**Critical Design Review**

**Objective**

The Critical Design Review (CDR) is a refinement of the information presented in your Preliminary Design Review, a summary of the spring semester’s progress, and a projection of the fall semester’s work. Its primary purpose is for you to show your ability to communicate your work to others effectively in a conference-style presentation form. Its secondary purpose is to give you an opportunity to present your fall semester project progress and issues to the class and instructors.

**Presentation**

Each team will have 30 minutes total, 20 minutes for presentation followed by 10 minutes of Q & A. Use, but do not exceed or fall short by more than two minutes, your full 20 minutes of presentation time - there is plenty to describe. Plan on using a team laptop to present, since ensuring that videos, animations, or other content elements run on another laptop can be tricky. However, have one team member upload your presentation to Canvas so we have a copy for archival purposes and all teams have the same deadline.

**Examples**

Top MRSD CDR presentations from last year are posted along with this assignment. As before, remember that these are not perfect models, in part because the content guidelines are continually refined - the ultimate guide is the CDR Guidelines document you are reading now. IEEE International Test Conference guidelines on how to prepare a good slide presentation are attached to the PDR task.

**General guidelines**

* A reasonable rule of thumb for presentations is one slide per minute, but this will depend on various factors, such as whether you have animations, so be guided by the time limit, and create however many slides fit into that.
* Everyone on the team plays a role in the presentation.
* You must attend all presentations. We will start on time, so ***be there a few minutes early***. If you miss your team’s presentation, you get a zero for the assignment. If you are late or absent for other portions of the presentations, up to 4 out of the 20 possible points will be deducted, prorated over the total time of the presentations.
* Do not use physical props to describe concepts. The idea is to give a talk as you would at a technical conference, or within a company to your CEO or CTO; in both cases, brevity and focus are crucial.
* Use videos, animations, and any other illustrative presentation techniques that Powerpoint or other presentation software allows.
* Assume a general technical audience; i.e., don't assume your listeners have special knowledge.
* In general, and especially for elements that would be too lengthy if presented in full (e.g. system requirements or multi-level functional architecture), pretend you are presenting to your company's CEO to get permission to build the system - what do you think he or she would like to hear most?
* Refine those parts of your presentation that have been presented before based on feedback already received and lessons learned during the first semester.

**Delivery**

You will be graded on delivery (item 9 in the rubric at the end of this document) as well as content. Practice as a team ahead of time; include the practice of smooth handoffs from one speaker to another. Adhere to the length limit, speak clearly and without stumbling, face the audience, keep your hands out of your pockets, and be prepared to answer questions crisply and coherently.

**Content**

The Critical Design Review (CDR) is a refinement of the information presented in your Preliminary Design Review that consists of the following components:

1. Project description
2. Use case
3. System-level requirements
4. Functional architecture
5. Cyberphysical architecture
6. Current system status
7. Project management
8. Conclusions

Items 1-5 should involve refinements/revisions of what you presented first in your CoDR, then in the PDR. Refer to the CoDR Guidelines for additional details on their contents. Items 6 & 7 are the meat of the CDR.

