Guidelines for Project Activity Surrounding:

Who to contact in the Collaboratory

Charter Reviews

MVP Reviews

Individual Performance Reviews

Project Reports

Project Records

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Who to contact in the Collaboratory

Doug Flemmens, Director

- Connections between Collab and broader Messiah College campus/structure
- Connections between Collab and community outside of Messiah
- Fundraising and giving to the Collab (not related to site teams)
- Concerns about any Collab staff or overall program
- Exploring and vetting new project ideas

Dereck Plante, Engineering Projects Manager

- Engineering Project Support including the following:
    - Hiring process/staffing a project
    - Partner communications (can attend meetings or assist if partner is unresponsive)
    - Deadline or technical issues
    - Conflict resolution
    - Arranging meetings with Messiah staff
    - Unusual project activity that requires special permission or use of facility outside of Frey
    - Coordinating/connecting with external professional consultants/MVP panelists
    - Exploring and vetting new project ideas
    - Ordering project supplies (also Andy Erikson, Paul Myers, John Meyer—depending on the project)

Lori Zimmerman, Program Manager

- Overall health of Collab program and its projects
- MVP scheduling, tech and room set up
- Site team training
- Project Support for non-engineering projects and teams
    - Hiring process/staffing a project
        - Partner communications (can attend meetings or assist if partner is unresponsive)
    - Deadline issues
    - Conflict resolution
    - Arranging meetings with or communicating with Messiah staff/offices

Shannon Walker, Administrative Assistant and Logistics Coordinator

- Project finances/balances/petty cash
- Reserving Frey 353 Conference room
- Site team logistics
- Ordering supplies for non-engineering projects

Jessica Kline, Student Director

- General questions/comments/concerns about Collab
- How to get involved
- Information on Discipleship Community
- Student leadership opportunities and support

Charter Review

A Guideline for a Charter Review Presentation

Definition

A Charter Review is a brief presentation by the team to relevant stakeholders regarding the overall mission and vision of the project. The presentation is intended to align all team members and support personnel on a common direction and vision for project activity. The meeting should provide opportunity for the team to solicit feedback and to solidify any aspects of the project charter that were previously unclear.

Preparing for the Charter Review

An essential first step in preparing for a charter review is completing the project charter. The Collaboratory provides a template for project charters that will guide the team through essential elements in framing a successful project.

Delivering the Charter Review Presentation

The charter review meeting will be scheduled for 30 minutes. The team should prepare a formal presentation lasting no more than 15 minutes, leaving the remaining time for questions and discussion. The presentation should include the following essential elements:

1. Describe the partner's vision and the target community.
2. Develop a clear problem statement – what is it that your team is hoping to solve?
3. List any design standards, specifications that must be followed, and any specific user requirements as requested by the partner. This information should also be included in KPI (Key Performance Indicator) section of the charter.
4. Describe methodology your team plans to take in solving the problem. This includes briefly updating the audience on work that has already been done.
5. Provide an estimated timeline of major project activity, assigning general themes to the next two or three MVP cycles.
6. Provide a list of previously drafted documents that are relevant to your team.
7. Describe steps your team will take to meet all project KPI's. For those teams that are not traveling or have limited interaction with the target community, do your best to mention how you how you could work with your partner to define success for these KPI's.

Charter Review Preparation Checklist

The following list of items is provided to help teams prepare for a strong charter review session.

Preparation	
Project Charter	Submit a completed project charter to the Collaboratory by the specified due date
Communicate Well	Correspondence with the Collaboratory office, project managers, and reviewers should be professional and respectful.
Presentation and Discussion	
Audience Awareness	Demonstrate an understanding of your audience, speaking to them respectfully and valuing their time. Dress professionally and speak clearly.
Balance	Use an appropriate mix of presentation media to convey the information, including oral presentation, text-heavy slides, photographs, maps, figures and graphs
Quality of Media	All handouts, figures, graphs, photographs and other media should be clear and professionally formatted
Organization	Organize the presentation/discussion time in a way that is intuitive and flows well, but also highlights and gives appropriate time to priority items and topics requiring discussion.
Foster Dialogue	The team should plan to facilitate discussion with the review panel, particularly around points of uncertainty, by asking good questions and responding respectfully to feedback.

Content

Partner/Client	Describe the nature of the partnership and that partner's vision and mission. In the absence of a partnership, describe the stakeholders for your work.
Problem Statement	Clearly articulate the problem that needs to be solved, focusing on the problem itself not on possible solutions.
Specification	Describe what a successful solution might entail – this probably involves cost, timeline, and some performance metrics
Goals	Clearly explain the overall mission and scope of work taken on by your team for the coming year. This includes setting context for projects that span multiple years – briefly summarize work that was done in previous years and make it clear how this year's effort fits into the broader project story.
Methodology	Describe the team's general approach to solving the problem at hand.
Timeline	Demonstrate awareness of an overall project timeline, including target dates for key deliverables
Documentation	For project teams inheriting work from previous years, provide a list of currently drafted or completed documents that are current, relevant, and will become part of your project report.
KPI's	Describe how your team defines success or take the necessary steps to define success for all project KPI's

MVP Guidelines

A Guideline for MVP Planning and Reviews

Definition

An **MVP (Minimum Viable Progress) review** provides an opportunity for the team to present the overall purpose of the project with particular focus on recent activities towards achieving that purpose. The presentation shall anticipate and encourage dialogue with a review panel. Effective MVP reviews will leave the panelists with an accurate perception of the project's status and the team with helpful input from the panelists towards achieving their goals. MVP reviews also provide an opportunity for the Collaboratory Staff to check in on the status and health of a project team. Time between MVP reviews will be approximately 7 working weeks.

Scheduling MVPs for the 2017-2018 Academic year for Engineering Teams

In an effort to better support MVP presentations and create more space for Monday night discipleship and project work, we are attempting to plan the MVPs for all engineering teams for the entire academic year. All teams will submit their top three choices for their schedule for the year during Workshop week or as soon as able. Each team will have the option between the following 8 scheduling plans which allow for 2 or 3 MVPs per academic year. The final schedule will take into consideration the availability of all required attendees and the students on the project. All MVPs will take place on Friday afternoons.

