# Delta Consulting

3D Printing Management Project
Emily Keehan, Tarek Snobar, Bryant Atkins

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# Project Charter

## Delta Consulting

The project charter is the introduction to the project. It describes the project details, its requirements and constraints, variables, deliverables, desired outcome, scope, and stakeholders. It serves as the information sheet and is the foundation of the project. All other project documents stem from the information found here. As such, it is essential that it is as thorough, detailed, and informative as possible.

## Company Background

Delta Consulting offers solutions to professionals who wish to improve a system process. The company provides its clients with practical solutions that fit within the resource-constrained environment.

## Project Background

After internal analysis, the Director of the University of Mary Washington ThinkLab, Shannon Hauser, determined that the current 3D printer management system was inadequate. An improved and streamlined process is required. Delta Consulting will work to find the best solution for this problem.

The current management system process is as follows:
- Students visit the ThinkLab location to submit a print request form.
- Submissions are stored on a database management software called *"Airtable,"* which tracks project status along with additional information.
- Tutors manually insert SD cards containing the completed design into the printers for each print job.
- Tutors manually update the status of the print.
- Tutors notify (if requested) students once the project is complete.

This process spans across many different platforms and involves a lot of hands-on work. This is inconvenient not only because it takes employees away from other duties, but also increases the possibility of human error. Software that combines all the steps in the process on one platform can significantly streamline the process.

## Project Objective

After a preliminary discussion with the Director of ThinkLab, Delta Consulting is recommending a software system that establishes a centralized submission point and allows for multiple projects to be queued and then sent to the correct printer. Delta Consulting will create a new submission process to work with this new system.

The software will work with current hardware and integrate with new 3D printers that are expected to be purchased by ThinkLab in the near future. The software should be under $100. The new 3D printer management system is to be fully operational on or before December 7th, 2018.

## Stakeholders

The University of Mary Washington, Project Manager, ThinkLab Director, ThinkLab Tutors, ThinkLab users, Technical Services Librarian

## Deliverables

1. A 3D printer management system that can
   a. Track projects as submitted
   b. Store sliced files
   c. Queue up print jobs in an efficient manner
   d. Notify students when projects are completed
2. Backend user manuals for ThinkLab Director and Student Tutors
3. Simplified submission system and instructions for students and faculty
4. Update current submission processes for the new 3D printer management software

## Milestones

1. Submit a report of the proposed software including our recommendation
   a. Send user data survey to ThinkLab tutors
2. Obtain approval from the library to download selected 3D printer management software
3. Installation of selected 3D printer management software
4. Testing of 3D printer management software along with a new submission system
5. Creation of training materials for new 3D printer management software and submission system.
6. Creation of online instructions and information section for Faculty, Students, and Staff.

7. Train Director and Tutors of ThinkLab, on new 3D printer management software and submission process.
8. Completion of a week-long pilot to test system
9. Turnover documents and account information to Director of ThinkLab and Tutors-December 7th

## Technical Requirements

1. The software must be compatible with the operating system on the ThinkLab's current computers and current 3D printers (Dremel 3D20 and Ultimaker2+) along with future printers.
2. The overall system must be easily accessible to ThinkLab tutors.

## Limits and exclusions

1. Any purchases must be under $100
2. ThinkLab director is responsible for all purchases necessary for the new system.
3. The software must be compatible with ThinkLab's current hardware.
4. UMW IT Services must approve the software.
5. Delta Consulting will provide transitional support services up until December 7th at 5 PM.
6. Training for ThinkLab will be provided up until December 7th at 5 PM.
7. Software upgrades and installation will be the responsibility of ThinkLab after December 7th at 5 PM.

## Roles and Responsibilities

Director of ThinkLab:
● Approves Project Charter and any changes made during the project
● Agrees to purchase the proposed software
● Submits purchase request to proper university offices
● Coordinates training sessions for ThinkLab tutors
● Establishes repositories for the review of training manuals

Simpson Office Manager:
● Assists in the purchase process for software and subscription services

Delta Consulting:
● Oversees implementation of the project
● Proposes new software that can streamline the printing process

## Customer review

A final customer review will be held with the Director of ThinkLab, which will include: A full walkthrough of the new system, a stress test of all systems, and a review of training materials.


_____                                          _____

ThinkLab Director                                                                    Professor

# Communication Plan

## Delta Consulting

## Purpose:

      Delta Consulting will create a plan that concisely outlines necessary communications and includes subject material as well as the target of the communication. Delta Consulting will use this document as a guideline when disseminating and gathering information. The plan will ensure the proper entities are addressed with issues that fall under their jurisdiction to prevent needless and wasteful miscommunication. The plan will help Delta Consulting complete their assigned project and will be updated as needed.

## Stakeholder Analysis:

      The primary stakeholders for this project are the project manager, project staff, and ThinkLab director. These stakeholders will need to be routinely updated on the status of the project. They must be managed carefully as the progress of the project relies heavily on their collaboration. The project manager must be regularly consulted and updated on project progress.

      In addition, there are stakeholders that require less interaction. The ThinkLab tutors and Technical Services Librarian effect the project but have low involvement. The ThinkLab Tutors need only necessary information, while the Technical Services Librarian needs only satisfaction with the completed project. The ThinkLab director will have to oversee communication with these entities.

**Stakeholder Analysis**

| | High | |
|---|---|---|
| | **Keep Satisfied** | **Manage Closely** |
| | • Christie Glancy (Technical Services Librian) | • Shannon Hauser ( Technical Services Specialist)<br>• John Burrow (Project Manager)<br>• Delta Consulting Team |
| **Power** | | |
| | **Provide General Information** | **Keep Informed** |
| | | • ThinkLab Tutors |
| | Low | |
| | Low      Interest      High | |
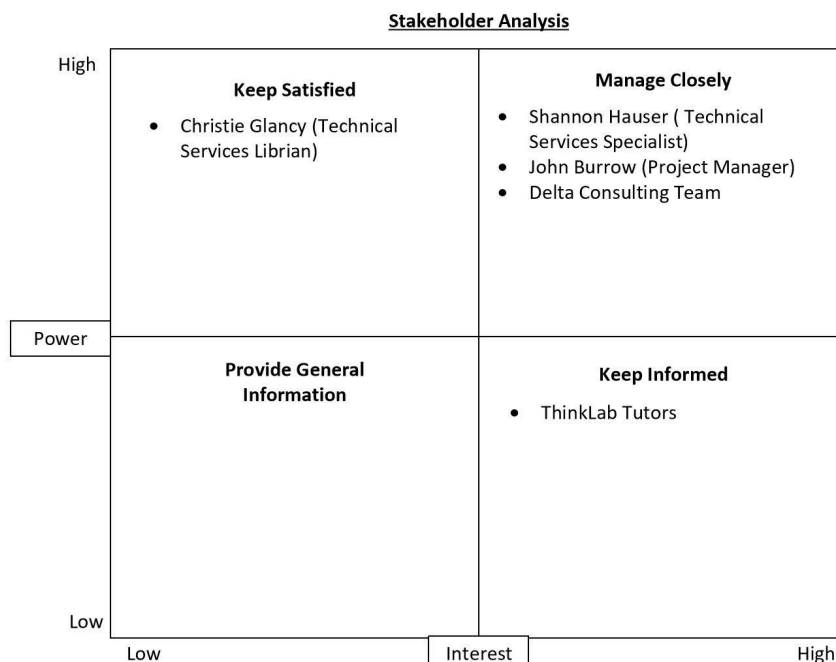
# Information needs:

**Weekly Reports:** The purpose of the weekly reports is to summarize Delta Consulting's weekly progress. Included in these reports will be several critical points of information. The first being to highlight all tasks Delta accomplished during the week. Next is to discuss any issues Delta has faced. If guidance or expertise is required, it will be listed in further detail within the report. Lastly, the report will contain a summary of hours worked by each team member.

**Deliverable Meetings:** Before submitting a deliverable, Delta will meet with the project manager. During the meeting, Delta will explain what work has been done, what has yet to be done and ask for feedback. At this point, the project manager will relay any comments or suggestions.

**Progress Status Reports:** These reports will summarize the overall project progress. Within the summary will be schedule adherence, future project goals, and any issues faced that need to be resolved.

**ThinkLab Tutor Survey:** Delta will create a survey to collect information on the current system in place. Surveys will then be administered to ThinkLab tutors. Feedback from the tutors will be taken into consideration when implementing a new system.

**Library Top-Management Update:** Provide any information regarding adjustments to operating procedures and any purchase needed for project implementation.

**Team Status Meetings:** Meetings that allow team members to go over scheduling, task assignments, personal updates, and collaborate to complete work.

**Change Requests:** Any necessary change or revision to the project schedule will be detailed and submitted for approval.

**Milestone Reports:** Milestones that have been achieved or surpassed will be detailed and submitted.

# Sources of Information:

Communications will be made based on the information gathered from the ThinkLab director, project manager, ThinkLab tutors, and Delta Consulting. These parties will drive communication throughout the project.

# Dissemination Modes:

Communications will be made using many different platforms. Google Drive will be used to complete work, while email, text message, and in-person meetings will be used to transfer information between parties. Paper hard copies of deliverables will be kept to ensure no information is lost.

# Communication Plan:

In order to efficiently distribute information to the interested parties, a plan must be formed. This plan will outline the different types of necessary communication throughout the project, to whom they will be sent, and at what frequency. This is an essential organization method since it compiles all communication information in one space.

| Type of Communication | Target Audience | Frequency | Method of Communication | Provider |
|---|---|---|---|---|
| Weekly Reports | Project Manager | Weekly | Email | Emily Keehan |
| Deliverable Draft Meetings | Project Manager | As required | In-Person | Delta Consulting |
| Progress Status Reports | ThinkLab Director | Biweekly | Email | Bryant Atkins |
| ThinkLab Tutor Survey | ThinkLab Tutors | Once | Email | Bryant Atkins |
| Library Top-Management Update | Technical Services Librarian | Biweekly | Email | ThinkLab Director |
| Team Status Meetings | Delta Consulting Project Team | Weekly (daily as needed) | Text, email, Drive, in-person | Delta Consulting |
| Change Request | Project Manager, ThinkLab Director | As required | In-person, email | Tarek Snobar |
| Milestone Reports | Project Manager, ThinkLab Director | As required | Email | Emily Keehan |

## Contact Information:

This section holds all the contact information for all stakeholders in the project. This will allow communications to be sent quickly and easily, with no interruption in the communication line.

| *Title* | *Name* | *Phone* | *Email* |
|---|---|---|---|
| Project Manager | John Burrow | ██████ | ████████ |
| ThinkLab Director | Shannon Hauser | ██████ | ████████ |
| Project Team Member | Emily Keehan | ██████ | ██████████ |
| Project Team Member | Bryant Atkins | 434-956-5117 | Jatkins@mail.umw.edu |
| Project Team Member | Tarek Snobar | ██████ | ██████████ |

# Work Breakdown Structure

## Delta Consulting

Given the complexity of the project and the substantiveness of the required workload, some structure and organization is needed. This would allow Delta Consulting to identify and understand the required tasks accurately, the order in which they should be completed, and how they connect and determine what resources were needed to complete the tasks. The following provides a work breakdown structure for the project.

## Written Work Breakdown Structure:

The written work breakdown structure details all the level 1 work, as well as work packages that are part of the project. It details the title of the work as well as duration and description. It is the elaborative description of all the work that goes into the project, and other documents can be built off of it.

| WBS | Task Name | Duration | Start | Finish | Predecessors | Description |
|---|---|---|---|---|---|---|
| **TL1** | **Assessment and Approval** | **9 days?** | **Tue 11/27/18** | **Fri 12/7/18** | | |
| **TL1.A** | **ThinkLab User Survey** | **1.5 days?** | **Thu 12/6/18** | **Fri 12/7/18** | | |
| **TL1.A.a** | **Survey Design** | **1.5 days?** | **Thu 12/6/18** | **Fri 12/7/18** | | |
| TL1.A.a.1 | Draft | 1.5 days | Thu 12/6/18 | Fri 12/7/18 | | Create a draft of the survey that will be distributed. 4 Man Hours |
| TL1.A.a.2 | Final | 1 day? | Fri 12/7/18 | Fri 12/7/18 | | Finalize the survey. This includes ensuring all spelling and layout are correct.  2 Man Hours |
| TL1.A.b | Distribute Survey | 1 day | Fri 12/7/18 | Fri 12/7/18 | | Distribute surveys to the ThinkLab director and tutors. ½ Man Hour |

| TL1.A.c | Analyze Results | 1.5 days | Thu 12/6/18 | Fri 12/7/18 | | Analyze the results of the survey to optimize the proposal. 4 Man Hours |
|---|---|---|---|---|---|---|
| **TL1.B** | **Proposal** | **9 days** | **Tue 11/27/18** | **Fri 12/7/18** | | |
| **TL1.B.a** | **Research** | **2.5 days** | **Wed 12/5/18** | **Fri 12/7/18** | | |
| TL1.B.a.1 | Preferred | 1 day | Fri 12/7/18 | Fri 12/7/18 | | Research a preferred program that would ideally suit the ThinkLab. 4 Man Hours. |
| TL1.B.a.2 | Alternative | 2.5 days | Wed 12/5/18 | Fri 12/7/18 | | Research an alternative program to propose to the ThinkLab. 4 Man Hours. |
| **TL1.B.b** | **Selection** | **1.5 days** | **Tue 11/27/18** | **Wed 11/28/18** | | |
| TL1.B.b.1 | Preferred | 1 day | Wed 11/28/18 | Wed 11/28/18 | | Final selection of the preferred program that will be proposed. The preferred selection must be a high-value software. It must be efficient and economical. 1 Man Hour |
| TL1.B.b.2 | Alternative | 1.5 days | Tue 11/27/18 | Wed 11/28/18 | | Final selection of an alternative program that will be proposed if necessary. Alternative program must also be economical and have the desired abilities. 2 Man Hours |
| TL1.B.c | Proposal | 2 days | Tue 11/27/18 | Wed 11/28/18 | | Propose the preferred solution to the ThinkLab. Propose an alternative if necessary. 1 Man Hour |

