or percentages what a successful implementation should look like:

* Classroom support tickets should occur less 5 per month per 100 classrooms
* Seventy percent of classroom support tickets should be resolved remotely, without need for an on-site technician
* Hardware replacements should occur less than 2 per month per 100 classrooms

A number of specific tasks and sub-tasks are present in the classroom upgrade project to ensure that dependability goals are met and the project is implemented successfully. The classroom upgrade technology will be chosen from lists of pre-approved technology that has been thoroughly tested and approved by the Classroom Support department. Installation of the technology upgrades will be completed by highly experienced, trained installation contractors.

1. Speedrefers to how quickly the technology can be up and running. Does it take several minutes of valuable class time to boot, load media, connect to the network, lower a projector screen, warm up a projector, and so on? Or can it start quickly so class can get underway without delay?

When classroom technology is started, it should start up simultaneously. That means the projector, computer, document camera, monitor, etc. would start with no problem at the same time.

When class is started, the startup of devices should only take less than ten seconds to show on screen. The upgrade's purpose is to make it faster and more efficient when using the classroom for lectures or events.

The setup of each classroom must be planned and executed accurately to ensure that the equipment in classrooms are working properly.

If the project team succeeds, there should be 100% chance that the upgraded technology is working properly. If maintained correctly, each classroom should have no issues for months. If a component breaks down or stops working, then it should be replaced quickly to ensure that the flow of class is not interrupted.

To ensure that the work is done correctly, the team will come up with a plan that will determine steps for finishing each classroom upgrade. There will be step-by-step instructions that the construction team will follow. This way, the work time is efficient and it will lessen the mistakes made.

There will be a process that must be followed. The maintenance team will also have some instructions on how to test the technology to ensure that each component is up-to-date and working as it should.

Overall, the upgraded technology will be significantly improved and faster.

Most times, the podium equipment is already turned on, causing less time for startups and allows the class to begin immediately.

If the event of equipment failure, the upgrades will be installed in a way that allows for maintenance to correct the issue in an appropriate manner. There should be minimal need to contact the project team for how equipment was installed and how to fix the issue.

The quality assurance will also enable the team project to identify if each classroom upgrade is performing at its best. Its performance must meet the expectations of stakeholders and users with no issues.

1. Workmanship refers to the quality of work done in the installation. Good workmanship means that the classrooms will maintain an attractive (or at least nondescript) physical appearance. It will facilitate future service by providing easy access to technology components. There will be no (or at least minimal) visible damage, wiring, or any hazard such as protruding nails.

Following the completion of work required for a given classroom, it should feel as though the appearance change was seamless. It should not be obvious where walls or ceiling tiles were modified to accommodate the new equipment installed. It is also expected that there will be no risk of injury from exposed building materials such as exposed nails and wiring.

It is expected from the building team that the work completed is up to health and building code. This includes withstanding the test of time as the room should appear after multiple years of use, the same as it did on day one.

When the classrooms are open for use the equipment should be easily accessible and usable. Placement of equipment should enhance the classroom experience and not distract from it. Professors should have to spend little time if any readjusting to the use of the new equipment.

If the project team succeeds students and faculty should be able to feel they are in a better position for learning. This includes easier visibility of projects, less noise issues from quiet speakers, and less downtime from failing equipment.

To ensure that the workmanship of the required work is up to standards, there will be routine checks at different stages in the project. There will be checks during installation and after installation to ensure that there is a high quality of work provided. Any oversights should be handled during these quality checks.

The quality checks completed will involve use of the equipment as if a class were present. This will be to ensure that in a real work environment the equipment is safe for use and functioning.

# Controlling Phase

## Change Control Plan (1)

The project team will use a change control system, outlined below, to ensure that all changes to the project are approved and documented.

All change requests, whether they are originating from within the project team or from external stakeholders, will be submitted to the project team in writing using the "Agreement for Project Changes" form below, along with additional supporting documentation as needed.

The project team considers its primary stakeholders to be:

1. Classroom facilities management, who will be responsible for maintaining the modified classrooms,
2. Departmental owners of the classrooms, who will have to teach in the modified classrooms, and
3. IT services, who will maintain and service the upgraded classroom technology systems.

When change requests are received, a change control board (CCB) will meet to discuss the proposed changes. The CCB will include the change requestor, appropriate partner stakeholders, and the project team. The requestor will present his or her argument in favor of the change. The CCB will review the form and have the opportunity to ask questions about the change and share potential impacts that the requestor may not have been aware of.