Component descriptions

1. Project description. This is a **refined** project description consisting of user needs and your resultant proposed method of meeting them. It focuses on end results, not the details of the technology.
2. Use case. Give a brief use case coupled with a **graphical representation** of the system in its **use case/mission environment**.
3. System-level requirements
4. **Summarize** your system requirements.
5. Identify any requirements changes since the PDR with justification for the changes.
6. Functional architecture
   1. This is a block diagram showing your system’s **major functions and the flow** (information, energy, material) between them. Limit the level of detail so the architecture is visible and intelligible.
7. Cyberphysical architecture
8. This is a block diagram showing your system’s **major cyberphysical (hardware & software) components and the flow** (information, energy, material) between them. Limit the level of detail so the architecture is visible and intelligible.
9. Current system status
   1. Spring-semester targeted system requirements. Identify the system requirements and corresponding subsystems and system elements emphasized during the spring semester development.
   2. ***Start with an overall system depiction.***
   3. Subsystem descriptions/depictions. Then describe and depict the subsystems developed during the spring semester. Use design drawings, photographs, schematics, brief video clips, and other visual means to convey the status of your subsystems.
   4. Modeling, analysis, and testing. Include a summary of any modeling, analysis, and testing you performed in order to design your system to specification and unit-test its components.
   5. Performance evaluation against the Spring Validation Demonstration. Summarize how well your system performed against the scenario and metrics specified by your SVD.
   6. Spring-semester website video excerpt. Show at least the beginning of the 2-to-3-minute spring video that you are required to post on your website. The beginning of the video should be a “teaser” that shows as much as possible of the system operating performing SVD-type activities (refer to the Project Website Guidelines).
   7. Conclusions. Highlight current system strong and weak points and needed areas of refinement.
10. Project management
11. Work Breakdown Structure. Present a **summary** of your three-level Work Breakdown Structure that has been refined as needed since the PDR.
12. Schedule status. Don’t present anything that is too detailed to see or talk about, such as a detailed (as opposed to a summary and intelligible) Gantt Chart. Answer these key questions:
    1. What are the major system development milestones in the remaining schedule?
    2. Are you behind, ahead of, or on schedule? If behind, how will you catch up?
13. Test plan. Present a concise high-level test plan for the fall semester including the Fall Validation Demonstration.
    1. Use a table to identify capability milestones for these fall-semester Progress Reviews (PR):
       1. PR 7: Early September
       2. PR 8: Mid-September
       3. PR 9: Early October
       4. PR 10: Mid-October
       5. PR 11: Mid-November
       6. PR 12: Late November
    2. Describe the Fall Validation Demonstration (FVD), to be conducted in early December, in greater detail than the other capability milestones. Use graphics as much as possible to make the following things clear:
       1. The location and needed equipment.
       2. The sequence of events.
       3. The quantitative performance metrics that your system will be measured against.
14. Budget status. Answer these key questions:
    1. What is your total budget?
    2. What are the big-ticket items that comprise the majority of your budget?
    3. How much/what percentage have you spent to date?
15. Risk management
16. Provide an update on the risks you identified in the Preliminary Design Review (PDR) and have been tracking/addressing since then.
17. As you did for the PDR, present the following (examples of which are given in the PDR Content Guidelines document), updating both tables to reflect any changes since the PDR:
    * 1. A Risk Management table with Risk ID, Risk, Requirement, Type, Likelihood, Consequence, Mitigation.
      2. A Risk Likelihood-Consequence Table
18. Conclusions
19. Key lessons learned during the spring semester.
20. Key planned activities during the fall semester.

The table below gives the grading rubric for this assignment.

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| **Critical Design Review Element** | **Weight** |
| 1. Project description | 0.3 |
| 2. Use case | 0.4 |
| 3. System-level requirements | 1 |
| 4. Functional architecture | 1 |
| 5. Cyberphysical architecture | 1 |
| 6a. Current system status: Targeted requirements | 0.3 |
| 6b. Current system status: Overall system depiction | 0.5 |
| 6c. Current system status: Subsystem descriptions/depictions | 1.5 |
| 6d. Current system status: Modeling, analysis, testing | 1 |
| 6e. Current system status: SVD performance evaluation | 1.5 |
| 6f. Current system status: Spring semester video excerpt | 1 |
| 6g. Current system status: Strong/weak points | 1 |
| 7a. Project management: Work Breakdown Structure | 0.5 |
| 7b. Project management: Schedule status | 0.5 |
| 7c. Project management: Test plan | 1.5 |
| 7d. Project management: Budget status | 0.5 |
| 7e. Project management: Risk management | 1.5 |
| 8a. Conclusions: Lessons learned | 0.5 |
| 8b. Conclusions: Key fall activities | 0.5 |
| 9a. Length | 1 |
| 9b. Intelligibility, flow, demeanor, audience connection | 2 |
| 9c. Handling of Q & A | 1 |
| **Total:** | 20 |