IC470 Software Engineering

Milestone 1 – Prototyping & Emergence of Software Engineering as a Discipline

Due date: As per the syllabus

Note: Teams are still not bound to what they present for this milestone. For this milestone you should present your best estimate of what your capstone will be based on what you know to date. However, keep in mind that you are free to change focus, Customers, or even the entire capstone topic at any point until you submit Milestone 3 - Part I, the formal proposal and which will be approved (or rejected) by a faculty committee. After Milestone 3, teams are committed to the capstone topic unless otherwise directed by your instructor.

Errata/Updates. Any errata or updates to this milestone will be dated and shown in red both as a summary below as well as in the contents of this milestone. Each team is responsible for checking (and delivering their milestone in compliance with) any changes indicated in this Errata/Updates section that are dated prior to the delivery of this milestone.

Summary of Errata/Updates:

08 Nov 2019 - Do not include screenshots of emails in slide presentations. Include prints of emails as attachments to the physical copy of your slide presentation as necessary.
08 Nov 2019 - Improved/clarified wording for what information is required on the Customer Meeting Summary slides; requirement has not changed.
08 Nov 2019 - Added Intro Slide.

Customer Involvement Alert: See the sections below labeled with "**Customer Involvement Alert**" for details on portions of this milestone for which you will need to explicitly interact with your Customer. Also, note that:

1. **Arrange to meet with your Customer**. **Customer Involvement Alert**: It is the team's responsibility to meet with their customer with enough lead time (at least 2 workdays prior to a milestone delivery) to get Customer and Technical Advisor feedback, required initials and meet published milestone delivery deadlines. Teams with off-Yard Customers may attach an email printout to their presentation slides showing their Customer's concurrence with the team's acceptance test case completion as well as the scores from the Customer for the Customer's Evaluation Cover Sheet in lieu of their physical initials.

i. **If you contacted your Customer and (Technical Advisor) at least 2 workdays prior and they were not able to meet with you:** Some teams, particularly those with off-Yard Customers, may have trouble getting Customers (and Technical Advisors) to provide timely feedback and complete the Customer Evaluation Cover Sheet in time for milestone deliveries. So as to not unfairly impact the team's grades in these cases, completing all of the following steps will be acceptable for each such milestone to avoid loss of points due to lateness:

   a. Contact your Customer (and your Technical Advisor) via email at least two workdays in advance of the milestone delivery date asking to arrange for their input regarding project feedback, and completing their Customer Evaluation Cover Sheet.

   b. Make necessary assumptions you need to make on your Customer's input and present these assumptions in your milestone delivery.

   c. With your emails to your Customer (and your Technical Advisor) attached documenting that you made a due diligence attempt to get their feedback, deliver the milestone on schedule. Demo all test cases that you have completed for the milestone to your instructor. Do not present the email(s) as part of your slide presentation. Print and attach email(s) to the physical copy of your slides.

   d. Your pending Customer Evaluation will be assumed to be "Meets Expectations" in each category and will result in an interim grade for the milestone until your Customer Evaluation is submitted.

   e. Turn in your Customer Evaluation Cover Sheet (and either a joint or separate Customer Evaluation Cover Sheet from your Technical Advisor) to your instructor once those are provided to you. These will be combined with your interim grade to determine your final milestone grade.

ii. **If you did not contact your Customer and Technical Advisor at least 2 workdays prior** to the milestone delivery and were unable to meet with them, this will be viewed as a planning shortfall on the part of the team.

   a. Your team will incur a 25 point penalty on your milestone grade.

   b. Make necessary assumptions on Customer input, turn in and present your milestone (to include a discussion of assumptions you made), and then follow up with your Customer and Technical Advisor to solicit their input after the presentation.

iii. **Lateness.** All milestones must be delivered in order to pass the course.

Milestone Focus Area (note that focus areas will change in subsequent milestones):
Customer Involvement Alert: For the purposes of your prototypes for this milestone, focus on the portions of your project that your team and your Customer agree would be the most beneficial for which to develop prototypes.