Due to the time-limited nature of this project, the CCB will meet on an ad-hoc basis (when changes are proposed), as opposed to routinely. Furthermore, the CCB will be sensitive to changes which may affect scheduling and timelines, given the relatively narrow time window allotted for the work.

At the end of the discussion, the CCB will, as a whole, decide whether to accept the change. All stakeholders must agree to allow the change. If necessary, the team will escalate change requests appropriately.

If the change is accepted, the project team will be responsible for updating project planning documents as necessary. If the change is rejected, the change proposer may modify the change as needed and come back to request it again.

## Change Control Documents (1)

**Agreement for Project Changes**

**Project name:**

|  |
| --- |
|  |

**Requested by: Date:**

|  |  |
| --- | --- |
|  |  |

**Request name: Request number:**

|  |  |
| --- | --- |
|  |  |

**Change description:**

|  |
| --- |
|  |

**Change reason :**

|  |
| --- |
|  |

**Impact of Change:**

|  |
| --- |
| * **Scope:** * **Budget:** * **Timeline** * **Resourcing:** * **Other:** |

**Proposed action:**

|  |
| --- |
|  |

**Associated cost:**

|  |
| --- |
|  |

**Approved by: Date:**

|  |  |
| --- | --- |
|  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Accepted Changes**  *This table will be used to track accepted changes and the dates this document was modified accordingly. Changes will be accepted through the "Agreement for Project Changes" form above.* | | | |
| **Request Number**  *ID number for the request* | **Requestor Name**  *Name of stakeholder that requested the change* | **Request Name**  *Descriptive name of the request* | **Date Modified**  *Date on which project planning documents were modified to reflect the change* |
|  |
| #000 | Jane Doe | Generic Request | Jan 1, 2020 |  |
|  |  |  |  |  |

# Closing Phase

## Project Summary and Next Steps (1)

The project team was very successful given the significant time constraints posed by the five-week course timeline. The team members collaborated well and worked efficiently to accomplish the weekly deliverables while balancing other personal and professional obligations.

The project team set up recurring weekly meetings to complete the project work and collaborate with each other on various deliverables. Due to the online nature of the course and social distancing provisions, work was completed entirely remotely. The project team collaborated using Google Meet meetings and Google Drive shared documents. Team members were also in frequent contact via University email and text message communication.

Lessons Learned:

* Remote collaboration requires additional communication and planning compared to similar work completed in person. Agreeing to a set schedule to meet remotely each week allows for work to be completed efficiently and in a timely manner.
* Delegation of the work activities allowed each team member to develop a specialization for each area of work. This did, however, lead to some overlap. Good communication was needed to resolve the overlapping work descriptions.
  + Lesson learned: delegation works but requires communication.
* The technology available to the team made instant communication easy. Using a group text allowed us to communicate freely and well. Using a shared Google Drive folder allowed us to work from a consistent, shared set of documents. Using Google Docs allowed us to edit the same document simultaneously with no differing version or formatting complications.
  + Lesson learned: set up the technology environment early and use the tools available.
* Due to the accelerated timeline of the course and busy work schedules, we did have trouble finding time to meet, but we were able to meet at least once a week.
  + Lesson learned: be flexible and accommodating of fellow students.