- Scheduling options A, B and C include 3 MVPs for the academic year
- Scheduling options D, E, F, G and H include 2 MVPs for the academic year

OPTION SPECIFIC DESCRIPTIONS

Option "A": Three MVP Presentations during 2017-18 academic year

Dates	Event	Details
Aug 29 – Sept 28	Project work	4 weeks of project work and prep before 1st MVP presentation
Sept 29	**MVP presentation**	**2:00 or 3:45**
Sept 30 – Dec 7	Project work	7 weeks of project work and prep before 2nd MVP presentation (excluding breaks)
Dec 8	**MVP presentation**	**2:00 or 3:45**
Dec 9 – April 12	Project work	7 weeks of project work and prep before 3rd MVP presentation (excluding breaks)
April 13	**MVP presentation**	**2:00 or 3:45** (No additional year-end reporting required)

Option "B": Three MVP Presentations during 2017-18 academic year

Dates	Event	Details
Aug 29 – Oct 5	Project work	5 weeks of project work and prep before 1st MVP presentation
Oct 6	**MVP presentation**	**2:00 or 3:45**
Oct 7 – Feb 8	Project work	7 weeks of project work and prep before 2nd MVP presentation (excluding breaks)
Feb 9	**MVP presentation**	**2:00 or 3:45**
Feb 10 – April 19	Project work	7 weeks of project work and prep before 2nd MVP presentation (excluding breaks)

April 20	**MVP presentation**	**2:00 or 3:45** (No additional year-end reporting required)

Option "C": Three MVP Presentations during 2017-18 academic year

Dates	**Event**	**Details**
Aug 29 – Oct 19	Project work	6 weeks of project work and prep before 1st MVP presentation (excluding breaks)
Oct 20	**MVP presentation**	**2:00 or 3:45**
Oct 21 – Feb 15	Project work	7 weeks of project work and prep before 2nd MVP presentation (excluding breaks)
Feb 16	**MVP presentation**	**2:00 or 3:45**
Feb 17 – April 26	Project work	7 weeks of project work and prep before 2nd MVP presentation (excluding breaks)
April 27	**MVP presentation**	**2:00 or 3:45** (No additional year-end reporting required)

Option "D": Two MVP Presentations during 2017-18 academic year

Dates	**Event**	**Details**
Aug 29 – Oct 26	Project work	7 weeks of project work and prep before 1st MVP presentation (excluding breaks)
Oct 27	**MVP presentation**	**2:00 or 3:45**
Oct 28 – Feb 22	Project work	7 weeks of project work and prep before 2nd MVP presentation (excluding breaks)
Feb 23	**MVP presentation**	**2:00 or 3:45**
Feb 24 – May 3	Project work	7 weeks of project work until end of year - **Additional year-end reporting required**

Option "E": Two MVP Presentations during 2017-18 academic year

Dates	**Event**	**Details**
Aug 29 – Nov 2	Project work	8 weeks of project work and prep before 1st MVP presentation (excluding breaks)
Nov 3	**MVP presentation**	**2:00 or 3:45**
Nov 4 – Mar 1	Project work	7 weeks of project work and prep before 2nd MVP presentation (excluding breaks)
Mar 2	**MVP presentation**	**2:00 or 3:45**
Mar 3 – May 3	Project work	6 weeks of project work until end of year - **Additional year-end reporting required**

Option "F": Two MVP Presentations during 2017-18 academic year

Dates	**Event**	**Details**
Aug 29 – Nov 9	Project work	9 weeks of project work and prep before 1st MVP presentation (excluding breaks)
Nov 10	**MVP presentation**	**2:00 or 3:45**
Nov 11 – Mar 8	Project work	7 weeks of project work and prep before 2nd MVP presentation (excluding breaks)
Mar 9	**MVP presentation**	**2:00 or 3:45**
Mar 10 – May 3	Project work	5 weeks of project work until end of year - **Additional year-end reporting required**

Option "G": Two MVP Presentations during 2017-18 academic year

Dates	**Event**	**Details**
Aug 29 – Nov 16	Project work	10 weeks of project work and prep before 1st MVP presentation (excluding breaks)
Nov 17	**MVP presentation**	**2:00 or 3:45**
Nov 18 – Mar 22	Project work	7 weeks of project work and prep before 2nd MVP presentation (excluding breaks)
Mar 23	**MVP presentation**	**2:00 or 3:45**
Mar 24 – May 3	Project work	4 weeks of project work until end of year - **Additional year-end reporting required**

Option "H": Two MVP Presentations during 2017-18 academic year

Dates	**Event**	**Details**
Aug 29 – Nov 30	Project work	11 weeks of project work and prep before 1st MVP presentation (excluding breaks)
Dec 1	**MVP presentation**	**2:00 or 3:45**
Dec 2 – Apr 5	Project work	7 weeks of project work and prep before 2nd MVP presentation (excluding breaks)
Apr 6	**MVP presentation**	**2:00 or 3:45**
Apr 7 – May 3	Project work	3 weeks of project work until end of year - **Additional year-end reporting required**

Planning at the Start of the MVP Cycle

1. At the beginning of the academic year, all teams should complete an MVP Planning form no later than September 15, 2017 regardless of when their MVP is scheduled.
2. After each MVP, an MVP planning form should be filled out no later than 2 weeks after the MVP has occurred.

Preparing for an MVP Review at the End of the Cycle

1. Submit no less than 3 business days before MVP presentation:
    - MVP Submission Form
        - Report and Records included in this form
    - Deadlines for the Submission Form are due by 5pm on the Tuesday before your Friday MVP.
2. Develop your preliminary, high-level goals for the next MVP cycle in time to share at the review.
3. Prepare each project team member for the MVP review session. The Collaboratory will prepare a project summary sheet for the review panel and facilitate the meeting.

After the MVP Review…

1. MVP Review panelists will upload review comments for project report and records by the MVP Review date via the "Project Report and Records (First Draft Comments)" form.
2. *After* receiving review comments, the team has one week to resubmit documents, if required or desired, via the "Project Report and Records (Final Submission)" form. See the assessment and grading portion of this document for more details.

    - Deadlines for the Final Submission Form are due by 5pm on the following Friday.

Facilitating the MVP Review Session – Recommended Outline

Part 1 – Design Review – 1 Hour

MVP Review sessions are often most fruitful when there is open multi-directional dialogue. There may be components of the meeting that are presentation-based, but those times should be minimized and interspersed with opportunities for discussion and feedback.

Collab Staff

- Introduce the MVP approach and review format, welcome and thank volunteers.
- Moderate the time and transitions to keep the meeting on schedule.