| | | | | | 12,15 | Written approval from ThinkLab director. ½ Man hour |
|---|---|---|---|---|---|---|
| TL1.B.d | Approval | 1.5 days | Thu 11/29/18 | Fri 11/30/18 | | |
| **TL2** | **Acquisition** | **5.5 days** | **Fri 11/30/18** | **Fri 12/7/18** | **16** | |
| **TL2.A** | **Approval** | **5.5 days** | **Fri 11/30/18** | **Fri 12/7/18** | | |
| TL2.A.a | Approval from ThinkLab Director | 1 day | Tue 12/4/18 | Tue 12/4/18 | | ½ Man Hour |
| TL2.A.b | Approval from Technical Services Librarian | 2.5 days | Fri 11/30/18 | Tue 12/4/18 | 19 | ½ Man Hour |
| TL2.A.c | Approval from Library Purchasing Officer | 2.5 days | Wed 12/5/18 | Fri 12/7/18 | 20 | ½ Man Hour |
| **TL3** | **Installation and Design** | **4.5 days** | **Fri 11/30/18** | **Thu 12/6/18** | | |
| TL3.A | Installation of Software | 2 days | Tue 12/4/18 | Thu 12/6/18 | 17 | Installation of new software onto the ThinkLab's equipment. 5 Man Hours |
| **TL3.B** | **Design of New Submission Process** | **4.5 days** | **Fri 11/30/18** | **Thu 12/6/18** | | |
| TL3.B.a | Outline | 1.5 days | Mon 12/3/18 | Tue 12/4/18 | | Outlining how the submission form will look. 2 Man Hours |
| TL3.B.b | Creating a form | 1.5 days | Wed 12/5/18 | Thu 12/6/18 | 25 | Creating the submission form. 2 Man Hours. |

| TL3.B.c | Coding of information | 1.5 days | Fri 11/30/18 | Mon 12/3/18 | 26 | Completing the necessary coding for the submission to work. 4 Man Hours. |
|---|---|---|---|---|---|---|
| **TL4** | **Testing** | **3 days** | **Wed 12/5/18** | **Fri 12/7/18** | | |
| **TL4.A** | **Initial test** | **3 days** | **Wed 12/5/18** | **Fri 12/7/18** | | |
| TL4.A.a | Testing of print software | 1.5 days | Thu 12/6/18 | Fri 12/7/18 | 23 | Test to ensure the software will allow users to print. ½ Man Hour |
| TL4.A.b | Testing of queuing software | 1.5 days | Wed 12/5/18 | Thu 12/6/18 | | Test to ensure users can enter the queue accurately. ½ Man Hour |
| TL4.B | Run through | 1.5 days | Wed 12/5/18 | Thu 12/6/18 | 31 | Testing the system as a whole at a real-world pace. 3 Man Hours |
| TL4.C | Stress Test | 1.5 days | Thu 12/6/18 | Fri 12/7/18 | 32 | Testing the system as a whole at max capacity. 4 Man Hours |
| **TL5** | **Training** | **5 days** | **Mon 12/3/18** | **Fri 12/7/18** | | |
| **TL5.A** | **Manuals** | **3 days** | **Mon 12/3/18** | **Wed 12/5/18** | | |
| TL5.A.a | Director Manual | 2.5 days | Mon 12/3/18 | Wed 12/5/18 | | Creating the Director's manual. 5 Man Hours |
| TL5.A.b | Tutor Manual | 2.5 days | Mon 12/3/18 | Wed 12/5/18 | | Creating the tutor's manual. 3 Man Hours |
| **TL5.B** | **ThinkLab Staff training** | **2.5 days** | **Wed 12/5/18** | **Fri 12/7/18** | | |
| TL5.B.a | Director Training | 1 day | Thu 12/6/18 | Thu 12/6/18 | 36 | Training the Director of the ThinkLab to operate the new system |

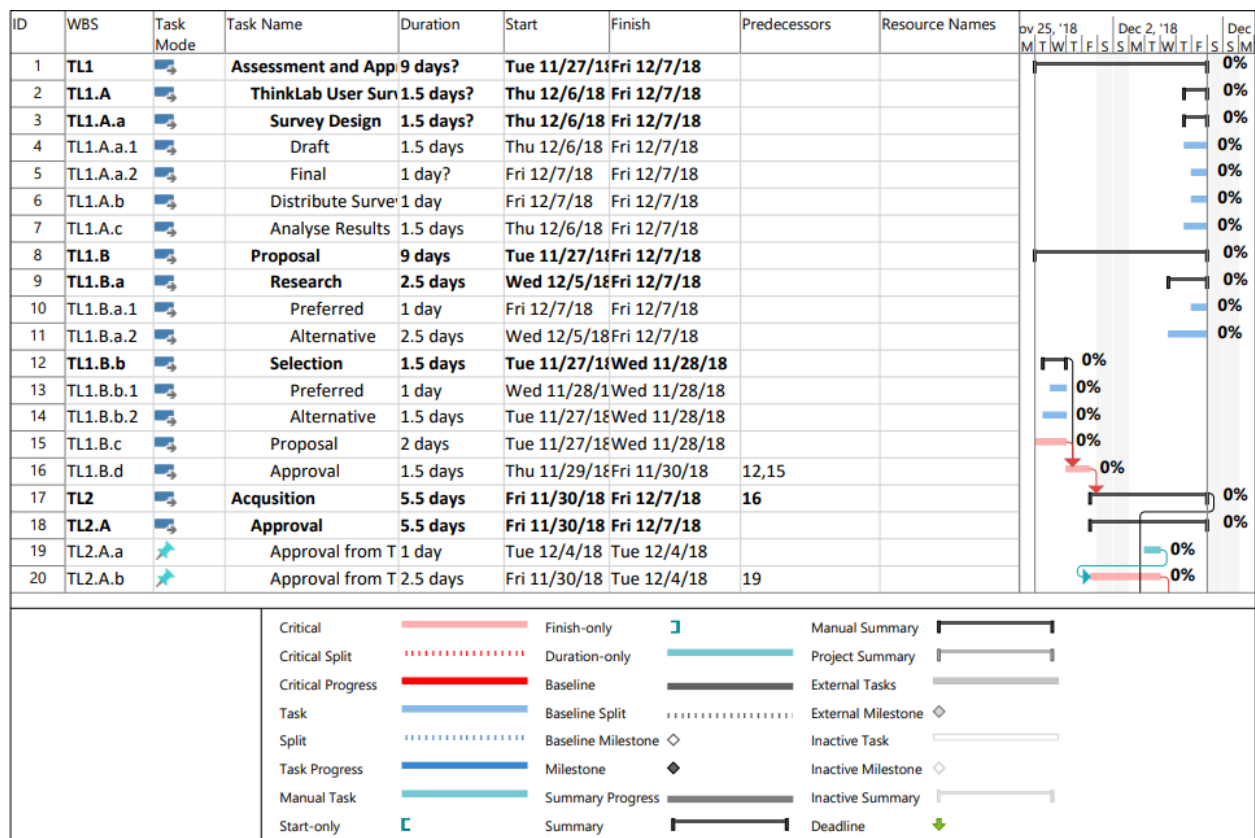| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | effectively. 2 Man Hours. |
| TL5.B.b | Tutor Training | 2.5 days | Wed 12/5/18 | Fri 12/7/18 | 37 | Training the tutors of the ThinkLab to operate the new system effectively. 2 Man Hours. |
| **TL6** | **Handoff** | **1 day** | **Fri 12/7/18** | **Fri 12/7/18** | | |
| TL6.A | Transfer manuals to Think Lab Director | 1 day? | Fri 12/7/18 | Fri 12/7/18 | 34 | Transfer all material to the ThinkLab Director. ½ Man Hour |
| TL6.B | Handoff | 1 day? | Fri 12/7/18 | Fri 12/7/18 | | Completion of the project. |

## Graphical Work Breakdown Structure:

The previous table shows all the information needed for the project, but it is large, complicated, and not very visually appealing. Therefore, another chart should be to illustrate the relationships between tasks easily and quickly show the flow of the project.
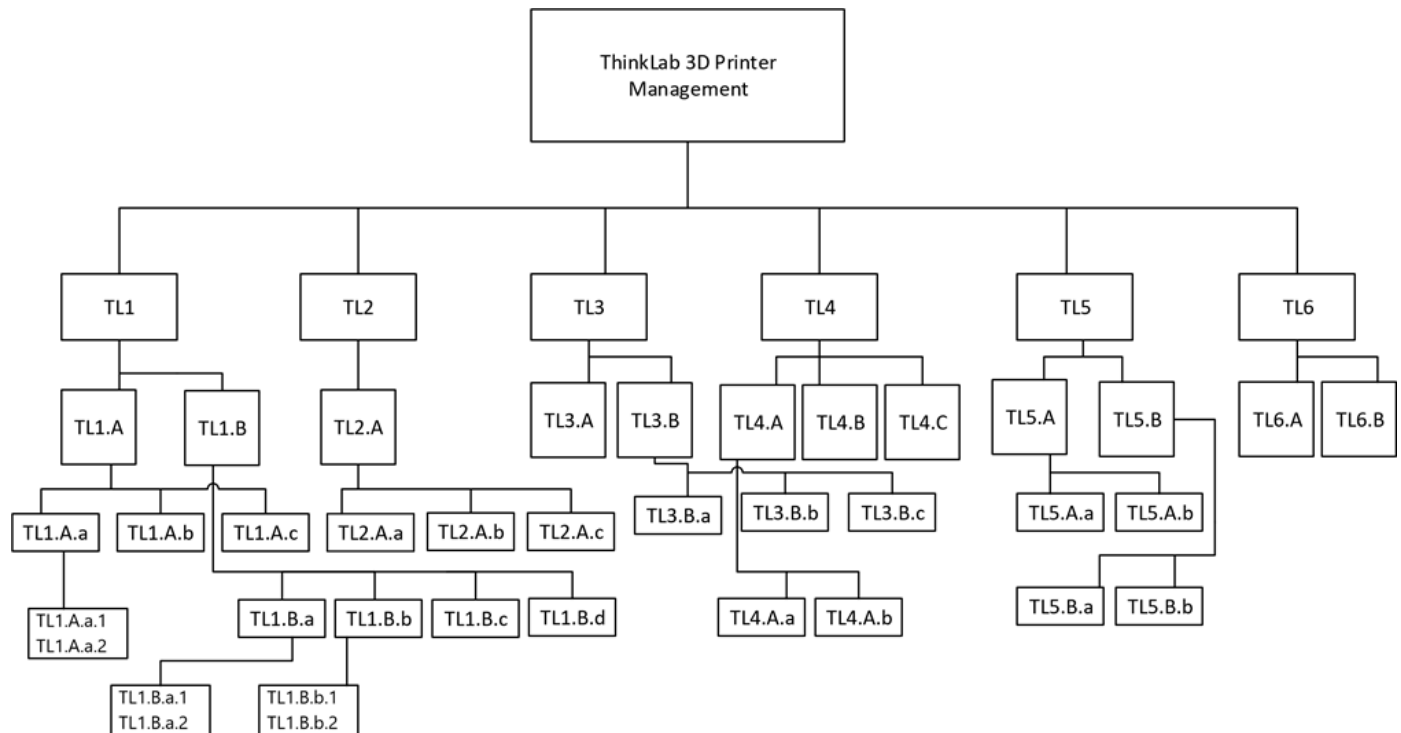
# Integrated Master Schedule

## Delta Consulting

To efficiently complete a project, time standards must be created. These stem from the work breakdown structure and take that information to another level. While the work breakdown structure described what work needed to be done, the integrated master schedule details when it will be done. It shows how long each work package from the work breakdown schedule will take to be completed. It details which tasks can be achieved simultaneously and which rely on predecessors. This schedule allows members to track their progress, see their deadlines, and determine if they are on, behind, or ahead of schedule. The following is the integrated master schedule for the project.

| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Predecessors | Resource Names |
|---|---|---|---|---|---|---|---|---|
| 1 | TL1 | | Assessment and App | 9 days? | Tue 11/27/18 | Fri 12/7/18 | | |
| 2 | TL1.A | | ThinkLab User Surv | 1.5 days? | Thu 12/6/18 | Fri 12/7/18 | | |
| 3 | TL1.A.a | | Survey Design | 1.5 days? | Thu 12/6/18 | Fri 12/7/18 | | |
| 4 | TL1.A.a.1 | | Draft | 1.5 days | Thu 12/6/18 | Fri 12/7/18 | | |
| 5 | TL1.A.a.2 | | Final | 1 day? | Fri 12/7/18 | Fri 12/7/18 | | |
| 6 | TL1.A.b | | Distribute Surve | 1 day | Fri 12/7/18 | Fri 12/7/18 | | |
| 7 | TL1.A.c | | Analyse Results | 1.5 days | Thu 12/6/18 | Fri 12/7/18 | | |
| 8 | TL1.B | | Proposal | 9 days | Tue 11/27/18 | Fri 12/7/18 | | |
| 9 | TL1.B.a | | Research | 2.5 days | Wed 12/5/18 | Fri 12/7/18 | | |
| 10 | TL1.B.a.1 | | Preferred | 1 day | Fri 12/7/18 | Fri 12/7/18 | | |
| 11 | TL1.B.a.2 | | Alternative | 2.5 days | Wed 12/5/18 | Fri 12/7/18 | | |
| 12 | TL1.B.b | | Selection | 1.5 days | Tue 11/27/18 | Wed 11/28/18 | | |
| 13 | TL1.B.b.1 | | Preferred | 1 day | Wed 11/28/1 | Wed 11/28/18 | | |
| 14 | TL1.B.b.2 | | Alternative | 1.5 days | Tue 11/27/18 | Wed 11/28/18 | | |
| 15 | TL1.B.c | | Proposal | 2 days | Tue 11/27/18 | Wed 11/28/18 | | |
| 16 | TL1.B.d | | Approval | 1.5 days | Thu 11/29/18 | Fri 11/30/18 | 12,15 | |
| 17 | TL2 | | Acqusition | 5.5 days | Fri 11/30/18 | Fri 12/7/18 | 16 | |
| 18 | TL2.A | | Approval | 5.5 days | Fri 11/30/18 | Fri 12/7/18 | | |
| 19 | TL2.A.a | | Approval from T | 1 day | Tue 12/4/18 | Tue 12/4/18 | | |
| 20 | TL2.A.b | | Approval from T | 2.5 days | Fri 11/30/18 | Tue 12/4/18 | 19 | |

| | | | |
|---|---|---|---|
| Critical | ——— | Finish-only | ⊐ |
| Critical Split | ·············· | Duration-only | ——— |
| Critical Progress | ——— | Baseline | ——— |
| Task | ——— | Baseline Split | ·············· |
| Split | ·············· | Baseline Milestone | ◇ |
| Task Progress | ——— | Milestone | ◆ |
| Manual Task | ——— | Summary Progress | ——— |
| Start-only | ⊏ | Summary | ▐——▌ |
| Manual Summary | ▐——— |
| Project Summary | ▐——▌ |
| External Tasks | ——— |
| External Milestone | ◇ |
| Inactive Task | |
| Inactive Milestone | ◇ |
| Inactive Summary | ▐——▌ |
| Deadline | ⬇ |

| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Predecessors | Resource Names |
|----|-----|-----------|-----------|----------|-------|--------|--------------|----------------|
| 21 | TL2.A.c | | Approval from Li | 2.5 days | Wed 12/5/18 | Fri 12/7/18 | 20 | |
| 22 | TL3 | | **Instilliation and Desi** | **4.5 days** | **Fri 11/30/18** | **Thu 12/6/18** | | |
| 23 | TL3.A | | Instillation of Softw | 2 days | Tue 12/4/18 | Thu 12/6/18 | 17 | |
| 24 | TL3.B | | **Design of New Sub** | **4.5 days** | **Fri 11/30/18** | **Thu 12/6/18** | | |
| 25 | TL3.B.a | | Outline | 1.5 days | Mon 12/3/18 | Tue 12/4/18 | | |
| 26 | TL3.B.b | | Creating a form | 1.5 days | Wed 12/5/18 | Thu 12/6/18 | 25 | |
| 27 | TL3.B.c | | Coding of inform | 1.5 days | Fri 11/30/18 | Mon 12/3/18 | 26 | |
| 28 | TL4 | | **Testing** | **3 days** | **Wed 12/5/18** | **Fri 12/7/18** | | |
| 29 | TL4.A | | **Intial test** | **3 days** | **Wed 12/5/18** | **Fri 12/7/18** | | |
| 30 | TL4.A.a | | Testing of print s | 1.5 days | Thu 12/6/18 | Fri 12/7/18 | 23 | |
| 31 | TL4.A.b | | Testing of queini | 1.5 days | Wed 12/5/18 | Thu 12/6/18 | | |
| 32 | TL4.B | | Run through | 1.5 days | Wed 12/5/18 | Thu 12/6/18 | 31 | |
| 33 | TL4.C | | Stress Test | 1.5 days | Thu 12/6/18 | Fri 12/7/18 | 32 | |
| 34 | TL5 | | **Training** | **5 days** | **Mon 12/3/18** | **Fri 12/7/18** | | |
| 35 | TL5.A | | **Manuals** | **3 days** | **Mon 12/3/18** | **Wed 12/5/18** | | |
| 36 | TL5.A.a | | Director Manual | 2.5 days | Mon 12/3/18 | Wed 12/5/18 | | |
| 37 | TL5.A.b | | Tutor Manual | 2.5 days | Mon 12/3/18 | Wed 12/5/18 | | |
| 38 | TL5.B | | **ThinkLab Staff trai** | **2.5 days** | **Wed 12/5/18** | **Fri 12/7/18** | | |
| 39 | TL5.B.a | | Director Training | 1 day | Thu 12/6/18 | Thu 12/6/18 | 36 | |
| 40 | TL5.B.b | | Tutor Training | 2.5 days | Wed 12/5/18 | Fri 12/7/18 | 37 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Critical | | Finish-only | | Manual Summary | |
| Critical Split | | Duration-only | | Project Summary | |
| Critical Progress | | Baseline | | External Tasks | |
| Task | | Baseline Split | | External Milestone | |
| Split | | Baseline Milestone | | Inactive Task | |
| Task Progress | | Milestone | | Inactive Milestone | |
| Manual Task | | Summary Progress | | Inactive Summary | |
| Start-only | | Summary | | Deadline | |

| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Predecessors | Resource Names |
|----|-----|-----------|-----------|----------|-------|--------|--------------|----------------|
| 41 | TL6 | | **Handoff** | **1 day** | **Fri 12/7/18** | **Fri 12/7/18** | | |
| 42 | TL6.A | | Transfer manuals t | 1 day? | Fri 12/7/18 | Fri 12/7/18 | 34 | |
| 43 | TL6.B | | Handoff | 1 day? | Fri 12/7/18 | Fri 12/7/18 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Critical | | Finish-only | | Manual Summary | |
| Critical Split | | Duration-only | | Project Summary | |
| Critical Progress | | Baseline | | External Tasks | |
| Task | | Baseline Split | | External Milestone | |
| Split | | Baseline Milestone | | Inactive Task | |
| Task Progress | | Milestone | | Inactive Milestone | |
| Manual Task | | Summary Progress | | Inactive Summary | |
| Start-only | | Summary | | Deadline | |

# Risk Management Plan

## Delta Consulting

The project of installing a new 3D printing process management system can only be completed if the team recognizes and plans for the inherent risks that come with a project. Being prepared for the worst will ensure the project can still be achieved despite the inevitable roadblocks that will occur. The purpose of the risk management plan is to identify, compile, and address all the possible risks associated with the project.

## Risk Assessment:

In order to efficiently allocate resources to the more significant risk events, a table can be constructed that concisely details the severity of each risk event and how to address it. This table acts as a key for all other tables in the document since it holds all the information referenced in the project. Each risk event has a response associated with it, which are described below:

- **Mitigate** - this course of action involves reducing the likelihood and impact of the risk event occurring.
- **Avoid** - this course of action involves changing the project plan to avoid the risk event altogether.
- **Transfer** - this course of action involves putting the responsibility of the risk event on someone else
- **Accept** - this course of action involves deciding to accept the risk event, either because it is entirely unavoidable or unlikely to occur.

| ID | Risk Event | Impact of Risk | Probability of Occurrence | Risk Value | Response | Contingency Plan |
|---|---|---|---|---|---|---|
| 1 | Unable to find acceptable software | 5 | 1 | 5 | Mitigate | Have multiple alternative software options |
| 2 | Denial of purchasing software and add-ons | 5 | 3 | 15 | Mitigate | Find a more economical software option |

| 3 | Denial of first and second choices | 5 | 3 | 15 | Mitigate | Constant communication with Hauser to understand requirements and adjust charter and statement of work if necessary |
|---|---|---|---|---|---|---|
| 4 | Scope creep | 2 | 1 | 2 | Mitigate | Remain within the current scope and use change management process for any changes to the scope |
| 5 | Incorrect survey structure leads to unhelpful results | 3 | 2 | 6 | Transfer | Make observations during regular operation to ensure correct questioning |
| 6 | Delayed approval of software | 5 | 5 | 25 | Accept | |
| 7 | Delay of getting approval from IT services to install software on University Computers | 5 | 5 | 25 | Accept | |
| 8 | The new process doesn't fix and/or improve on past problems | 5 | 3 | 15 | Mitigate | Work with ThinkLab throughout the project to ensure project success |

| 9 | Software is not compatible with computers | 5 | 1 | 5 | Mitigate | Ensure that the software we propose is compatible with ThinkLab's computers |
|---|---|---|---|---|---|---|
| 10 | Software fails the stress test | 4 | 3 | 12 | Mitigate | Modify the current system to run at its max capacity. Develop new system if needed |
| 11 | Trainees do not understand the process | 2 | 2 | 4 | Transfer | Supervised trial run by trainees |
| 12 | ThinkLab Tutors reject use of the new system | 5 | 1 | 5 | Transfer | Work with ThinkLab's director to create a persuasive message illustrating how the new system will benefit tutors in their work and allow them to focus more attention on the modeling of the items rather than manually queuing up |
| 13 | Delayed response from the ThinkLab | 4 | 2 | 8 | Accept | Give sufficient lead time for response |

# Risk Severity Matrix:

Some risks are more severe than others, and a matrix can be used to showcase the distribution across a scale quickly. The numbers on the chart refer to their corresponding risk ID numbers from the Risk Assessment table. The risk events in red should be considered significant risks and monitored closely. Risk events in yellow are found to be moderate and should also be monitored regularly. Although the risks in the green are considered minor, they should still be considered throughout the duration of the project.

**Likelihood**

| | | | | | |
|---|---|---|---|---|---|
| High | 5 | | | | | 6, 7 |
| | 4 | | | | | |
| Medium | 3 | | | | 10 | 2, 3, 8 |
| | 2 | | 11 | 5 | 13 | |
| Low | 1 | | 4 | | | 1, 9, 12 |
| | | 1 Low | 2 | 3 Medium | 4 | 5 High |

**Impact**

MAJOR
MODERATE
MINOR
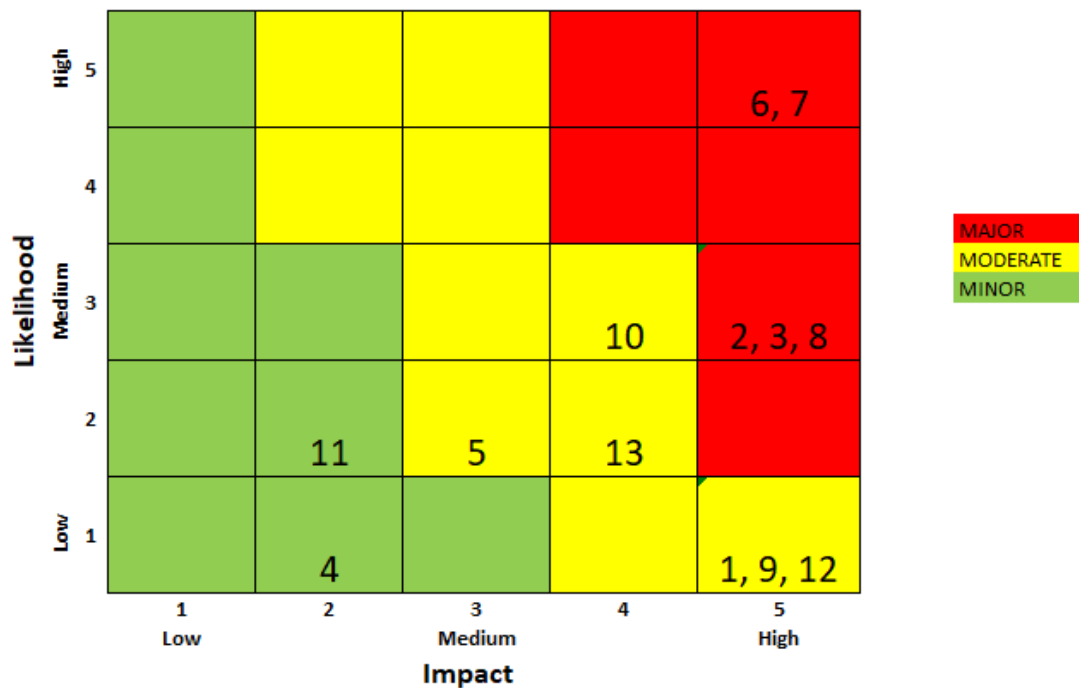
# Defined Conditions for Impact Scales:

This table can be used to understand the inputted values that contribute to the risk value.
Software add-ons show no risk of an increase in cost as the pricing plan for the software is fixed
which is why all money impacts have been determined to have no insignificant cost increase

| Project Objective | 1 Very Low | 2 Low | 3 Moderate | 4 High | 5 Very High |
|---|---|---|---|---|---|
| Money | Insignificant cost Increase | Insignificant cost Increase | Insignificant cost Increase | Insignificant cost Increase | Insignificant cost Increase |
| Time | <2% time Increase | <2% time Increase | 2-10% time Increase | 10-20% time Increase | >20% time increase |
| Scope | Scope decrease barely noticeable | Minor areas of scope affected | Minor areas of scope affected | Scope reduction unacceptable to sponsor | The project end item is effectively useless. |
| Quality | Quality degradation barely noticeable | Only very demanding applications are affected | Quality reduction requires sponsor approval | Quality reduction unacceptable to sponsor | The project end item is effectively useless. |

# Change Management Process:

Throughout the life of a project, changes may need to be made. This a critical step that must be made with caution. To ensure all changes are made properly, we use a change management process. The change management process is a series of steps and instructions on how to identify, review, and execute changes. This enables us to track all changes, which we can refer to in the future if needed. The process is as follows:

1. Change Orginiates
   a. Project management team members will refer to actions listed in the risk assessment. If all other avenues of the risk management process have been exhausted the team will identify changes needed.