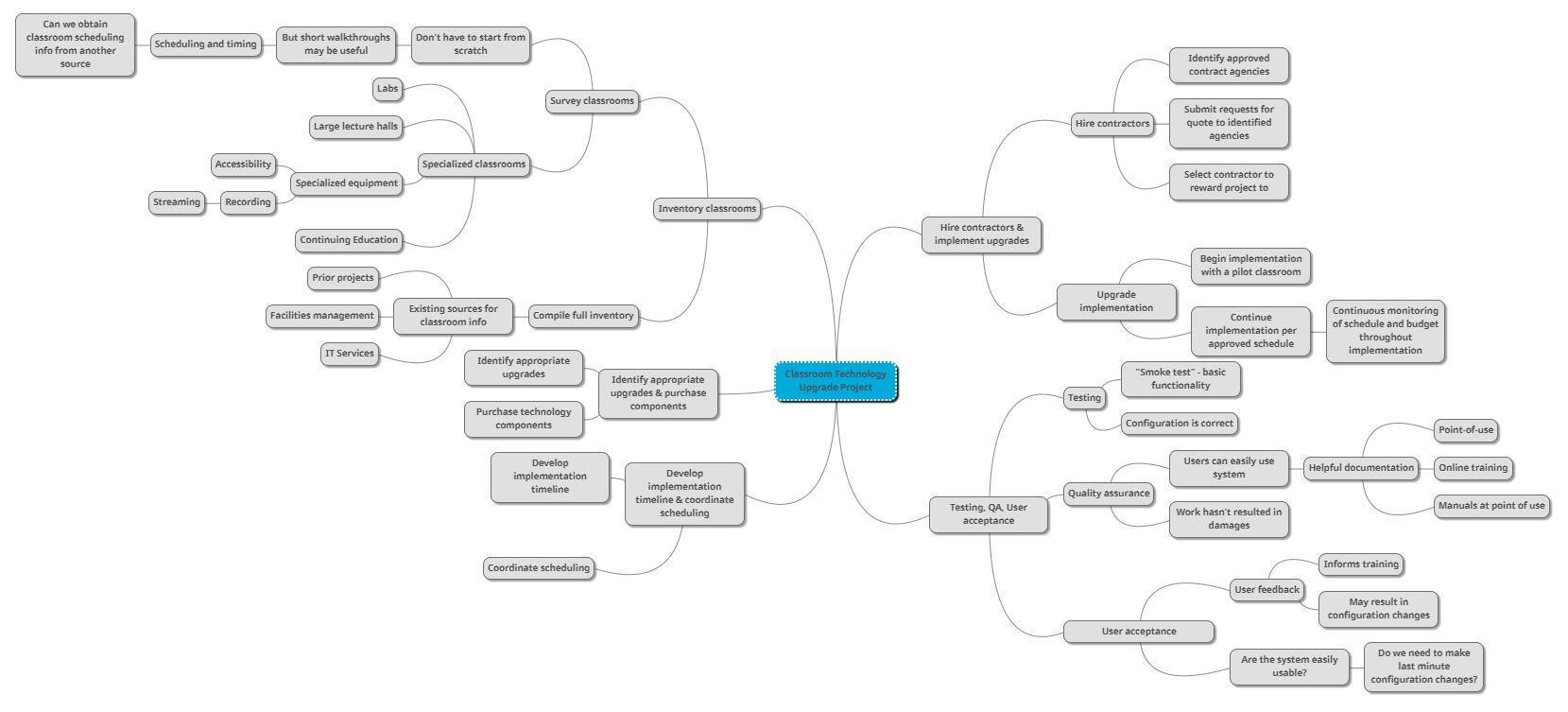
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# Appendix

## Appendix 1 (1)

*Insert Appendix items as needed. This will include the graphics for the Risk Management Plan, Quality Plan, Work Breakdown Structure, and other items which do not fit into the Microsoft Word format of this template. Number all appendix items sequentially.*

**Mind Map**



## 

## Appendix 2 (1)

**Schedule Calendar**

|  |  |  |
| --- | --- | --- |
| **Task** | **Duration Estimate (Days)** | **Calendar Date**  **(2021)** |
| Obtain list of classrooms | 2 | February 22-23 |
| Obtain list of technology | 2 | February 24-25 |
| Review classroom list data quality | 1 | February 26 |
| Update and/or correct classroom list as needed | 3 | March 1-3 |
| Identify classrooms in/out of scope | 2 | March 4-5 |
| Update and/or correct technology list as needed | 4 | March 8-11 |
| Identify specialized rooms | 1 | March 12 |
| Additional information gathering as needed | 2 | March 15-16 |
| Reviewing direction | 1 | March 17 |
| Final data quality assurance | 2 | March 18-19 |
| Obtain a list of needed upgrades | 5 | March 22-26 |
| Order the new technology equipment | 10 | March 29-April 9 |
| Develop timeline and schedule classroom upgrades | 14 | April 12-29 |
| Identify approved contract agencies | 1 | April 30 |
| Generate and submit requests for quote to identified agencies | 1 | May 3 |
| Select contractor for project and sign contract | 9 | May 4-14 |
| Assembling classroom podiums with new technology | 14 | May 17-June 4 |
| Filing the new technology into the inventory | 5 | June 7-11 |
| Removing all outdated technology in specified classrooms | 39 | June 11-August 6 |
| Setting up new technology | 39 | June 11-August 6 |
| Sending outdated technology to surplus | 5 | August 9-August 13 |
| Final Testing | 5 | August 9-August 13 |
| Continuous monitoring of schedule and budget throughout the implementation | 63 | May 17-August 13 |

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