Review Panel

- Introduce themselves and participate in dialogue with the team through the review.

Design Team

- 5-10 minutes – Introduction (this should include overall context of the project)
- ~50 minutes – Facilitated Discussion/Review The team should be prepared to manage the 50 minutes well to ensure that the most important topics receive appropriate time for discussion. (This will typically mean having about 20 minutes of "uninterrupted" content. See detailed "Guideline for Discussion/Facilitated Review" section below.

Guests

- Guests other than those on the review panel are welcome to observe the session and participate in the discussion.

Part 2 – Assessment – 15 minutes

Collab Staff

- Facilitate the review panel assessment conversation while moderating time.

Review Panel

- Discuss the health of the team and assess the team performance according to the MVP rubric privately, apart from the design team.

Design Team

- Self-assess their performance separate from the review panel using the same rubric.
- Develop overall goals for the next MVP based on the feedback already received. Teams should come to the meeting prepared with drafts of those goals that will be honed during the review meeting (Part 1) and later delivered to the panel (Part 3).

Part 3 –Feedback – 15 minutes

Collab Staff

- Moderate time and facilitate transition points in discussion.

Review Panel

- Provide real-time feedback to the team towards improvement comparing the two rubric assessments.
- Provide feedback on the updated goals for the next MVP developed by the team.

Design Team

- Share self-assessment and goals for the next MVP and accept feedback.

Guideline for Introduction

Collab Staff Responsibility
A Collaboratory staff person will give a brief introduction/overview of the MVP structure and allow people to introduce themselves, particularly if there is a guest from off campus. The Collaboratory staff person equips the panelists, enforces time limits, and communicates results to Collaboratory leadership.

Project Team Responsibility
A member(s) from the project team gives a short overview of the project (3-4 minutes):

- Briefly, state names and area of study for each member on the team.
- Explain the need this project will meet and describe the relevant stakeholders.
- Who is your partner? How frequently and to what degree are you in contact with them?
    - If applicable, show a geographic representation of where the project is focusing.
- Explain the goal and current progress towards applicable KPI's.
- Clearly outline goals specific to this MVP review.

Guideline for Discussion/Facilitated Review

The project team should lead a discussion focused on progress towards goals of the MVP cycle. Portions of the discussion could be direct presentation, but the one-directional presentation time should be limited to 20 minutes (in other words, a presentation prepared assuming zero discussion would take no more than 20 minutes so that there is time remaining for discussion to take place at the MVP review within the 50 minute timeframe.)

Management of that time will require intentional prioritization. It may not be necessary to share details related to all work done during the MVP cycle. Instead, focus on key activities and on items for which the team most needs feedback from the review panel. It is helpful to prepare questions in advance of the review in areas where the team is most in need of support from the review panel.

Everyone on the team is responsible for the quality of the facilitated review, but not everyone needs to have a formal presentation or speaking role. Throughout an academic year all team members should have a speaking role in the MVP setting at least once.

If the partner is present, gratefully acknowledge their role in the project and adjust your meeting plan to incorporate them, perhaps asking them to reaffirm your understanding of the need and specifications for your project and requesting specific feedback about the proposed solution to meet that need. When the partner is present, *the Project Manager should affiliate with the team* as one of the people charged with meeting the needs of the partner while taking on a less-critical review approach than might be the case in reviews in which the partner is absent.

MVP Tips

1. Edit your PowerPoint for proper grammar and content relevant to the MVP presentation.
2. Wear professional or business casual dress, and treat the MVP presentation as a business event. The MVP review panel consist of faculty and other industry or professional representatives.
3. Practice transitions to make them flow smoothly and quickly.
4. Ensure the font and font sizes are legible on the PowerPoint. There is a template Collaboratory PowerPoint available on Collab Internal.
5. If you have detailed calculations and charts in your project records that are important in your presentation, print them as a handout so your reviewers can look at them during the presentation. Feel free to refer to these handouts, but do not go through each of them in detail. If you receive a question, then you can use the handout to talk more specifically regarding your response.

MVP Review Preparation Checklist

The following list of items is provided to help teams prepare for a strong MVP review session. The review panelists will be expecting to see each of these addressed:

Preparation

MVP Submission	Be sure to prepare the MVP Submission form on time, no less than three business days prior to the MVP review.
Communicate Well	Correspondence with the Collaboratory office, project managers, and MVP reviewers should be professional and respectful.

Presentation and Discussion

Audience Awareness	Demonstrate an understanding of your audience, speaking to them respectfully and valuing their time. Dress professionally and speak clearly.
Evidence	Show evidence of the work that the team has accomplished. This can include such things as photos, drawings, or physical prototypes. Oftentimes the evidence will be documented within a project record.
Project Story	Be prepared to tell the overall 'story' of the project, particularly if there are guests present who know little about the project. Be sure to include a clear definition of the problem to be solved and describe the various stakeholders.
Organization	Organize the presentation/discussion time in a way that is intuitive and flows well, but also highlights and gives appropriate time to priority items and topics requiring discussion.
Foster Dialogue	The best MVP reviews come about when the team facilitates discussion with the review panel, asking good questions and responding respectfully to feedback.

Evidence of Planning

Goals – Clarity	Clearly articulate the goals that had been established for the MVP planning cycle.
Goals – Difficulty	Demonstrate that the goals set were an appropriate level of challenge. In the event that you began work and realized the goals were either too challenging or too trivial, how did you respond?
Goals – Deliverables	Demonstrate that the deliverables for the MVP, including project records, were well planned and developed over the course of the MVP, not all thrown together on the last day.
Goals – Alignment	Demonstrate that the goals for the MVP were well aligned with the overall project goals (e.g. KPIs). In instances where project scope creep started to occur, explain how you adjusted and maintained a healthy trajectory.
Goals – Looking Ahead	Be prepared to share preliminary goals for the next MVP cycle with the review panel. In particular, it will be important to make sure that what you perceive to be highest priority moving forward aligns with the panel's thinking on priorities.

Evidence of Progress

Goals - MVP	Document and explain progress made towards the project's MVP goals and offer clarification on goals not achieved.
Documentation	The project report should be updated and the project records should be complete and professional (see separate guidelines documents for each of these).
Trajectory	Demonstrate that the team is on track for on-time delivery of applicable KPIs. In the event that the team is not on track, acknowledge that and develop an adjusted timeline and plan.