2. Change Request Submitted
   a. Before a change request is submitted the project team must fill out the "Project Change Request" document located in appendix A.
   b. "Project Change Request" must have unanimous approval from team members before submission.

3. Review Change Request
   a. The project manager in collaboration with the customer representative (or designee) will review the "Project Change Request" alongside current risk management plan, project charter, work breakdown structure.

4. Change Approval
   a. The Project Manager, along with the customer representative (or designee), will approve or deny the request.
      i. If the "Project Change Request" is approved then changes are to be made the appropriate documentation. A copy of the form is sent to the organization representative office with the original being kept in the change request binder.
      ii. If the "Project Change Request" is denied, a written justification on the denial. A copy of the denial along with the written justification will be sent to the organization representative. A new request may be submitted with changes if deemed necessary.

5. Distribute for Action
   a. If approved changes are to be posted in the central document cloud drive, update to the WBS and appropriate documents, and notification of change to those who are impacted.

## **Project Change Request**

| Project Name | | Change Number | |
|---|---|---|---|
| Requested By | | Date of Request | |

| Change Name | |
|---|---|

| Description of Change | |
|---|---|
| | |

| Reason for Change |
|---|
| |

| Effect on Deliverables (including a list of any affected deliverables): |
|---|
| |

| Effect on Organization: |
|---|
| |

| Effect on Schedule (Including Estimated Completion Date for this change): |
|---|
| |

| Effect on Project Cost: | | | | |
|---|---|---|---|---|
| Item Description | Hours | | Dollars | |
| | Reduction | Increase | Reduction | Increase |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total Net Change in Cost: | | | | |

| Effect of NOT Approving this Change |
|---|
| |

| Reason for Rejection (if applicable): |
|---|
| |

Project Manager
___ Approved      Signature_____
___ Rejected      Title:_____      Date:_____

UMW ThinkLab Director
___ Approved      Signature:_____
___ Rejected      Title:_____      Date:_____

# Training Manual

## Delta Consulting

The ThinkLab "Astroprint Training Guide" is a manual that will aid the ThinkLab staff upload, prep, preview, and submit their job to one of the 3D printers. Due to UMW financial regulations on purchasing subscription services, we were unable to provide print instructions for the "cloud queueing system" which is expected to be purchased Spring 2019. Instructions for features that are active during the printing process will be included in a January 2019 update.

UMW ThinkLab

Astroprint Training Guide
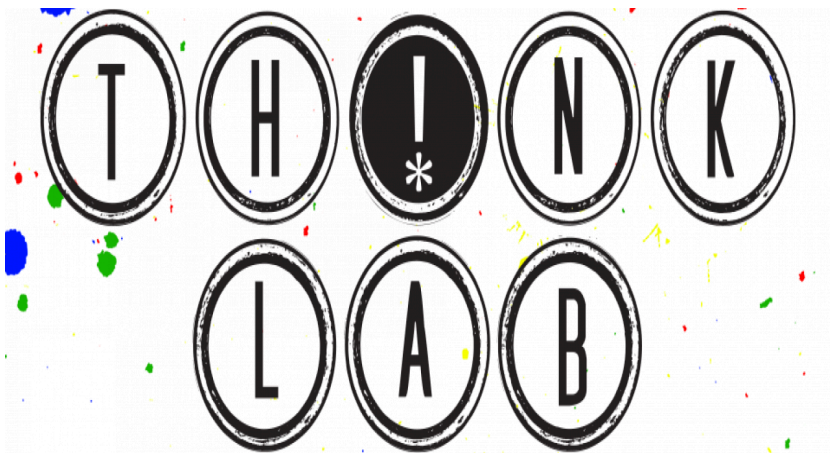
**Table of Contents**

## Introduction:

Astroprint is a 3D printer management software designed to simplify the process of maintaining multiple files and queueing them to be sent to multiple printers. The software also has the ability to incorporate a variety of apps within its marketplace to be able to centralize the processing and printing.

The software is able to the following features
- Scale, rotate, and multiply objects
- Inspect prints with the in-software GCODE reader
  - View the print paths of your GCODE files
  - Analyze your design layer by layer before printing
  - Analyze the print speed (represented by different shades of the SAME COLOR)
  - Tweak settings and see the changes reflected visually in the viewer
- Slicing within the software (you can still slice with current software)
- Add printers with easy by using preprogrammed printer profiles.
- Sync with a cloud system that unlocks even more features.
  - Manage printers from anywhere
  - Print queueing
  - 3D printing app marketplace

## Adding Printer(s):

The utilmaker2+ is already installed in Astroprint for your convenience. If you need to install a printer in the future if in the event that utilmaker2+ becomes uninstalled you are able to easily install it without any issues.
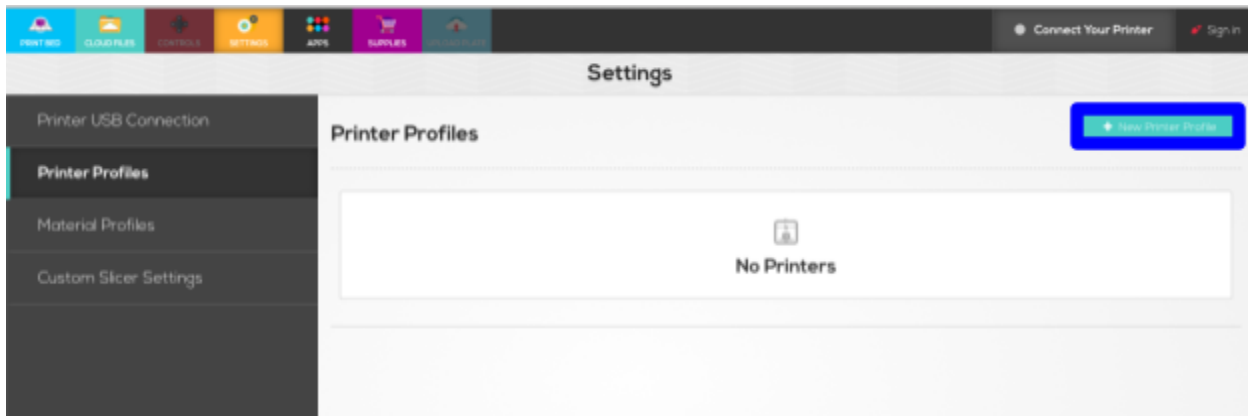
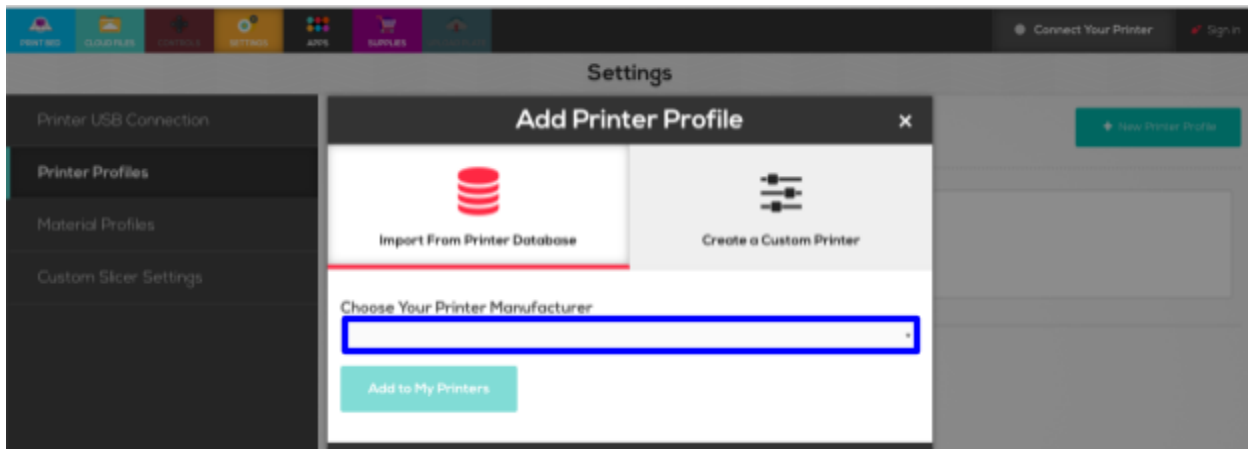1. From the home screen select the settings tab

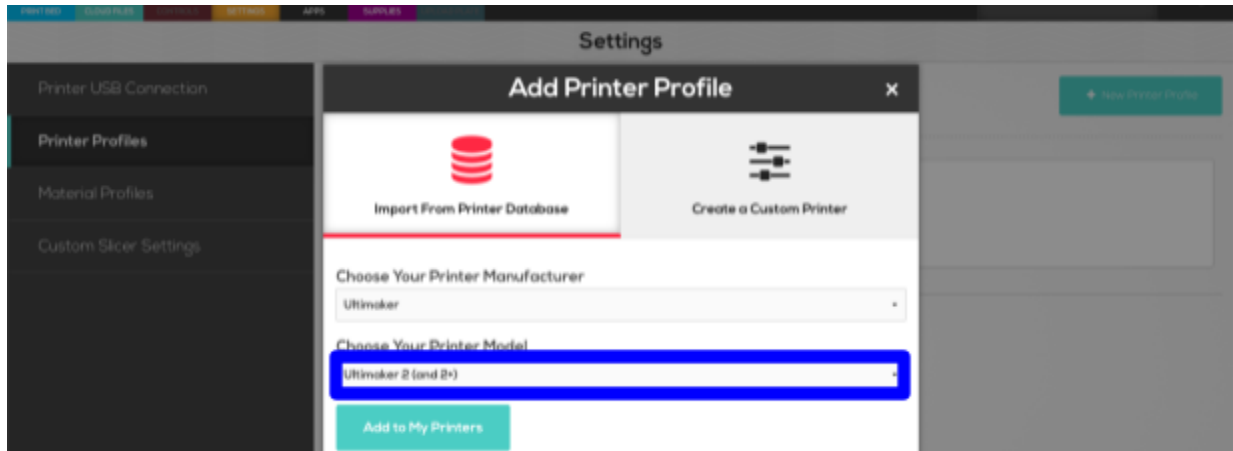2. Once on the setting screens select printer profiles
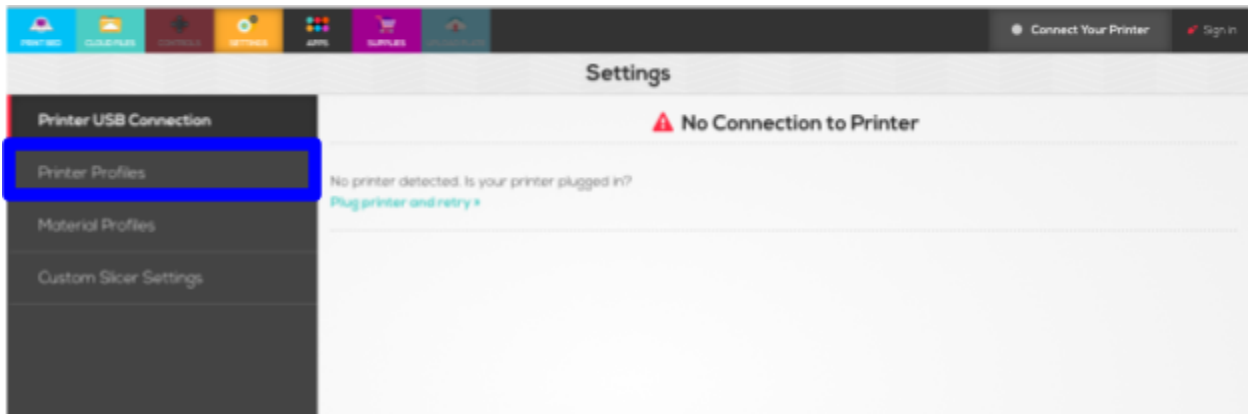


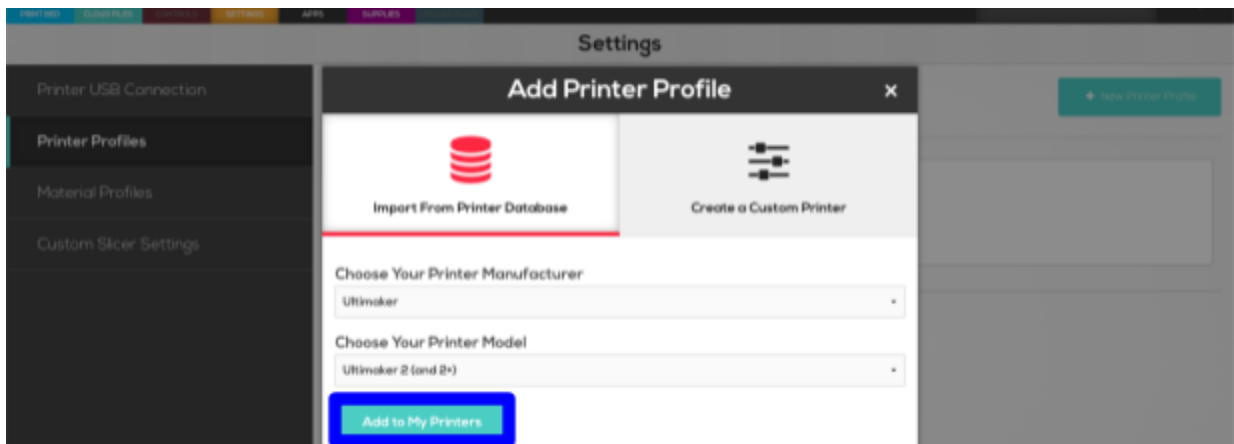3. On the "Printer Profiles" select "add printer profile"