- The purpose of a prototype is to get feedback from your Customer on what they need the project to do, so your prototypes for this milestone are to be targeted towards clarifying uncertain requirements of your system.

- Do not tackle simple parts of your system (such as a login screen) as a prototype, rather, focus on the parts of your project that contain a good bit of uncertainty (on your and/or your Customer’s part).

Milestone _____ Team _____
(the above filled in by the team)

Deliverables checklist (see below for more info on each of these items). Be prepared to present the below, in order, during your milestone delivery.

- Checklist (a copy of this deliverables checklist sheet)
- Customer's Evaluation Cover Sheet completed by Customer (and Tech Advisor), or, copies of emails showing your attempts to contact them at least two days prior
- Intro Slide
- Concise Project Overview
- Functional Requirement's Trace Table
- Customer meetings summaries and action items (with lead mid for each action item identified)
- Project Planning Gantt Chart
- Prototype
- Assigned Software Engineering paper presentation
- Paper copy of milestone presentation ready at start of period
- Email milestone presentation slides to instructor with subj: Group X, Milestone Z as the subject line

Milestone Deliverables Paper copies of your slides must be turned in to your instructor *prior* to beginning your oral presentation.

1. **Admin (Administration).**
    a. **Customer's Evaluation Cover Sheet**. Attach (but do not present) a copy of the Customer's Evaluation Cover Sheet (see the course Resources page), with the top portion filled in by the team, to the top of your paper milestone deliverables. For un-initialed or missing Customer's Evaluation Cover Sheets at the start of a milestone delivery, the Customer's evaluation will be assumed to be the lowest score in each category, which will impact your milestone grade.
        i. **Milestone Lead:** For all milestones, your team must identify a team member who is tasked with making sure all deliverables set forth in the milestone description are ready to be presented on the due date.
        ii. The Milestone Lead is NOT tasked with accomplishing all the deliverables, but rather serves as the task master to evenly distribute and oversee the workload amongst the team members (including him or herself).
        iii. The Milestone Lead will rotate for each milestone, and no student may serve as the Milestone Lead for a second time until all other team-mates have taken their turn at being a Milestone Lead.
        iv. Each Milestone Lead is tasked with the following (all relative to the milestone being worked on):
            1. Communicating effectively with the group,
            2. Delegation of tasks such that each team member is responsible for their fair share of tasks,
            3. Displaying a positive and productive leadership attitude,
            4. Reviewing delegated tasks in a timely manner so that the milestone delivery contains all required items and that they are all in good order.

    b. **Paper Copies of Slides.** Include a paper copy of all the slides used in your oral presentation, screen captures (or hand-drawn renderings) of your prototypes, to include any user interfaces (UIs), and a copy of the oral presentation grading sheet (available from the course web page) with your team members names filled in. Turn all of these items in to your instructor *prior* to beginning your oral presentation.

    c. **Miscellaneous.** Anything not covered in the below should be included here in terms of accounting for man-hours spent on this milestone. Discuss each item you included as miscellaneous as part of your workload matrices presentation.

2. **Proj Mgnt (Project Management).**

a. **Intro Slide**. Combine the information contained in the "Title, Customer and Technical Advisor" slide and the "Team Composition" slide from Mile0 into a single introductory slide for your presentation.

b. **Concise Project Overview**. Present the title of your project and a brief (one concise paragraph) overview of your project so that your audience is made aware of your team's overall project focus. Note: As the milestones progress, update your overview as needed to better describe your project.

c. **Functional Requirements Trace Table.** **Customer Involvement Alert**: Interview your Customer and develop and present a two column Functional Requirements Trace Table similar in layout to that shown in Figure 1. In the left column enumerate all the functional requirements (things your system must do) pertaining to JUST the prototype (see Modeling below) that you are developing for this milestone - one functional requirement per row.