Team Health

Partner Relationship	Clarify the roles of any partners or clients involved in the project and indicate whether they are appropriately involved in your work.
Efficiency	Demonstrate that the team is working efficiently and that the hours expended on the project are proving fruitful.
Commitment	Demonstrate the team's commitment to overall project success. This could be in the form of hours worked or heart-felt passion for the project and target community.
Expertise	Demonstrate that the necessary expertise for success is present on the current team. In the event that other expertise is needed, clearly articulate that.

Individual Performance Assessment

Strong team performance relies heavily on meaningful contributions from each team member. The Collaboratory project management framework aims to provide formative feedback to individuals so that they can learn how to become stronger team members. The framework also provides accountability so that those underperforming are identified.

Individual performance is addressed via two different venues: 1. Performance Assessment Meetings, and 2. Performance Assessment Surveys

Performance Assessment Meetings

A Performance Assessment Meeting is held one-on-one between the individual and project manager. The project manager may solicit input from other team members about the individual's performance in advance of the meeting.

A significant aspect of the performance assessment meeting is the reflective self-assessment that the team member should execute in advance of the meeting. The meeting itself then provides an opportunity for the project manager to affirm or refute the individual's self-evaluation. The team member should come to the meeting prepared to lead a discussion about his/her performance on the team. Factors likely to be relevant include, but are not limited to:

- Hours worked
    - The number of hours the individual has engaged with the project should align with that individual's commitment level
    - For credit bearing students, the official institutional commitment is 40 hours of effort during the semester for each credit hour registered.
        - This includes hours recorded in categories: Working on tasks, Documentation, Team meetings, MVP Review meetings and prep, Other
    - Hours committed to Collaboratory discipleship and team building exercises are valued and encouraged. Such commitments are rewarded within the credit bearing Project structure as a student who invests deeply, positively impacting individual performance evaluations.
- Prompt task completion
- Level of difficulty in tasks
- Collegiality
- Initiative
- Overall investment

Performance Assessment Survey

Another tool used to assess individual performance and to provide feedback so that individuals can grow as team members is an anonymous survey completed by all members of the team. Anonymity is preferred in this tool so that respondents are more likely to provide a candid assessment. Team members will be asked the following questions about each other:

- Person X consistently contributes to meetings by offering ideas or suggestions that demonstrate a collaborative spirit with the rest of the team
- Person X facilitates contributions from other team members by demonstrating respect for others' ideas and building upon them in a helpful way
- Person X completes assigned tasks on time
- Person X takes on tasks at a level of difficulty that is fair and reasonable considering his/her commitment level to the team and level of preparation (e.g. class year)
- Person X fosters a positive team climate
- Person X delivers the effort expected for the commitment level
- Person X demonstrates initiative by eagerly seeking out opportunities to help the team succeed.
- Person X invests deeply in the project activity or in the Collaboratory, as a whole, by working more hours than required for the commitment or by bringing a level of passion that is infectious to the rest of the team

Project Report Guidelines

Definition

A **project report** provides the reader with an accurate and timely perspective on the current state of the project. The project report should be as complete as possible at any point in time, as if the project end is imminent. The project report is a living document that will be updated often, but updates should be saved as new versions so that old versions serve the purpose of archiving.

Report Framework

- Determine the audience for your final deliverable/report
- Develop an outline of the final report that makes sense for your topic and your audience

Updating the Report

- The project report should be updated (in a new version; save the old version for archiving) each MVP cycle.
- The version tracking table in the project report should be kept up-to-date

Report Narrative

- The report should begin with an executive summary or abstract that concisely states the overall purpose and goal of the project, along with the salient points of any conclusions and the current status.
- The goals and objectives should be clearly stated
    - What problem are you trying to solve?
    - Who cares about the success of the project?
    - How will you measure success?
    - Are the goals SMART?
- The narrative should be updated each MVP cycle. New information should be added, and outdated information should be updated or removed.
- The narrative should be comprehensive, but concise. It should also be cohesive across sections, even if written by different authors. Avoid including information about aspects of the project that are no longer relevant – maintain them in an appendix if the team feels strongly that this piece of project history needs to be included for the end reader.
- The tone should be professional and technical, not conversational.
    - Technical level: written for other engineers – not necessarily experts in your discipline and certainly not your project.
- The narrative guides the reader to appropriate project records
    - Include a summary or abstract of the project record within the report
    - Clearly state the implications of the record on the project
    - Not all project records need to be included – some are outdated.
        - Include an appendix with relevant but no longer timely project records

    - In addition to citing project records within the narrative, include a list of all project records relevant to the report in a table of contents or works cited page
- The team is responsible for the entire report – even work that was done prior to you joining the project
- Final design drawings should be archived somewhere. Large sets of drawings should be in a project record. Important isolated drawings might be reasonable to include in the report.
- Use the project report rubric in this document to guide and self-assess your own work
- Include the report in your professional portfolio
- A sample outline is provided below. Plan carefully what types of things should be included in each section, and if each section is relevant for your project.

Figures

- Key figures, schematics, drawings, renderings, photos should be included in the report even if they are also in a record (e.g. not necessarily all figures; only those most helpful in clarifying key points or conclusions). The report should be a useful stand-alone document in itself and not require accompanying records in order to be intelligible.
    - All figures should be referenced in the narrative (why is this figure important/significant?) and include a caption (what is the figure?). See example on page 25.
    - Figures should be of an appropriate resolution, contextually clear, visually simple (not complicated with distracting background, etc)

Revision Tracking

Authors should briefly summarize meaningful revisions that have been made to the document since the previous version. This should be included as the second page in the document (immediately following the title page). Provided here are exemplar statements intended to help the student understand the level of granularity appropriate in the revision tracking section. Some statements might apply more readily to project records than to project reports.

- The abstract was updated and rewritten (Emily)
- A graph that plots temperature changes over time was added to the test results section (Jamal)
- Figure 4 was updated for clarity and professionalism (Greg)
- The narrative in the "test procedures" section was updated to summarize the Testing project record (Lakisha)
- The previous Testing project record and Results project record were combined to make this project record (Ted)
- This project record focused on material selection and is a subset of the previous Prototyping project record (Veronica)
- A section was added to describe the functionality of the prototype (Joel)
- The section about the PVC prototype was removed because it is no longer relevant to the project work (Randy)

- Grammar, spelling, and word choices were improved throughout the document in response to editorial comments by John Doe. (Helen)

Organization

The organization of the report should be intuitive and appropriate for the content and audience. There is not a prescribed outline (except a few sections noted below) that all project teams must follow; instead teams are expected to develop and adopt an organizational scheme that makes sense in their own context. A sample outline is provided below as a starting point, but additional sections could be included, some sections could be excluded, and the order could be changed where appropriate.