4. Click on the dropdown and select the printer you are installing.

5. Once you've selected your printer manufacturer you'll then select the printer model.



6. Once you've selected your printer you'll then select "Add to My Printers."
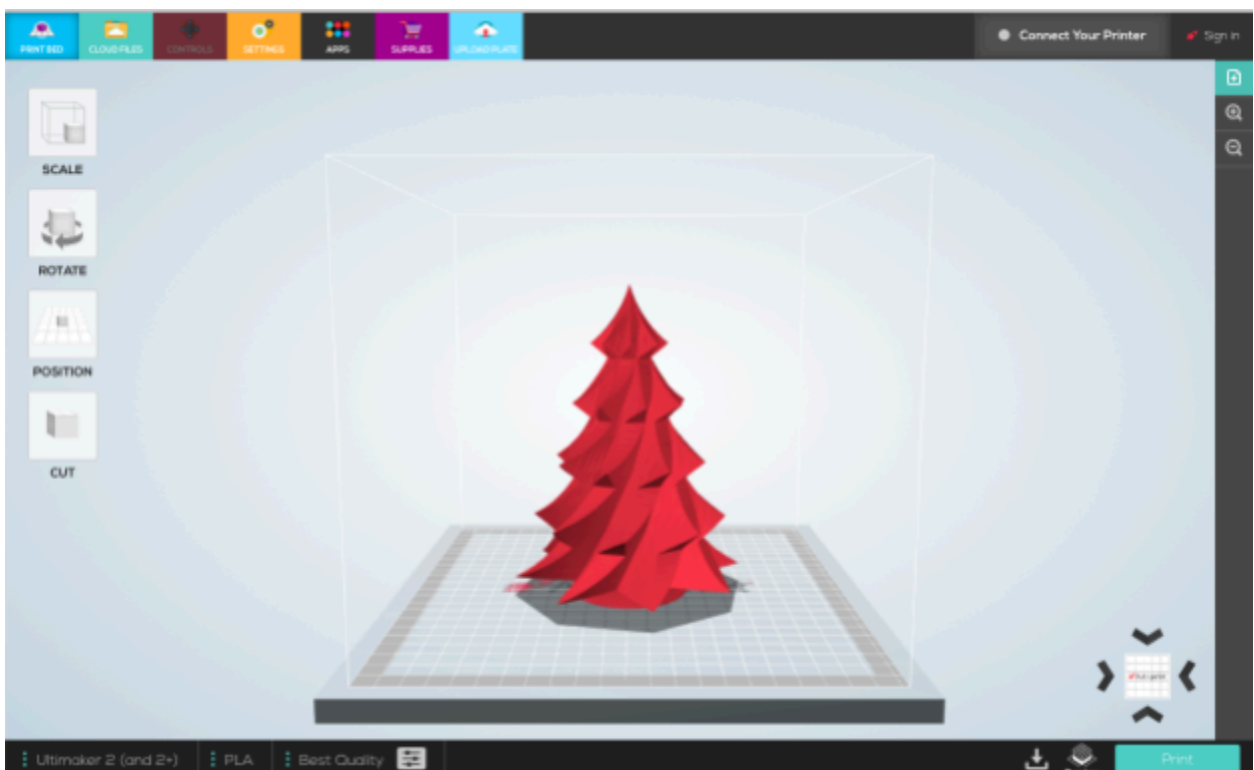
# Submitting a print job (non-cloud):

To send a print job through the 3D printer management system without using the non-cloud queuing feature you'll need to do the following.

1. Add print file to the editor by selecting the icon indicating below



2. Once you have selected your file it will pop up on the plate

3. From here you will be able to make some adjustments to your design before you submit it to be printed. By clicking on the design you will be able to see some additional features. These features include: Duplicate, Lay flat, and delete design.
   a. You are also able to scale, rotate, position, and cut the model

4. Once you have made all the adjustments you need to on this screen you are able to go into either print preview or print
   a. Print preview will allow you to see what the model will look like and will be able to get the time estimation to complete the model. With the print preview model you will be able to adjust extruder color, slicer settings and other features which will be shown below
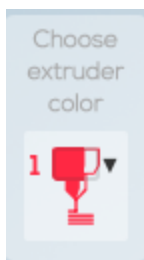
General Print Preview
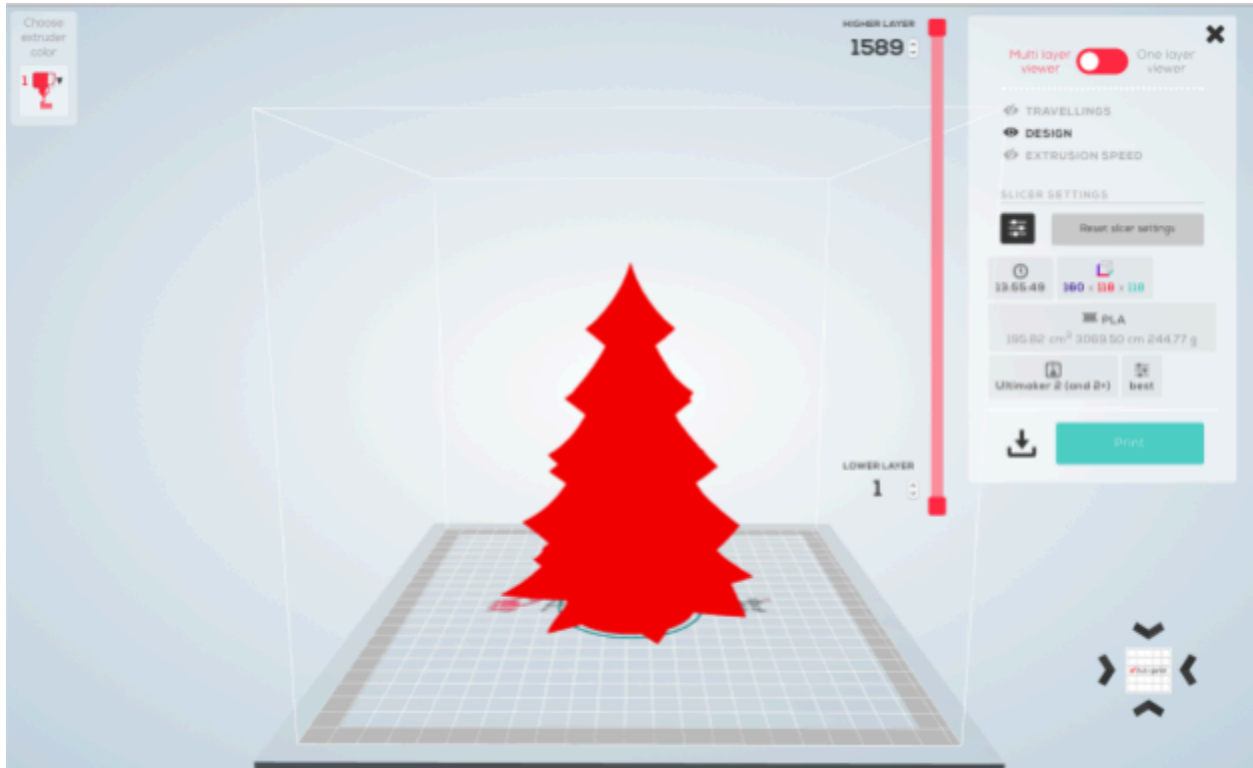
Custom Settings
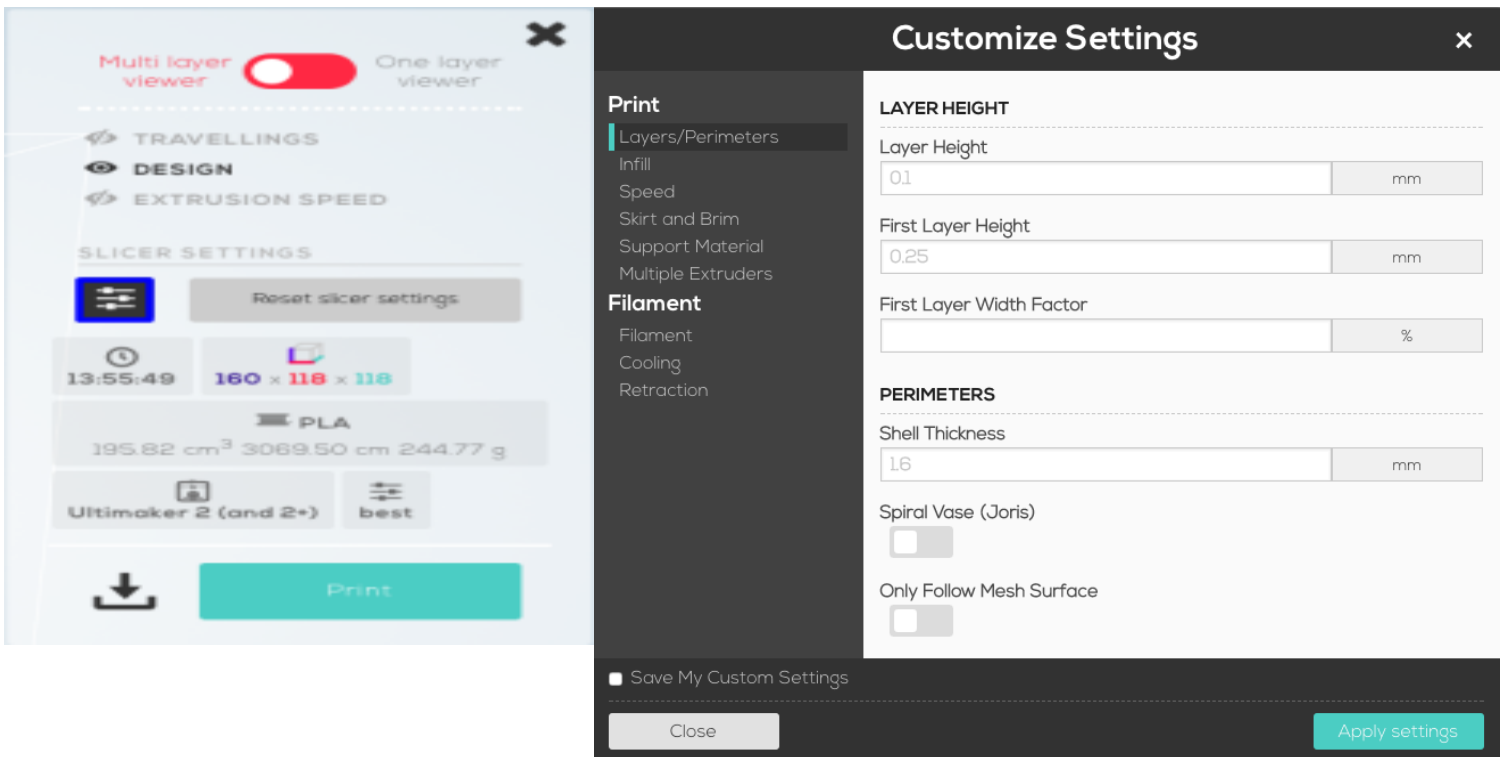


## Choosing Extruder Color:

**Before you print** please select extruder color and enter the color code for which you are using.



When you are done you can then hit print and the software will send the job to the printer.

## Submitting a print job (cloud):

To be added spring 2019

## Printing controls:

To be added spring 2019

# Lessons Learned

## Delta Consulting

## Some roadblocks aren't as disastrous as they seem:

Over the course of the project, Delta Consulting faced several seemingly disastrous roadblocks. These obstacles were identified in the risk management plan but were unavoidable since the events were crucial to the successful completion of the project. The only option was to accept the possibility of these risk events occuring. When faced with the actuality of these events coming to pass, Delta Consulting panicked instead of remaining calm and checking the authenticity of the risk occurrence. These risks could be detrimental to the project but were, in the end, non-factors. These risk events never came to pass since they were resolved once composure was gained and a thread of communication was created. However, those moments of stress could have been easily avoided had communication between Delta Consulting and Hauser been better, as well as communication within Delta Consulting. The lesson learned was to research before panicking, and that communication is key.

## People become comfortable in a routine and aren't always open to change:

Delta Consulting administered a survey to the ThinkLab tutors in an attempt to gain more knowledge on what exactly was wrong with the current print management process and what the tutors wanted to see changed. The results of the survey were puzzling since it seemed the tutors were content with the current process and saw no need for change or improvement. This was in direct contrast to Hauser's request for a new, updated, better print management system. Delta Consulting came to realize some people are content with what they see as normal and often do not see the need for a change. That does not mean, however, that a change is not needed. This knowledge can be applied to life as well as used to understand the purpose of an assigned project.