   1. In the right column of each row, give a complete set of Acceptance Test Plan test cases that can be objectively validated. As the project progresses, these will be used to explicitly and conclusively show whether or not the operational system indeed meets the indicated Functional Requirement.
   2. Include both normal and abnormal Acceptance Test Plan test cases, and label each test case as such. The set of normal test cases need to demonstrate that the system meets all aspects of the expected uses of the system pertaining to the indicated function requirement, while the abnormal test cases spell out what the system response would be to an unusual state (such as invalid user input, lost signal, etc) that the system could potentially find itself in.
   3. All of the functional requirements you identify must be measurable, testable, related to specific customer needs, and defined to a level of detail sufficient for subsequent system design. For each test case, indicate the expected result that allows the test case to be objectively validated.
   4. Do not include compound requirements (such as "Analyze Input Data" and "Format Output" as one requirement). Instead, split these into two or more Functional Requirements, one for each discrete requirement.

Functional Requirement	**Acceptance Test Plan test cases** (Set of scenarios that, in

	total, show that the Functional Requirement has been met. Include all normal and abnormal uses of the system. Clearly distinguish between normal and abnormal test cases by identifying them as shown below.)
1. Login/Password GUI: Each user must have their own login/password pair that sets their User Role within the system.	1.1 User with correct login/password is able to successfully log in to system. **Expected result ->** The correct User Role is associated with the login/password pair. (*normal*) 1.2 User attempts login with the wrong password. **Expected result** -> User is prevented from logging in. (*abnormal*) 1.3 User indicates they forgot their password. **Expected result ->** System emails a temporary password which user is required to change upon logging in. (*abnormal*) 1.4 …
2. …	2.1 … 2.2 …

Figure 1. Functional Requirements Trace Table

d. Risk Management.

N/A For this milestone.

e. Meetings. These include meetings with your Team, Customer or Tech Advisor (other than meetings whose primary focus is Testing and in which you demonstrate your working source code for your customer - those meetings are to be recorded under the Testing category below). You are reminded to include time spent in such meetings in your workload matrices (under this, the Proj Mgnt category).

f. Customer Meeting Summaries. Customer Involvement Alert => Each team is to

a. Arrange a time during which the entire team can meet with the Customer. For off-Yard Customers, this can be a conference call, Gmail Meetup, Google Hangouts, etc.
b. Take notes at the Customer meetings,
c. Prepare a summary of what was discussed at each Customer meeting to include a list of all action items,
d. Identify which team member is the lead on getting each action item resolved,
e. Have your Customer initial the summary to signify the Customer's concurrence with what transpired at the meeting. Alternatively, you may email your Customer each meeting summary, and have them give their concurrence via email. Summarize ~~Include~~ this email exchange in your presentation, but do not include screenshots of emails in your presentation. Instead, print and attach emails to the physical copy of your slide presentation.

f. In your milestone delivery, include and present all meeting summaries for meetings that have occurred since the last milestone delivery. For each meeting include the date, the names of everyone present, the major topics discussed, and the list of action items with the designated lead Midn for each action item.

g. Project Planning Gantt Chart. Assume that you begin implementing your capstone project in earnest on 1 Nov (ie., your Gantt chart ignores everything that occurs prior to 1 Nov), and that you will continue your implementation through the semester that you take IC480. See the course's Resources page for a Gantt Chart sample using PowerPoint.

A Gantt chart is a project planning tool that lists on the vertical axis the major tasks to be performed during the duration of a project, along with the projected start and completion times of each task along the horizontal axis. There are many online tools to assist in the creation of (sometimes overly complex) Gantt charts, but note that a well-designed Excel spreadsheet using a stacked bar chart view of the scheduling data or even a PowerPoint file will often suffice for most projects. Be sure to retain a copy of this original project planning Gantt Chart as you will need it again this semester as well as during your IC480 semester.

1. Include a Gantt chart for your proposed capstone project that spans both the fall and spring semesters and keeps includes the following deliverables.
    a. 30% Milestone: At least 30% of acceptance test plan test cases met and integrated together. Delivered the beginning of the last week of the IC470 semester. Give a brief two-word description of what major portion(s) of your capstone will be primarily worked on during this milestone (same two-word description applies to all XX% milestones discussed below).
    b. 50% Milestone: At least 50% of acceptance test plan test cases met and integrated together. Delivered the beginning of week 3 of IC480.
    c. 75% Milestone: At least 75% of acceptance test plan test cases met and integrated together. Delivered the beginning of week 6 of IC480.
    d. 100% Milestone: 100% of acceptance test plan test cases met and all system components fully integrated. Delivered the beginning of week 9 (or the week before Spring Break – whichever comes first) of IC480.
    e. Alpha Testing Milestone: Delivered the beginning of week 11 of IC480.
    f. Beta Testing Milestone. Delivered the beginning of week 14 of IC480.

g. Capstone Poster Session Milestone**:** Delivered the beginning of week 15 of IC480.
h. Final Product Delivery Milestone: Delivered the beginning of week 16 of IC480.