Sample Outline

1. Executive Summary or Abstract (required)
2. Problem Definition (required)
3. Project Goals (required)
4. Research
5. Design and Analysis
6. Prototype development
7. Testing and Evaluation
8. Summary of Proposed Solution
9. Implementation and Maintenance plan
10. Conclusion (required)

Project Report Essential Characteristics/Grading Rubric (Quality of Documentation)

Setup and Framing	
Title Page	Include a descriptive title, updated revision chart, list of contributing authors, and date of most recent update.
Abstract	
Context	The abstract should very briefly describe the overall context or the problem that needs to be solved. Later sections of the report will flesh this out in greater detail, but the abstract should quickly characterize the overall situation facing the project team or the team's client.
Summary	The abstract should accurately and efficiently summarize the body of work contained in the project report.
Conclusion	The conclusions or recommendations of the report should be apparent in the abstract. This is a living document, so conclusions should summarize the current status or the current thinking of the team even though they may change once more work has been done.
Communication – High Level	

Organization	The goals of the report should be clearly stated. The conclusions should be concise and well substantiated. The flow of thought through the document should be intuitive and transparent (perhaps through sub-headings)
Balance	Seek an appropriate balance of communication media including written narrative, figures, tables, graphs, or photos. If the information is better conveyed graphically than through written text, take the time to prepare a clear graphic. *Not all graphics from the project records should be duplicated in the report, but, at minimum, key figures that help define the context of the problem or summarize the proposed solution should be included.*
Mechanics	Carefully consider the audience and strive for an appropriate level of detail and tone in writing to suit their need and expectation.

Communication – Detail Level

Grammar/Spelling	Grammar and spelling errors should be minimized in professional work
Appearance	The document should be professionally word-processed and formatted. This includes consistent headings, margins, fonts, and text sizes, among other things.
Figures/Tables	Figures and tables that are included should efficiently communicate specific information. They should be referenced in the narrative and appropriately captioned (see figures/tables earlier in this document)
Graphs	Where graphs are used to convey information be sure to label the axes, include a legend, and consider appropriate line types. Do not accept the software's default formatting in wholesale; take the time to adjust formatting so that the reader can quickly and accurately understand the information shown in the graph.

Project Report Essential Characteristics (Quality of Content)

Problem Definition	Clearly explain the problem that will be addressed and the stakeholders involved. Who cares about the outcome of the project and how will they be affected?
Narrative	The written narrative (paragraph structure) should provide an organized and intuitive connection between the various aspects of the project. The narrative should set up various project records, often summarizing their findings and referencing the record where more complete information could be found.
Records	Records are appropriately referenced and summarized in the report.
Content	The content selected for inclusion in the report is necessary and efficiently informs the reader about important aspects of the project work. Avoid content that is redundant or irrelevant; it is not necessary for the report to mention everything the team has done if some of that work is no longer relevant to the project's current status.

Updates	The project report should be up-to-date for the current state of the project. For projects of longer duration, the report should be periodically updated and cleansed of outdated and irrelevant information.
Conclusions	Conclusions and recommendations should be clear and concise. For reports drafted while the project remains in progress, the conclusions should be consistent with the current status of the project even if they are likely to change once more work has been done.

Project Record Guidelines

Project Record Definition:

A **project record** documents the results of work undertaken to achieve a specific task associated with a project goal. The scope of this work is expected to be completed within a short (several weeks) period of time and often not require the efforts of the entire project team. Results or conclusions of the work documented in a Project ***Record*** are expected to be cited in the Project ***Report***. Project records are living documents and should be updated if there is ongoing activity on the same topic (update is a new version; maintain the old version for archiving). It is understood that Project Records used during MVP reviews and cited in current Project Reports will at times be incomplete because work is ongoing.

Project Record Audience:

There are multiple audiences for a Project Record.

Yourself:	Include the detail needed for you to recall the process and reasoning you used to reach your stated conclusion. You will reference this in the future
Your Team:	Include enough detail for those following you to learn about this facet of your project at a sufficient level to pick up the work if this question needs to be revisited
MVP Panelists:	Include sufficient detail for panelists to ask well informed questions about your process and conclusions
Partner/Client:	In some instances project teams will need to provide documentation to a client or partner. Preparing project records with this audience in mind limits the amount of re-writing needed at the project's completion.

Project Record Mechanics:

Planning Well

Before you begin work you need to:

- Identify with your advisor what type of project record will be used to report your process and results – Examples: Prototyping, Testing, Research, Engineering Decisions, Design, etc.
- Write the Goal statement. This should provide the context for your work – why was it needed to make progress towards a project objective?
- Create an outline of the record
    - Identify the section headings appropriate for the work being undertaken
    - Identify anticipated figures and tables

Abstract

After the work has been completed, write the Abstract. This is summary of your document that elevates the most important points. The abstract sets a short context of why the work was undertaken and states the conclusion.

Figures/Tables

- Anticipate that most project records will require some combination of figures and tables to summarize or convey key information
- Figures include drawings, photographs and graphs of results.
- Every figure and table must be labeled with an identifying number or letter and a caption. Typically figure captions are shown below the figure and table captions are above the table. To insert a caption in Microsoft Word, right-click on the figure or table and choose "Insert Caption." (example on the next page)
- The caption includes enough information for the reader to know what the figure or table is without reading the text of the record
- The written narrative must reference all figures and tables. "Figure 3 shows the prototype as set up in the testing rig."
- Figures and tables should be located close to the text which references them; either on the same page or the next page.

Figure/Table Example – Captions and References:

The previous investigation of appropriate testing protocol determined that we would use the PH1000 meter for the testing of all our water samples. Use of this device and the set-up of the test is shown in Figure 1. All samples collected from the various scenarios under study were tested by the same means. The pH data from the tests is summarized in Table 1. It is apparent from the table that parameter 3 has the most impact on the water's pH.

Figure 1. Test setup using the PH1000 meter.