## It only matters what the customer wants:

To expand on the previous lesson learned, Delta Consulting learned it was important to focus on what, exactly, each customer wanted from us. Identifying the customer was the first step, since we had to differentiate between what the ThinkLab Director wanted, what the ThinkLab Tutors wanted, and which desire was more important. Delta Consulting realized Hauser was the customer and, as such, what she wanted is what should be delivered, no matter what opinions others have. In addition, Professor Burrow was a customer. He did not want a printing

management software, he wanted us to learn. He wanted to see that we understood the project management process and were able to provide him with the required deliverables. Hauser had no interest in seeing a work breakdown structure, she simply wanted the end product. This knowledge helped us to allocate our time and effort in different ways so as not to waste time on unnecessary work. We learned to differentiate and focus on what the different customers wanted.

## Taking the project one step at a time leads to success:

It is easy, as students who have never managed a project before, to become overwhelmed with the sheer perceived size of the workload. The original assignment seemed large and daunting, but the key to success was taking it one step at a time. To think of the project as a whole would have led to failure since the scope would be too overwhelming to even know where to begin. Taking the time to follow the process and create the deliverables gave us something to focus on while slowly chipping away at the larger assignment. The project required a lot of work, but the hard part was the deliverables, not the completion of the project itself. Taking it a step at a time meant a large amount of work was completed without realizing, so when it came time to finish the project, it was fairly easy. The work we put in at the beginning paid off in the end.

## Asking Professor Burrow to look over drafts is a must:

Delta Consulting found that meeting with Professor Burrow before each assignment due date was incredibly beneficial. Not only did these meetings allow us to receive feedback on our work before official grading, it helped us understand what Professor Burrow was expecting from each deliverable. This allowed us to focus on what we knew was important, not waste time on unnecessary work, and deliver him the best product possible. It is important to understand the wants of the customer so as to deliver them exactly what they want. Delta Consulting would recommend future students take advantage of the open office hours and willingness from Professor Burrow to help.

## Frequent communication with the project manager is incredibly important:

Professor Burrow had previously mentioned teams to keep him updated. If there are no updates, then it is assumed there has been no work done. Therefore, it was very important to Delta Consulting that Professor Burrow was aware of the progress we were making. We reported our progress in the weekly updates, but we wanted to do more. The main way we provided updates was through the aforementioned meetings. Providing drafts of assignments showed we were putting in effort and wanted to produce our best work, but also showed how much work we had completed to date. Through this, he was able to gauge our progress and see how much time and effort we were putting into the assignments.

## Communication is key:

Communication is the most important aspect to any team. This applies to sports, education, business, and many other industries. Delta's team members tried to stay in contact as much as possible. We believe our open communication led to a cohesive, strong team. Communication doesn't have to be face to face. In order to efficiently complete tasks, Delta used Google drive to ensure that all team members had the latest documents and information. We also, as mentioned before, kept a thread of communication with our project manager. We feel that an important lesson we learned is that lack of communication is detrimental to success. Delta wants to make sure any future team has a good, and open communication system.

## Importance of staying ahead of work:

Delta Consulting was able to complete the project on schedule. That being said, there were many hurdles that could have stopped our progress. During the installation process, Delta encountered some connection issues between the computer and the 3D printer. Finding a fix for the problem took more time than we initially estimated. Delta was able to find time in our schedule to correct the issue, and ensure its functionality. If Delta was behind schedule at that point, it could have easily led us to run out of time. It is important to not get complacent. Even when Delta was ahead of schedule, we continued to work. If we had stopped our progress, we wouldn't have had time to fix different problems.

## Doing can be more revealing than thinking:

While creating the integrated master schedule, Delta Consulting included a task that was perceived to be a predecessor to another task. Once Delta Consulting began carrying out the schedule, they realized these two tasks could actually be completed simultaneously. This realization did not negatively impact the team or our ability to complete the project on time, but the lesson taken from this situation is that no amount of planning can compare to the act of actually carrying out a task. We didn't realize this mistake until we implemented the schedule, so the lesson learned is it is possible to plan extensively, but there will always be a small mistake that is revealed when the plan is implemented.

## Understanding the importance of presentation:

While the substance of a report is of utmost importance, the presentation determines how well that information is received. Sometimes it is easy to forget that assignments do not stand on their own and require a short introduction or explanation, simply to make it flow smoothly. To simply list information or show tables feels choppy and disconnected, but to add in a few short, connecting paragraphs can change the tone and feel of the entire document, and make it easier for the reader to digest. Delta Consulting was focused on providing the necessary information and not so much on how it was presented. When formulating our draft risk management plan, we

didn't account for the flow of the document. We had a matrix preceding a table that explained the material showed in the matrix, which was confusing to the reader. The information didn't flow smoothly so we corrected it and learned that, at the end of the day, a person needs to read all of the documents we created, so we might as well make it as easy on them as possible.

# **Appendix**

## **Delta Consulting**

## Change to the Integrated Master Schedule:

Delta Consulting corrected two tasks that were scheduled incorrectly. Originally, TL1.A was listed as preceding TL1.B, when in reality they were parallel and could be completed simultaneously. This correction was made once implementation of the project had begun and moved the schedule up. Additionally we had to remove several tasks due to changes in software and red tape within the university financial regulations. Those change requests are available for review in pages 41-48 in this document.

| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Predecessors | Resource Names | % Work Complete | % Complete |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TL1 | | Assessment and Appl | 10 days | Mon 11/26/1 | Fri 12/7/18 | | | 100% | 100% |
| 2 | TL1.A | | ThinkLab User Surv | 0 days | Mon 11/26/1 | Mon 11/26/18 | | | 100% | 100% |
| 3 | TL1.A.a | | Survey Design | 0 days? | Mon 11/26/1 | Mon 11/26/18 | | | 100% | 100% |
| 4 | TL1.A.a.1 | | Draft | 0 days | Mon 11/26/1 | Mon 11/26/18 | | | 100% | 100% |
| 5 | TL1.A.a.2 | | Final | 0 days? | Mon 11/26/1 | Mon 11/26/18 | | | 100% | 100% |
| 6 | TL1.A.b | | Distribute Surve | 0 days | Mon 11/26/1 | Mon 11/26/18 | | | 100% | 100% |
| 7 | TL1.A.c | | Analyse Results | 1.5 days | Mon 11/26/1 | Tue 11/27/18 | | | 100% | 100% |
| 8 | TL1.B | | Proposal | 9 days | Tue 11/27/1 | Fri 12/7/18 | | | 100% | 100% |
| 9 | TL1.B.a | | Research | 2.5 days | Wed 12/5/18 | Fri 12/7/18 | | | 100% | 100% |
| 10 | TL1.B.a.1 | | Preferred | 1 day | Fri 12/7/18 | Fri 12/7/18 | | | 100% | 100% |
| 11 | TL1.B.a.2 | | Alternative | 2.5 days | Wed 12/5/18 | Fri 12/7/18 | | | 100% | 100% |
| 12 | TL1.B.b | | Selection | 1.5 days | Tue 11/27/1 | Wed 11/28/18 | | | 100% | 100% |
| 13 | TL1.B.b.1 | | Preferred | 1 day | Wed 11/28/1 | Wed 11/28/18 | | | 100% | 100% |
| 14 | TL1.B.b.2 | | Alternative | 1.5 days | Tue 11/27/1 | Wed 11/28/18 | | | 100% | 100% |
| 15 | TL1.B.c | | Proposal | 2 days | Tue 11/27/1 | Wed 11/28/18 | | | 100% | 100% |
| 16 | TL1.B.d | | Approval | 1.5 days | Thu 11/29/1 | Fri 11/30/18 | 12,15 | | 100% | 100% |
| 17 | TL2 | | Acqusition | 1 day | Tue 12/4/18 | Tue 12/4/18 | 16 | | 0% | 0% |
| 18 | TL2.A | | Approval | 1 day | Tue 12/4/18 | Tue 12/4/18 | | | 0% | 0% |
| 19 | TL2.A.a | | Approval from T | 1 day | Tue 12/4/18 | Tue 12/4/18 | | | 0% | 0% |
| 20 | TL2.A.b | | Approval from Technical Services Librarian | 2.5 days | Fri 11/30/18 | Tue 12/4/18 | 19 | | 0% | 0% |
| 21 | TL2.A.c | | Approval from Library Purchasing Officer | 2.5 days | Wed 12/5/18 | Fri 12/7/18 | 20 | | 0% | 0% |
| 22 | TL3 | | Instilliation and Desig | 2 days | Tue 12/4/18 | Thu 12/6/18 | | | 100% | 100% |
| 23 | TL3.A | | Instillation of Softw | 2 days | Tue 12/4/18 | Thu 12/6/18 | 17 | | 100% | 100% |
| 24 | TL3.B | | Design of New Submission Process | 4.5 days | Fri 11/30/18 | Thu 12/6/18 | | | 0% | 0% |
| 25 | TL3.B.a | | Outline | 1.5 days | Mon 12/3/18 | Tue 12/4/18 | | | 0% | 0% |
| 26 | TL3.B.b | | Creating a form | 1.5 days | Wed 12/5/18 | Thu 12/6/18 | 25 | | 0% | 0% |
| 27 | TL3.B.c | | Coding of information | 1.5 days | Fri 11/30/18 | Mon 12/3/18 | 26 | | 0% | 0% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Critical | | Task Progress | | Baseline | | Summary | | Inactive Task |
| Critical Split | | Manual Task | | Baseline Split | | Manual Summary | | Inactive Milestone |
| Critical Progress | | Start-only | | Baseline Milestone | | Project Summary | | Inactive Summary |
| Task | | Finish-only | | Milestone | | External Tasks | | Deadline |
| Split | | Duration-only | | Summary Progress | | External Milestone | | |

| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Predecessors | Resource Names | % Work Complete | % Complete | Nov 25, '18 | Dec 2, '18 | Dec 9, '1 |
|----|-----|-----------|-----------|----------|-------|--------|--------------|----------------|-----------------|------------|--------------|------------|-----------|
| 28 | TL4 | | **Testing** | **1.5 days** | **Thu 12/6/18** | **Fri 12/7/18** | | | **100%** | **100%** | | | 100% |
| 29 | TL4.A | | **Intial test** | **1.5 days** | **Thu 12/6/18** | **Fri 12/7/18** | | | **100%** | **100%** | | | 100% |
| 30 | TL4.A.a | | Testing of print s | 1.5 days | Thu 12/6/18 | Fri 12/7/18 | 23 | | 100% | 100% | | | 100% |
| 31 | TL4.A.b | | Testing of queing software | 1.5 days | Wed 12/5/18 | Thu 12/6/18 | | | 0% | 0% | | | |
| 32 | TL4.B | | Run through | 1.5 days | Wed 12/5/18 | Thu 12/6/18 | 31 | | 0% | 0% | | | |
| 33 | TL4.C | | Stress Test | 1.5 days | Thu 12/6/18 | Fri 12/7/18 | 32 | | 0% | 0% | | | |
| 34 | TL5 | | **Training** | **5 days** | **Mon 12/3/18** | **Fri 12/7/18** | | | **0%** | **42%** | | | 42% |
| 35 | TL5.A | | **Manuals** | **2.5 days** | **Mon 12/3/18** | **Wed 12/5/18** | | | **100%** | **100%** | | 100% | |
| 36 | TL5.A.a | | Director Manual | 2.5 days | Mon 12/3/18 | Wed 12/5/18 | | | 0% | 0% | | | |
| 37 | TL5.A.b | | Tutor Manual | 2.5 days | Mon 12/3/18 | Wed 12/5/18 | | | 100% | 100% | | 100% | |
| 38 | TL5.B | | **ThinkLab Staff trai** | **2.5 days** | **Wed 12/5/18** | **Fri 12/7/18** | | | **0%** | **0%** | | | 0% |
| 39 | TL5.B.a | | Director Training | 1 day | Thu 12/6/18 | Thu 12/6/18 | 36 | | 0% | 0% | | | 0% |
| 40 | TL5.B.b | | Tutor Training | 2.5 days | Wed 12/5/18 | Fri 12/7/18 | 37 | | 0% | 0% | | | 0% |
| 41 | TL6 | | **Handoff** | **1 day** | **Fri 12/7/18** | **Fri 12/7/18** | | | **0%** | **0%** | | | 0% |
| 42 | TL6.A | | Transfer manuals t | 1 day? | Fri 12/7/18 | Fri 12/7/18 | 34 | | 0% | 0% | | | 0% |
| 43 | TL6.B | | Handoff | 1 day? | Fri 12/7/18 | Fri 12/7/18 | | | 0% | 0% | | | 0% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Critical | | Task Progress | | Baseline | | Summary | Inactive Task |
| Critical Split | | Manual Task | | Baseline Split | | Manual Summary | Inactive Milestone |
| Critical Progress | | Start-only | | Baseline Milestone | | Project Summary | Inactive Summary |
| Task | | Finish-only | | Milestone | | External Tasks | Deadline |
| Split | | Duration-only | | Summary Progress | | External Milestone | |

# Change to risk management plan:

Delta Consulting added a Risk 13 to the risk management plan. This risk was realized upon implementation of the project.

# Change to work breakdown structure - Training (TL5):

Delta Consulting planned to offer formal training to the ThinkLab Director and Tutors upon installation of the chosen software. However, given time constraints at the end of the semester, the training was not completed. A verbal commitment was given to administer the training at the beginning of the Spring 2019 semester.

