

## Project Deliverable D: **Conceptual Design**

### GNG 1103 – Engineering Design

Faculty of Engineering – University of Ottawa

#### ***Objective:***

Develop a set of conceptual designs for your problem statement, based on the previous user benchmarking and technical benchmarking and the list of prioritized design criteria you have developed. Analyze and evaluate these concepts and choose the concepts or combination of concepts that you will continue to develop. Justify your reasoning as you go.

#### ***Instructions:***

1. Based on your team's problem statement, benchmarking and the list of prioritized design criteria, each team member will generate at least one concept for each subsystem required and the final functional solution should have a minimum of three subsystems. You should clearly define the boundaries between those subsystems, so that conceptual designs for each subsystem are inter-changeable. Identify the specific team member creator for each concept in the deliverable.
2. Team members will then reconvene as a team and discuss these concepts in order to categorize/condense/combine/refine/reconsider each sub-system. As a team, your goal is to produce a completely new or modified concepts for each subsystem.
  1. Each subsystem should be well-documented using clear sketches and descriptions. Give a few lines and notes to show the benefits and drawbacks of the different concepts you considered. It should be understandable by a reader who is unfamiliar with your problem.
3. The subsystems can then be combined into three fully functional solutions, by mixing and matching the subsystem ideas. These global concepts must then be analyzed and evaluated against your design criteria using a selection matrix, similar to the one used in class, for comparing the solutions from the technical benchmarking process.
4. From this analysis and evaluation, choose the best global concept and identify it for further development. Give a few lines and notes to show the benefits and drawbacks of the different concepts you considered. Justify your final selection or any ideas that you did not select with suitable notes in the document.

Your chosen concept will continue to be used in future project deliverables, including your task plan and cost estimates, as well as prototyping. It is possible that you realize along the way that

your chosen concept is not ideal or perhaps requires modification. Therefore, it is critical at this stage of the process that you properly document your ideas in case you need to change or modify your design later. Therefore, you must also record your top three ideas in the submitted deliverable and you should **also** keep a record of the other ideas that you've generated somewhere safe. It is recommended that you include them as appendix material in your submission.

It is OK to document other exciting ideas that you've had (e.g. you will not be penalized for having *more* than three ideas for the subsystems). However, you still need to select the "best" idea, based on what you know right now and based on your analysis and prioritization of requirements and design criteria so far.

Please capture your work in a structured, technical document format (see the template for the details of what constitutes a basic technical document structure).

### ***Client Meeting 2:***

For your second meeting with your client, you will be presenting your concepts one-on-one to get feedback on them. Prepare some slides to validate your problem statement and present more than one concept to your client so they can give you feedback on the direction you can take. Prepare some questions to ask the client to confirm your target specifications and/or to clarify aspects of the project.

### ***Task Plan Update:***

1. Update your Trello task board to include any changes in estimated task duration, missing tasks, task responsibilities, or details, based on your better understanding of the project or based on feedback that you have received from your PM/TA.
2. Include more detailed sub-tasks for the tasks that will need to be completed over the next few weeks.
  - Important note: It should be possible for ONE person to complete each identified task or sub-task in the allotted time. The allotted time should also be *reasonable*, based on the task owner's availability. Everyone should be doing their fair share of the work.
3. Verify and update the task start dates and end dates for each task, based on your project progress.
4. Ensure that you have taken into account each team member's *actual* availability over the next two weeks, as well as significant events, such as particularly high course loads, exams or travel, which might be going to limit actual project work progress.
5. For *each* person in your group, it should be possible to determine:
  - What was completed last week (i.e. "**Completed**" tasks),

- What will be done next (i.e. “**In Progress**” tasks)
  - If tasks are going to be put “**On Hold**” or “**Cancelled**” altogether
6. Any and all group “Issues” should be discussed and dealt with, ideally with the assistance of your Project Manager (PM). This should happen during **each** of your lab sessions or can happen earlier, using your defined communication methods. As already explained, it is essential to keep your PM/TA “*in the loop*” throughout the term. It is usually *not* a good idea to ignore conflicts between team members. Instead, you should deal with them in a constructive way.

***Submission:***

Each team (***only one person from each team***) must submit a PDF copy of this deliverable by uploading the file as an attachment into BrightSpace.

***Due Date:***

See BrightSpace.

## **Appendix – Basic Structure of a Technical Report**

<b>Title Page</b> , with appropriate title, authors' names, course name, etc.
<b>Abstract:</b> Concise summary of the work.
<b>Table of Contents, List of Figures, List of Tables:</b> All tables and figures should be important enough to be referenced in the text of the document, otherwise they should be excluded. Microsoft Word has features to automatically generate tables of contents, lists of figures, and lists of tables. Citations should be provided where appropriate and properly linked to the bibliography. Again, Microsoft Word has a feature for this, but standalone systems such as Zotero or Mendeley work well too.
<b>Introduction</b>
Motivate and explain your problem (“So What?”).
Explain the basic user requirements (“Who Cares?”), (“Why Now?”), provide insight into why the problem is important to solve, in a broader context, and who is affected by the solution.
Explain how your design differentiates from others or the key aspects that make your product better (“Why You?”).
<b>Body of the Document:</b> Structure this well (e.g. using the design steps or process you used, as we did in class). Be sure to include:
Work, related research and analysis of calibration data (technical and user).
A detailed description of your customers/users and their requirements, explaining relative priorities. It should be clear that you have empathized with the user and have also done a significant amount of research and critical analysis here.
A statement of the problem and any required justification for that problem statement.
A list of “some” interesting design solutions you generated (neat figures are a good idea here too and should be referenced in the text!).
The design criteria you developed (and an explanation of the metrics and target specifications you used) to select your chosen concept.
A clear and detailed description of your selected design solution and its features, with a clear justification of why you selected it.
<b>Conclusions and recommendations for future work:</b> Summarize your lessons learned and your work and propose the most productive avenues for future work (i.e. the next prototypes you are considering or the main challenges you have with your selected concepts, etc.).
<b>Bibliography:</b> What references did you consult?
<b>Appendices:</b> You can put important or critical work you have done in appendices. Perhaps this work is not central to the structure of your paper, but needs to be included, such as concepts you did not select or perhaps additional technical drawings or detailed calculations.