Table 1. Summary of measured pH for all water samples.

Sample	Test Scenario	Measured pH
A	Control	7.0
B	Parameter 1	6.8
C	Parameter 2	6.6
D	Parameter 3	9.1
E	Parameter 4	7.2

Citations
Cite the source of any claim that you make unless one of the following statements is true

- The claim springs directly from measurements or analysis undertaken as a part of the record. Data or other items coming from other project records should cite those project records.
- The claim is commonly understood to be true within your profession's expertise.

Revision Tracking

Refer to the "Revision Tracking" section under Project Reports; apply the same concept to Project Records.

Documenting Unresolved Issues

If the work documented in a project record is still in process, include a summary of outstanding questions or work needing to be done to finish the goals articulated at the beginning of the effort. At times the work documented in a project record leads to the need for additional work which will be included in a different record. Document the issues identified by the current effort that are initiating that new phase of work.

Professionalism

Project records should be written for a well-informed audience. The tone of writing should be professional, not conversational or informal. Slang and casual phrases should be avoided.

Content Expectations

There are some general expectations of all project records that are explained in the next section. Following that, note that each category of work (prototyping, testing, etc.) has a unique and specific set of expectations. Refer to the pages that follow.

Level of Effort

The level of work involved with drafting the current version of a project record will be characterized by one of the following statements:

- (2) Nearly the entire document was drafted in this MVP cycle
- (2) The document was started in a previous MVP cycle but was substantially updated in this cycle
- (1) The document was nominally updated after being drafted in a previous MVP cycle
- (1) The document was started in this MVP cycle but is a work in progress and not nearly complete
- (1) The record summarized activity that is trivial to document, such as meeting minutes or communication records

Project Record Categories, Summary and Definitions

Project records shall be of high quality in terms of documentation (see *Essential characteristics of all Project Records*) and of high quality in terms of content (*Specific Content Expectations* are clarified for each of the categories defined below).

Problem definition - often involves investigation that better clarifies the problem that must be solved or the specifications of the end user.

Communication - records summarize salient points from key correspondence that impacts the problem definition or design process.

Research - often involves careful investigation of a particular question while considering appropriate sources of information.

Analysis - generally refers to modelling (often mathematically) some physical reality in an existing or proposed design in order to determine some specific performance metric – force in a member, flow in a pipe, etc.

Engineering decisions - often involve a non-trivial choice between two or more alternatives. This can range from choosing which prototype design to move towards final design or which supply to use for sourcing a particular raw material.

Design: Biomedical - appropriate for any device that interacts with the human body or bodily fluids. There are specific considerations such as safety and biocompatibility that need to be examined when the device is intended for use in patient health.

Design: Mechanical/Electrical - involves the careful selection of component sizes, materials, and other details to refine a conceptual mechanical design and schematic, board, and wiring details for electrical designs.

Design: Civil/Structural - often includes development of plans for something that will be built only once and will not involve prototyping or other iterative development.

Design: Software - involves the planning and organizing of a section of code that needs to be written.

Prototyping - often involves physical or analytical construction of something intended to simulate portions of a future completed design.

Testing - often involves verifying the performance level of an existing element or anticipating its performance by evaluating a prototype.

Testing: Software verification - involves the testing of developed code to ensure functionality and accuracy.

How-to/Training - involves developing a clear procedure for others to follow, such as an assembly sequence.

In-progress - records that have yet to draft significant content but are instead assembled to provide a framework for future writing and documentation.

Preliminary/Conceptual design - involves development of ideas and concepts that will be vetted as potential solutions for a problem and advanced to final design.

Other - Wait, do not default to choosing 'other' because you did not diligently consider the other categories. Choose other only if the project record truly does not align with another category.

Essential characteristics of all Project Records (Quality of Documentation)

Setup and Framing

Title Page	Include a descriptive title, updated revision chart, list of contributing authors, and date of most recent update.
Title	The title itself should be descriptive and intuitively understood by the reader.
Classification	The record should be classified as a particular type – prototyping, testing, etc.

Abstract

Context	The abstract should clearly explain how the work documented in this project record fits within the context of the overall project. Why is this work being done and how will its conclusion affect the project?
Summary	The abstract should accurately and efficiently summarize the body of work contained in the project record.
Conclusion	The conclusions or recommendations of the record should be apparent in the abstract.

Communication – High Level

Organization	The goals of the record should be clearly stated. The conclusions should be concise and well substantiated. The flow of thought through the document should be intuitive and transparent (perhaps through sub-headings)
Balance	Seek an appropriate balance of communication media including written narrative, figures, tables, graphs, or photos. If the information is better conveyed graphically than through written text, take the time to prepare a clear graphic.
Mechanics	Carefully consider the audience and strive for an appropriate level of detail and tone in writing to suit their need and expectation.

Communication – Detail Level

Grammar/Spelling	Grammar and spelling errors should be minimized in professional work
Appearance	The document should be professionally word-processed and formatted. This includes consistent headings, margins, fonts, and text sizes, among other things.
Figures/Tables	Figures and tables that are included should efficiently communicate specific information. They should be referenced in the narrative and appropriately captioned (see figures/tables earlier in this document)
Graphs	Where graphs are used to convey information be sure to label the axes, include a legend, and consider appropriate line types. Do not accept the software's default formatting in wholesale; take the time to adjust formatting so that the reader can quickly and accurately understand the information shown in the graph.

Category-Specific Content Expectations

Each project record shall satisfy the minimum expectations described in the following sections for its particular category.

Problem Definition

Problem definition often involves investigation that better clarifies the problem that must be solved or the specifications of the end user.

Problem definition records will typically address the following items:

Statement of Need	The record should clearly define and articulate the need – what is the problem that must be solved. If conducted in the midst of an existing larger problem, one might only need to clarify what additional information about the problem is needed and why it is being sought at this stage of the design.
Investigation	Summarize the data or other evidence that is gathered in order to better understand the need.
Performance Specification	Carefully describe the specification by which the solution's performance will be measured. *The solution will be considered successful if costs less than fifty dollars, purifies 50 gallons of drinking water per day, and can be maintained by local villagers.*

Communication

Communication records summarize salient points from key correspondence that impacts the problem definition or design process.