**<u>Project Change Request</u>**

| Project Name | ThinkLab 3D printer Management System | Change Number | 03 |
|---|---|---|---|
| Requested By | Project Management Team | Date of Request | 12/3/18 |

| Change Name | Elimination of training |
|---|---|

| Description of Change |
|---|
| Project management team seeks to eliminate all training for ThinkLab staff. |

| Reason for Change |
|---|
| Due to time constraints caused by the end of semester projects and exam preparation for students. The Project Management Team would like to eliminate training in order to ensure academic success for all stakeholders. |

| Effect on Deliverables (including a list of any affected deliverables): |
|---|
| The following deliverables will be eliminated<br>    ● TL5.B<br>        ○ TL5.B.a-Director Training<br>        ○ TL5.B.b-Tutor Training |

| Effect on Organization: |
|---|
| Elimination on training could potentially impact full implementation when new printers are purchased and they are able to use the system as originally planned for.  We hope to mitigate this by providing more in depth instructions and link to youtube videos if we are able to locate |

| some and place them within the training manual. |
| --- |

| Effect on Schedule (Including Estimated Completion Date for this change): |
| --- |
| Will shorten our completion date. |

| Effect on Project Cost: | | | | |
| --- | --- | --- | --- | --- |
| Item Description | Hours | | Dollars | |
| | Reduction | Increase | Reduction | Increase |
| Director Training | 1hr | 0 | 0 | 0 |
| Tutor Training | 2.5hrs | 0 | 0 | 0 |
| | | | | |
| | | | | |
| Total Net Change in Cost: | 3.5hrs | | | |

| Effect of NOT Approving this Change |
| --- |
| Could cause frustration by ThinkLab tutors by adding additional work to their already busy final schedules. Additionally, the Project Management Team will also have to squeeze time in within our final exam schedule. |

| Reason for Rejection (if applicable): |
| --- |
| |

Project Manager
___ Approved        Signature_____
___ Rejected        Title:_____        Date:_____

UMW ThinkLab Director
___ Approved        Signature:_____
___ Rejected        Title:_____        Date:_____

# Change to work breakdown structure - Training Manual (TL5.A):

Delta Consulting planned to create separate training manuals for the ThinkLab Director and ThinkLab tutors. However, it is possible to create one document for both parties.

**<u>Project Change Request</u>**

| Project Name | ThinkLab 3D Printer management system | Change Number | 02 |
|---|---|---|---|
| Requested By | Project Management Team | Date of Request | 12/3/18 |

| Change Name | Training Manual Consolidation |
|---|---|

| Description of Change |
|---|
| Project management team would like to consolidate the "ThinkLab Director" and "ThinkLab Tutor" manuals. |

| Reason for Change |
|---|
| It has been determined that consolidating training manuals into one central document would be more efficient for the ThinkLab team. Providing both Director and Tutor information in one place would allow them to quickly troubleshoot software and hardware issues. |

| Effect on Deliverables (including a list of any affected deliverables): |
|---|
| The following deliverables will be affected<br>&bull; TL5.A<br>    ○ TL5.A.a-ThinkLab Director Training Manual<br>    ○ TL5.A.b-ThinkLab Tutor Training Manual |

| Effect on Organization: |
|---|
| The consolidation will provide a centralized resource and reduce the amount of documentation to track and maintain. |

| Effect on Schedule (Including Estimated Completion Date for this change): |
|---|
| No significant impact on schedule |

| Effect on Project Cost: N/A | | | | |
|---|---|---|---|---|
| Item Description | Hours | | Dollars | |
| | Reduction | Increase | Reduction | Increase |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total Net Change in Cost: | | | | |

| Effect of NOT Approving this Change |
|---|
| Would cause extra documents to keep track of for ThinkLab staff. |

| Reason for Rejection (if applicable): |
|---|
| |

Project Manager
___ Approved      Signature_____
___ Rejected      Title:_____      Date:_____

UMW ThinkLab Director
___ Approved      Signature:_____
___ Rejected      Title:_____      Date:_____

# Change to work breakdown structure - Stress Testing (TL4.C):

Delta Consulting planned to implement a stress test to ensure the compatibility between the chosen software and the 3D printers. However, this was impossible given the fact that two of the three printers were incompatible with the software. These incompatible printers will be replaced in the near future with printers that are compatible with the software.

**Project Change Request**

| Project Name | ThinkLab | Change Number | 01 |
|---|---|---|---|
| Requested By | Project Management Team | Date of Request | 12/3/18 |

| Change Name | Eliminating stress testing |
|---|---|

| Description of Change |
|---|
| Eliminating stress testing for all three printers as listed in WBS TL4.C |

| Reason for Change |
|---|
| During initial installation it was discovered that Astroprint software is unable to communicate with the Dremel 3D20. After further investigation it was determined that Dremel does not plan on releasing proprietary software to allow Astroprint to communicate with Dremel printers. |

| Effect on Deliverables (including a list of any affected deliverables): |
|---|
| No deliverables will be affected |

| Effect on Organization: |
|---|
| No impact on the ThinkLab is detected. |

| Effect on Schedule (Including Estimated Completion Date for this change): |
|---|
| No impact on schedule |

| Effect on Project Cost: N/A | | | | |
|---|---|---|---|---|
| Item Description | Hours | | Dollars | |
| | Reduction | Increase | Reduction | Increase |
| Stress testing | 1hr | 0 | 0 | 0 |
| | | | | |
| | | | | |
| | | | | |
| Total Net Change in Cost: | 1hr | 0 | 0 | 0 |

| Effect of NOT Approving this Change |
|---|
| There would be no impact on this change as the software and the hardware are incompatible. |

| Reason for Rejection (if applicable): |
|---|
| |

Project Manager
___ Approved     Signature_____
___ Rejected     Title:_____     Date:_____

UMW ThinkLab Director
___ Approved     Signature:_____
___ Rejected     Title:_____     Date:_____

# Change to work breakdown structure - Design of New Submission System:

Delta Consulting planned to design a new way for students to submit their 3D printing requests to ThinkLab, in addition to procuring new print management software. However, it was discovered that this was not necessary once implementation of the project began.

**Project Change Request**

| Project Name | ThinkLab 3D Printer Management System | Change Number | 04 |
|---|---|---|---|
| Requested By | Project Management Team | Date of Request | 12/3/18 |

| Change Name | Elimination of New Submission System Deliverable |
|---|---|

| Description of Change |
|---|
| The Project Management team is seeking to eliminate the new submission system as one of our deliverables. |

| Reason for Change |
|---|
| After reviewing survey results we have determined that creating a new submission system is not needed. New software takes care of a lot of the issues listed in Project Charter. |

| Effect on Deliverables (including a list of any affected deliverables): |
|---|
| The following deliverables will be eliminated<br>    ● TL3.B<br>        ○ TL3.B.a<br>        ○ TL3.B.b<br>        ○ TL3.B.c |

| Effect on Organization: |
|---|
| There will be no impact on the ThinkLab |

| Effect on Schedule (Including Estimated Completion Date for this change): |
|---|
| Will remove a significant amount of work and will allow the project to be completed on time |

| Effect on Project Cost: | | | | |
|---|---|---|---|---|
| Item Description | Hours | | Dollars | |
| | Reduction | Increase | Reduction | Increase |
| New Submission System | 12hrs | 0 | 0 | 0 |
| | | | | |
| | | | | |
| | | | | |
| Total Net Change in Cost: | 12hrs | 0 | 0 | 0 |

| Effect of NOT Approving this Change |
|---|
| Could potentially be rushed in order to meet project deadlines or extend work after project deadlines. |

| Reason for Rejection (if applicable): |
|---|
| |

Project Manager
___ Approved      Signature_____
___ Rejected      Title:_____          Date:_____

UMW ThinkLab Director
___ Approved      Signature:_____
___ Rejected      Title:_____          Date:_____

# Weekly Report(s)

## Weekly Report 11/4/18

**Work Accomplished:**
Completed project charter and communication plan.

**Work in Progress:**
Delta Consulting is currently in the process of developing the Work Breakdown Structure for our project.

**Issues Overcome:**
We were a little behind but we worked to catch up and now we're back on track and staying on top of the work.

**Issues Requiring Professional Guidance:**
N/A

**Approximate Total Work Hours for the week:**
Emily - 5 hours
Bryant -  4.5 hours
Tarek - 3 hours

# **Weekly Report 11/11/18**

**Work Accomplished:**
Completed the work breakdown structure.

**Work in Progress:**
Began development of the integrated master schedule

**Issues Overcome:**
N/A

**Issues Requiring Professional Guidance:**
N/A

**Approximate Total Work Hours for the week:**
Emily - 2 hours
Bryant -  1.5
Tarek - 1.5 hours

# **Weekly Report 11/18/18**

**Work Accomplished:**
- Risk Management Plan
- Integrated Master Schedule

**Work in Progress:**
N/A

**Issues Overcome:**
N/A

**Issues Requiring Professional Guidance:**
N/A

**Approximate Total Work Hours for the week:**
Emily - 2 hours
Bryant - 1.5 hours
Tarek - 2 hours

# **Weekly Report 12/02/18**

**Work Accomplished:**
Analyzed survey results, chose software, sent report, got approval

**Work in Progress:**
Installing software

**Issues Overcome:**
Was able to readjust the original schedule to now be caught up.

**Issues Requiring Professional Guidance:**
N/A

**Approximate Total Work Hours for the week:**
Emily - 1 hour
Bryant - 1.5 hours
Tarek - 2 hours

# **Weekly Report 12/09/18**

**Work Accomplished:**
Installed and tested software, created training manual, compiled deliverables for the binder

**Work in Progress:**
N/A

**Issues Overcome:**
Figuring out what additional services we could provide to the ThinkLab with regards to training them on the software given the time constraints we had.

**Issues Requiring Professional Guidance:**
N/A

**Approximate Total Work Hours for the week:**
Emily - 5 hours
Bryant - 3.5 hours
Tarek -  3.5 hours

# Presentation

## Delta Consulting

**BUAD 440 FINAL PRESENTATION**

• • •

Emily Keehan, Bryant Atkins, Tarek Snobar

**OUR PROJECT**

Find a new 3D printing submission system that is more streamlined than the current process

# What was the problem?

## Current Submission System

- Student visits ThinkLab location to submit a print request form
- Submissions are stored on a database management software called Airtable
- Tutors manually insert SD cards containing the completed design into the printers for each print job
- The status of the print is manually updated by tutors
- Tutors notify (if requested) students once the project is complete

-

## What We Were Looking For

- Software with a centralized submission point so there are less steps in the printing process
- Allows multiple projects to be queued at one time
- Easily operated by ThinkLab tutors
- Is compatible with the ThinkLab's current and future hardware/software
- Under $100

# PROJECT CHARTER

## DELIVERABLES

1. A 3D printer management system
2. User manuals for ThinkLab Director and Student Tutors
3. Simplified submission system and instructions for students and faculty
4. Update current submission processes for the new 3D printer management software



## MILESTONES

1. Submission of a report of proposed softwares including our recommendation
2. Sending of user data survey to ThinkLab tutors
3. Approval from library to download selected software
4. Installation of software
5. Testing of software
6. Creation of training materials
7. Completion week-long pilot to test system
8. Turnover documents and account information to Director of ThinkLab and Tutors

# COMMUNICATION PLAN

## STAKEHOLDER ANALYSIS

- University of Mary Washington
- Project Manager
- ThinkLab Director
- ThinkLab Tutors
- ThinkLab users
- Technical Services Librarian



Stakeholder Analysis

| | Low Interest | High Interest |
|---|---|---|
| **High Power** | **Keep Satisfied**<br>• Christie Glancy (Technical Services Librian) | **Manage Closely**<br>• Shannon Hauser ( Technical Services Specialist)<br>• John Burrow (Project Manager)<br>• Delta Consulting Team |
| **Low Power** | **Provide General Information** | **Keep Informed**<br>• ThinkLab Tutors |
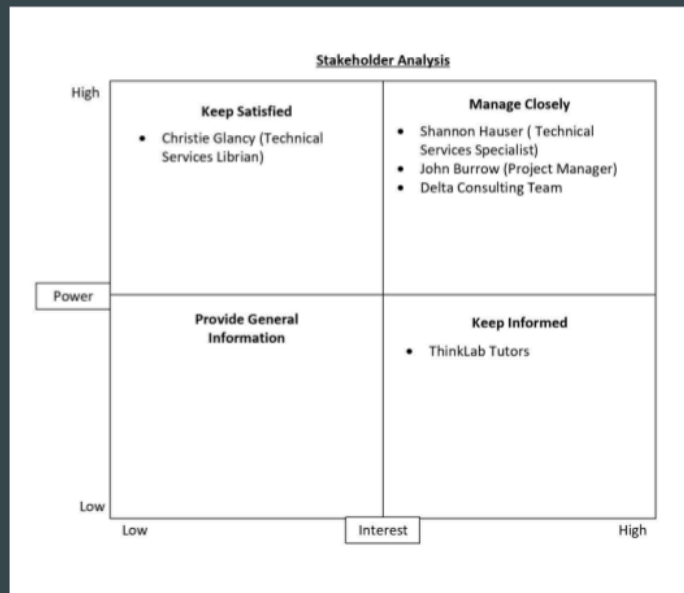
# COMMUNICATIONS

1. Weekly Reports
2. Deliverable Meetings
3. Progress Status Reports
4. ThinkLab Tutor Survey
5. Library Top-Management Update
6. Team Status Meetings
7. Change Requests
8. Milestone Reports



## Communication Plan

| Type of Communication | Target Audience | Frequency | Method of Communication | Provider |
|---|---|---|---|---|
| Weekly Reports | Project Manager | Weekly | Email | Emily Keehan |
| Deliverable Draft Meetings | Project Manager | As required | In-Person | Delta Consulting |
| Progress Status Reports | ThinkLab Director | Biweekly | Email | Bryant Atkins |
| ThinkLab Tutor Survey | ThinkLab Tutors | Once | Email | Bryant Atkins |
| Library Top-Management Update | Technical Services Librarian | Biweekly | Email | ThinkLab Director |
| Team Status Meetings | Delta Consulting Project Team | Weekly (daily as needed) | Text, email, Drive, in-person | Delta Consulting |
| Change Request | Project Manager, ThinkLab Director | As required | In-person, email | Tarek Snobar |
| Milestone Reports | Project Manager, ThinkLab Director | As required | Email | Emily Keehan |

# WORK BREAKDOWN STRUCTURE
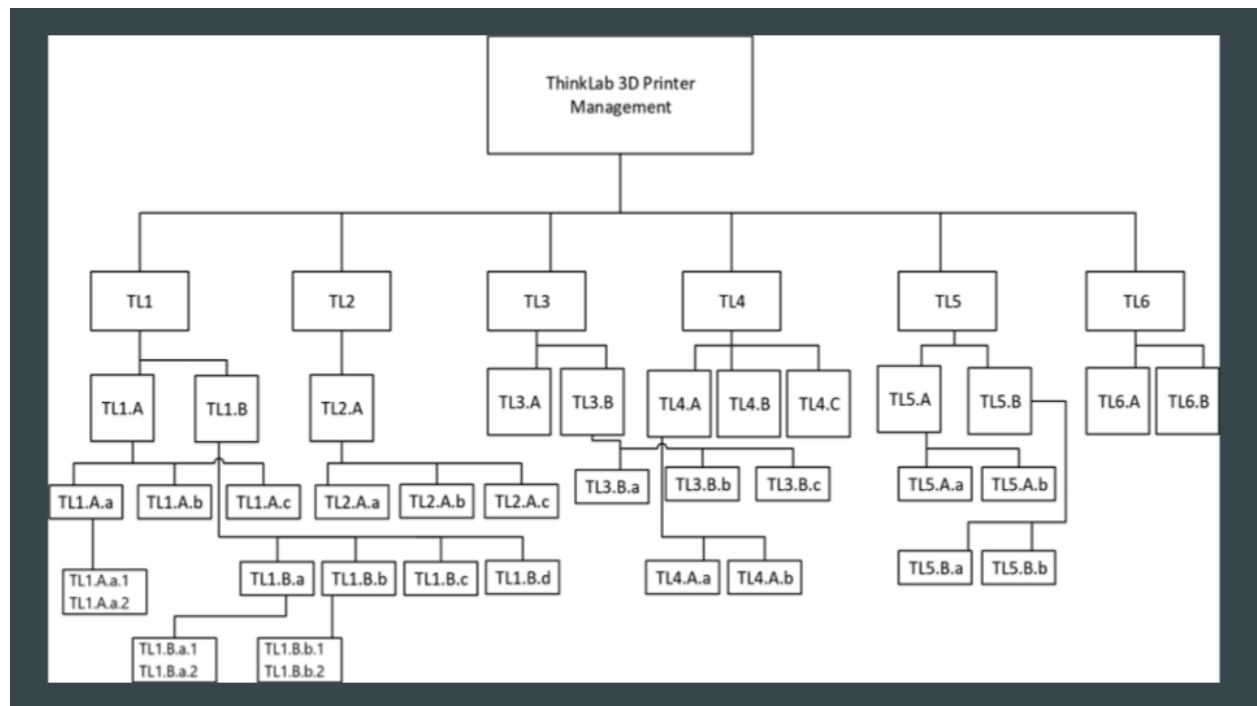
# THE MAIN PARTS OF OUR PROJECT

**TL1: Assessment**

- Research, Selection, Surveys

**TL2: Acquisition**

- Approval

**TL3: Installation and Design**

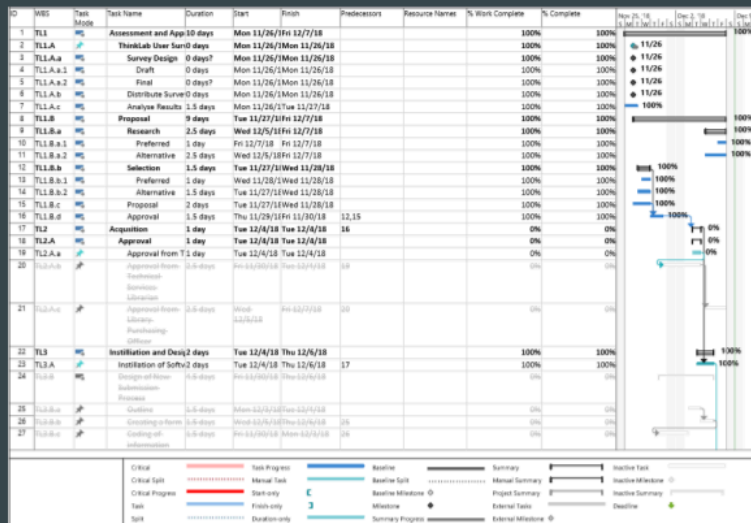- Installation, new submission process

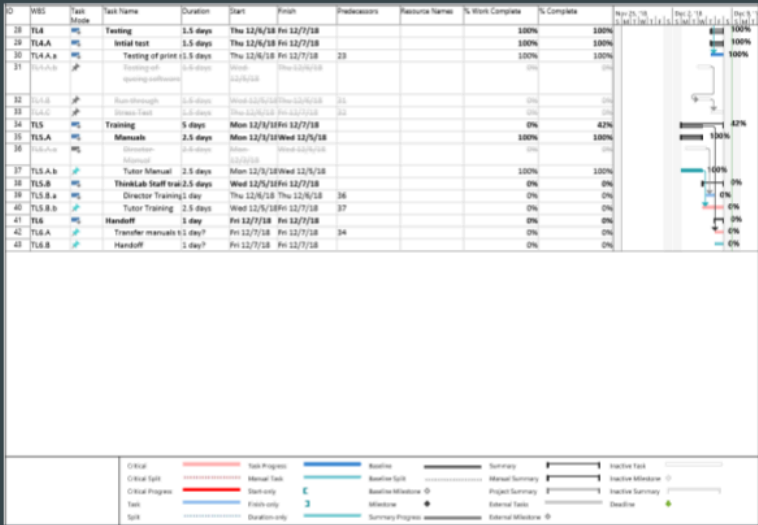**TL4: Testing**

- Print, Queuing, Stress

**TL5: Training**

- Manuals, Training

**TL6: Handoff**

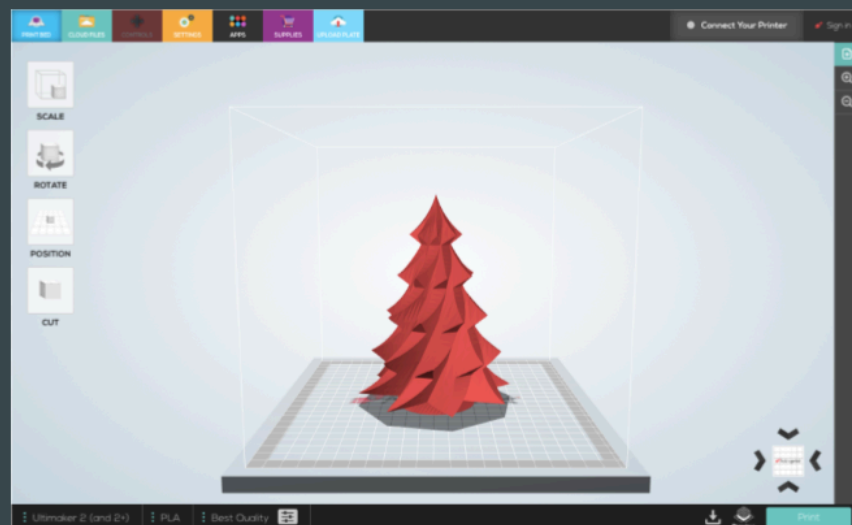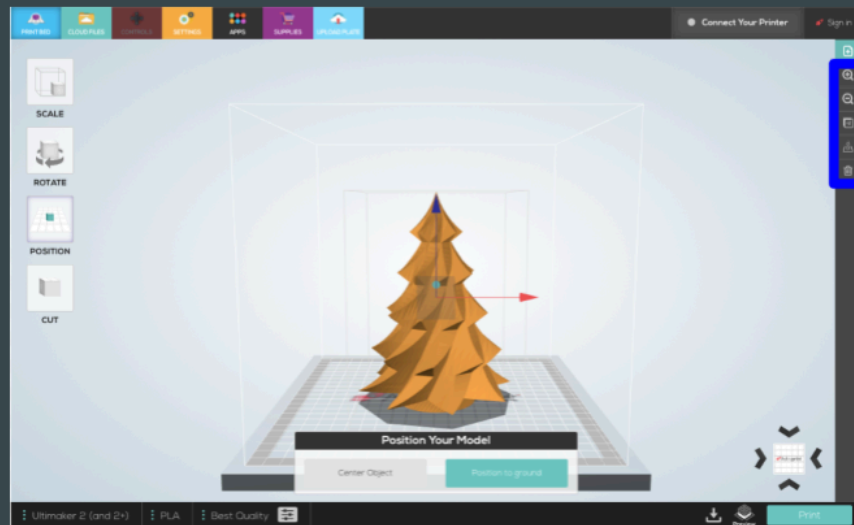# INTEGRATED MASTER SCHEDULE

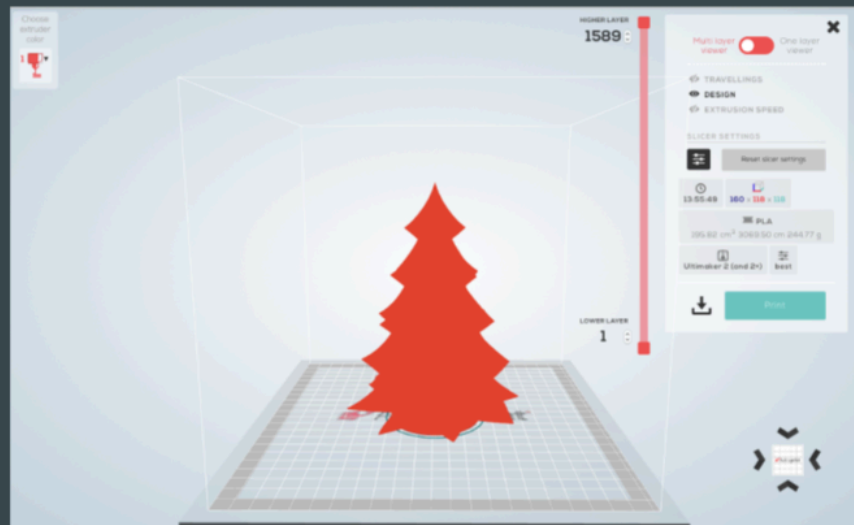## Integrated Master Schedule (Cont.)



# DEMONSTRATION
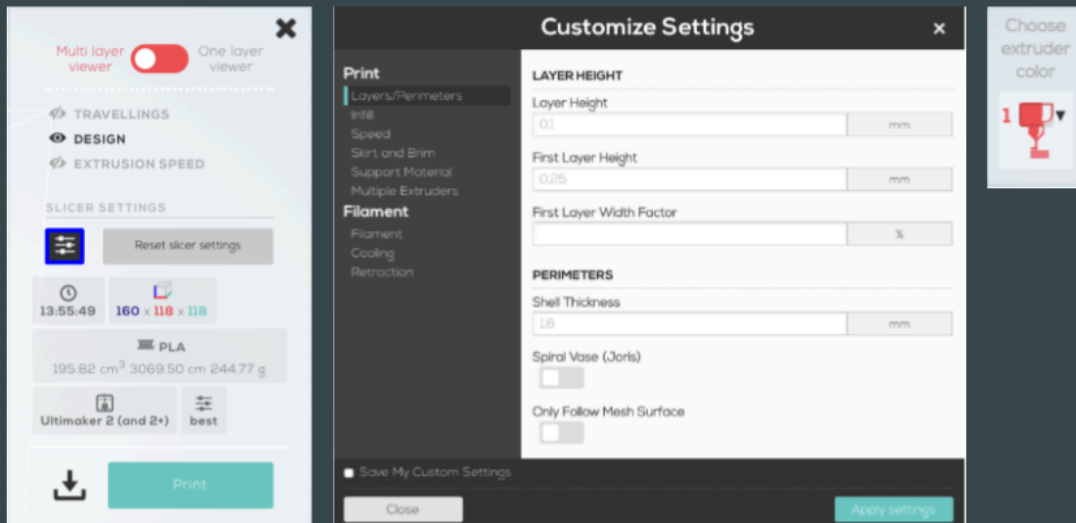
# Demonstration



# Demonstration (Cont.)

# Demonstration (Cont.)



# Demonstration (Cont.)

# Demonstration (Cont.)



# LESSONS LEARNED



1. Some roadblocks aren't as disastrous as they seem
2. People become comfortable in a routine and aren't always open to change
3. It only matters what the customer wants
4. Taking the project one step at a time leads to success
5. Asking Professor Burrow to look over drafts is a must
6. Frequent communication with the project manager is incredibly important
7. Communication is key
8. Importance of staying ahead of work
9. Doing can be more revealing than thinking
10. Understanding the importance of presentation



"The only mistake in life is the lesson not learned"

Albert Einstein