Communication records will typically address the following items:

Topic	Clearly describe the primary topic or purpose of the communication record. *The following correspondence clarifies the partnership obligations of the Collaboratory and of Forward Edge.*
Content	Often the correspondence can be consolidated and summarized to include only main points. Carefully track the dates and sources of the correspondence. *Skype call on June 6. Email received by John Doe from Harry Smith on October 2.*
Conclusion	Conclusions based on the correspondence that impact the project should be summarized and clearly stated. *Rio Missions indicated that lumber is much harder to source locally than cable so the design will include minimal amounts of lumber.*

Research

Research often involves careful investigation of a particular question while considering appropriate sources of information.

Research records will typically address the following items:

Topic Selection	The topic or purpose of the research should be clearly defined and articulated.
Sources	The sources of information used should be appropriate for the purpose of the work. This could range anywhere from a merchant's website to a design standard or a journal publication.
Content	Relevant information from the various sources is adequately summarized.
Citation	Citations should be such that one could find the same information again in a second search, if necessary.
Substantiating Claims	Any claim made in the written work should be adequately substantiated by citation and the narrative itself. Oftentimes tagging a citation on the end of a line that makes a claim is dissatisfying to the reader – it helps to include in the narrative a brief summary that includes that sources right to make the claim.
Conclusions	The research work ends with a clear conclusion or recommendation based on the information available.

Analysis

Analysis generally refers to modelling (often mathematically) some physical reality in an existing or proposed design in order to determine some specific performance metric – force in a member, flow in a pipe, etc.

Analysis records will typically address the following items:

Methodology	Why did you use the analysis method you did? This could include your choice of equation to use (*the assumptions of that equation match the reality of this situation*) or the software program to use (*the situation required an analysis more robust than could be done by hand, so a finite element model was needed*). The methodology chosen should be consistent with the needs of the project at this phase, both in terms of accuracy and effort required.
Input Specifications	The parameters (such as boundary conditions) input to the mathematical model are a reasonable and appropriate representation of the physical situation.
Assumptions	Some assumptions are almost always made in analysis since it is impossible to precisely model most physical scenarios. The assumptions inherent in the analysis should be carefully identified and their impact on the results accurately summarized (*this choice of boundary condition will lead to conservative results since it will lead us to over-estimate the stress*)
Accuracy	The analysis results themselves should be checked for accuracy. Often this can be done through comparison with results of similar situations known to be accurate or by bounding the solution between extreme scenarios.
Precision	The precision of the results and the potential for error should be considered and, to the extent possible, quantified.
Conclusions	Do not assume the results "speak for themselves." The record should clearly and succinctly state conclusions that are being drawn from the analysis results and noting the impact those conclusions have on the future of the project.

Engineering Decisions

Engineering decisions often involve a non-trivial choice between two or more alternatives. This can range from choosing which prototype design to move towards final design or which supply to use for sourcing a particular raw material.

Engineering decision records will typically address the following items:

Criteria	What are the criteria that will be used in deciding which alternative is most appropriate? What must be true of the chosen alternative?
Describe Alternatives	What are the alternatives that seem to be available and satisfy at least some of the criteria? These are the choices available in this decision.
Constraints/Impact	Demonstrate that the constraints and impacts on various areas (e.g. budget, social impact, environmental impact, implementation timeline) are well understood.
Prioritizing Criteria	The criteria relevant in the decision are appropriately prioritized or ranked against each other.
Justification	The final decision between alternatives should be well explained, rationalized, and justified.

Design: Biomedical

Biomedical designs are appropriate for any device that interacts with the human body or bodily fluids. There are specific considerations such as safety and biocompatibility that need to be examined when the device is intended for use in patient health.

Biomedical Design records often address the following items:

Biocompatibility	Any aspects of the device that come into contact with the patient should be assessed for biocompatibility. Consider how the properties of the materials in the design interact with the user. If the material contacts the skin, hygiene, friction, and comfort should be considered. If the device does not contact the patient, this should be noted.
Material Properties	The materials in the design should be chosen carefully to maximize patient health. For example, this may mean absorbing force, deforming slowly over time, not reacting to bodily fluid, or being durable enough to withstand a fall. The material choice should be clearly justified in the context of patient health.
Safety	Consider normal operation and possible failure modes of your design and how they might affect the safety of the user.
Drawings	All components of the design should be drawn according to engineering standards with full use of units and labels. The type of drawing should correspond to how the device will be manufactured (i.e. SolidWorks drawing, optical table layout, plasmid map, etc).
FDA Considerations	The designer should give preliminary consideration to FDA guidelines for medical devices. What class (I, II, or III) is this device anticipated to be? Could this device be considered 510(k) exempt? Will it have substantial equivalence to an existing device? If not, what FDA standards and testing may need to be considered as the design progresses?

Design: Mechanical/Electrical

Mechanical design involves the careful selection of component sizes, materials, and other details to refine a conceptual design. Electrical design involves an understanding of the specifications and desired outcome of the circuit, which will guide the circuit design, component selection, board layout, and wiring and board interconnections.

Mechanical and Electrical Design records often address the following items:

Context	Clearly describe the context of the work being done – how does this fit into the larger project?
Specifications	Demonstrate a strong understanding of the specifications (what does the finished design need to do?) from the client. If the design is of a particular component/subsystem that becomes part of a larger design, indicate the requirements of the component/subsystem that will make it compatible with the finished design.
Conceptualization	Use tools appropriate to the task to aid with design conceptualization and visualization. This could include Solidworks, hand sketches, or physical models for mechanical design and schematics and board layouts for electrical design.
Detail	The level of detail in the design itself, and its documentation, should be aligned with the stage of development. Final (or nearly final) design requires much greater attention to detail than concept development. Final designs should include a materials list with vendor information and items costs.
Visualizations	Provide appropriate visuals – sketches, photos, renderings – to help the reader quickly understand what you have developed. The visualizations should be well labeled and captioned. Electrical design might include screenshots from oscilloscopes or other test equipment or include a table of achieved parameters.
Description	Describe the features of the design at a level of technical detail appropriate for the intended audience.
Conclusions	Summarize important findings from the design exercise, including any remaining questions that must be addressed in future work.

Design: Civil/Structural

Civil/Structural Design often includes development of plans for something that will be built only once and will not involve prototyping or other iterative development.

Civil/Structural Design records often address the following items:

Context	Clearly describe the components of the overall design that are documented in the project record.
Standards	Summarize the design standards that will be used in guiding the design.
Analytical Model	Describe and substantiate the analytical model that will be used to anticipate demand on the structure or to predict its performance.
Accuracy and Safety	Describe the process used to ensure that analysis and design results are accurate and sufficiently 'safe.'
Communicating Results	The outcome of the design should be clearly communicated so that it can become part of the construction drawings or documents at some point towards conclusion of the project. This should often be presented in the format of a drawing or the language of a specification.

Design: Software

Software design involves the planning and organizing of a section of code that needs to be written.

Software development records often address the following items:

Purpose	Clearly describe the purpose of the software that will be developed.
Flowchart	Develop a flowchart or other means to describe the high level organization and functionality of the planned program.
Platform	Select and justify the programming platform/language that will be used for the software development.
Modules	Divide the program into various modules and clearly describe the purpose and function of each.
Conclusion	Summarize important findings from the design exercise, including any remaining questions that must be addressed in future work.

Prototyping

Prototyping often involves physical or analytical construction of something intended to simulate portions of a future completed design.

Prototyping records will typically address the following items:

Documentation	There should be thorough records of the prototype itself. Documentation might include clearly dimensioned fabrication drawings, blocks of code that are organized and include comments or a flowchart, or photographs of prototype assembly.
Prototype Development	Take reasonable steps during the development of the prototype to ensure accuracy and reasonableness. For instance, simple mock-ups or computer renderings may be necessary to ensure geometry, fit, and basic function of the prototype will be as intended.
Representation	The prototype should be appropriately representative of the future completed design considering the stage of design. For example – the prototyping approach must be informed by the design stage (concept review or detailed design) and the intended use of the prototype (aesthetic mock-up, geometric fit mock-up, performance testing, etc).
Component Selection	The choice of component parts used to build up the prototype should be thoughtfully considered in light of intended use, budget, etc.
Fabrication	Fabrication of the prototype should be carefully planned so that work can be done efficiently with minimal impact on others (e.g. lab technicians, other project teams).
Workmanship	The prototype should be neat with an appropriate level (depending on intended use) of care given to development.

Testing

Testing often involves verifying the performance level of an existing element or anticipating its performance by evaluating a prototype.

Testing records will typically address the following items:

Purpose of Testing	The overall purpose of the test should be clearly defined and articulated. *The results of this test will help in determining whether the existing system needs to be replaced.* Notice below that other aspects of setting up the test are driven by the test's purpose.
Identify Parameters	The team planning the test should carefully identify all parameters that could significantly impact the test results. *Temperature is known to influence performance of this material so that was held constant throughout the study. Relative humidity is known to not affect performance, so it was not monitored*.
Experimental Set-up	The testing procedure is likely to produce data with a level of accuracy and precision appropriate for the purpose of the test.
Test Documentation	The testing procedure should be documented in a level of detail sufficient for someone else to reproduce the test, if needed.
Data Collection	Collecting data from a test can range from the primitive (e.g. a tape measure) to very sophisticated electronic devices. The choice of the data collection technique should be aligned with the purpose of the test and the required precision and accuracy.
Presentation of Data	The data that is collected should be organized and presented in a format that is intuitive and easy for the reader to interpret. Carefully consider whether the data should be presented in a table, a graph, or some other means. Also consider whether it's necessary to show ALL the data or if an important subset of the data is most important to the reader.
Analyze Results	Do not assume that the results "speak for themselves" even if it seems like the conclusion is self-evident upon inspection of the data. The narrative should clearly summarize "what the data means" and highlight key points. *The performance data shows that the filtration system is capable of passing only 1.2 gallons of water per minute, compared with the anticipated demand of 2.5 gallons per minute.*
Conclusions	Interpret the results for the reader in a way that clearly summarizes conclusions that will be made based on the testing that has taken place. *Since the capacity of the filtration system is clearly below the anticipated need of the community, replacement of the system is recommended.*

Testing: Software Verification

Software verification involves the testing of developed code to ensure functionality and accuracy.

Software verification records often address the following items:

Context	Clearly describe the intended purpose of the code that is being verified and its role within the project.
Proof conditions	Develop a set of conditions or parameters that will be used in proof testing the code. In other words, determine how many successful runs and with what specific conditions must be observed in order to declare the software functional and accurate.
Conclusion	Summarize relevant conclusions from the verification exercise.

How-to/Training

How-to/Training involves developing a clear procedure for others to follow, such as an assembly sequence.

How-to/Training records often address the following items:

Context	Clearly describe the intended purpose of the training guide
Written narrative	The written narrative should be clear and concise with the process or procedure explained clearly and efficiently.
Non-verbal communication	Training documents often include strategic and perhaps frequent use of figures or pictures that clearly communicate various steps in the activity.
Detail	A training document must include the appropriate level of detail for the audience or end-user. It must be sufficiently detailed so that no steps in the process are left to the imagination, but not so overly-detailed that the communication is inefficient or the end-user is frustrated by trivial information.
Conclusion	Summarize relevant conclusions from the process of developing a training document.

In-progress

In-progress records are those that have yet to draft significant content but are instead assembled to provide a framework for future writing and documentation.

In-Progress records often address the following items:

Context	Clearly describe the intended purpose of the document
Outline	Clearly demonstrate the intended (future) organization of the document by outlining major section headings.

Preliminary/Conceptual Design

Preliminary design involves development of ideas and concepts that will be vetted as potential solutions for a problem and advanced to final design.

Preliminary design records often address the following items:

Context	Clearly describe the intended purpose of the concept development work. (Examples: 1 - It leads to prototype development with functionality that will demonstrate some specific functionality of the proposed finished product. 2 - It is part of developing a list of many options that will be compared with one another for selection to move into final design.)
Problem Statement	Development of design alternatives should demonstrate a working understanding of the problem statement that define a successful design.
Specification	Development of design alternatives should demonstrate a working understanding of the specifications that define a successful design.
Assessment	Documentation should indicate initial assessment design alternatives, citing strengths and weaknesses of various ideas in meeting the need of the problem statement.
Description	Documentation does not need to approach that required of final design, but a description sufficient for future generations of the team to recall what was considered (as an example) is essential.
Conclusion	Summarize relevant conclusions from the process of developing a preliminary design.

Other

All generic project records should include at least the following elements:

Context	Clearly describe the context and purpose of the work that is being documented.
Content	Develop well-organized content aligned with the purpose of the work.
Conclusion	Summarize relevant conclusions and the impact they have on the project.