2. Each row of your Gantt chart must contain two-word task descriptions that indicate specifically what is primarily being worked on during that time period.
    a. For example, "Terrain Map" would likely be a good row descriptor, while "30% Milestone" would not.
    b. The chart's horizontal axis is headed by columns indicating dates.
    c. The graphics portion of the Gantt chart consists of horizontal bars for each primary task (one task per row) showing the *planned* start and completion dates for the task on each row.
    d. Note that some tasks will need to be split into two or more portions, in particular if one portion of a task cannot be completed until after some portion of another task is completed.
    e. Figure 2 gives a project's Gantt Chart. The Gant Chart shows that the project plan includes developing the Vehicle Interface in two phases, initially in November for 2 weeks and then again in February for two weeks.
    f. Find the USNA academic calendar for the IC470 and IC480 semesters and use those dates in your chart.

Sample Gantt Chart

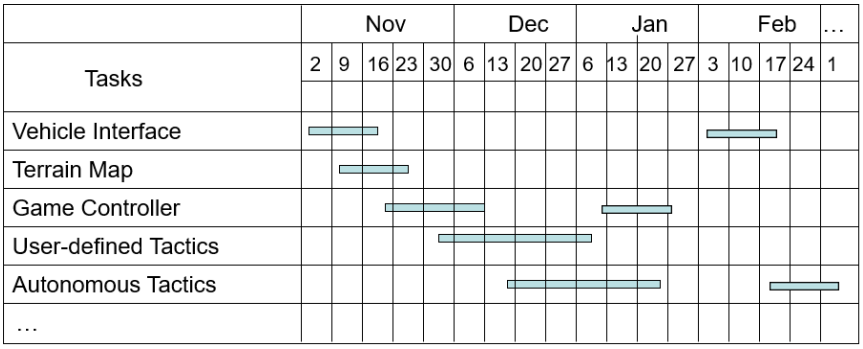

Figure 2. Sample Gantt chart of a project development timeline.

3. **Modeling.**

a. Analysis/Design Artifacts.

N/A for this milestone.

b. Prototypes.

i. In your presentation, discuss the portions of your potential capstone project that you focused on for your prototypes for this milestone. Remember that the purpose of a prototype is to get feedback from your Customer on what they need the project to do, so your prototypes should be targeted towards clarifying uncertain requirements of your system. Do not tackle simple parts of your system (such as a login screen) as your prototype, rather, focus on the parts of your project that contains uncertainty on your part of how you will accomplish them.

ii. Present your prototypes and explain their role relative to your Functional Requirements.

1. Complex User Interface (UI) prototypes may be hand-drawn. Use very dark pencil/ink, scan them, and include them as images in your PowerPoint presentation.
    a. Use straight edges and grid paper as necessary to get a professional looking result.
    b. Such hand-drawn images can be quite effective in getting inexpensive feedback from your customer, especially on the parts of the system for which the Customer's needs (ie., GUI layouts) are unclear.
    c. If desired (by you or your Customer), you may alternatively develop your UI using software/tools such as Java, Visio, etc.
2. If your capstone topic does not contain UIs as complex parts of your system, then instead of a UI, present conceptual hardware, database, or dataflow pictures (may be handdrawn) of the major components of your system and the information that you expect will be moving from one part of your system to another.

iii. **Customer Involvement Alert**: Get feedback from your Customer on your prototypes and present this feedback as part of this milestone.

iv. You do not need to alter your prototypes based on your Customer's input just yet, but you must be able to explain what they want changed and why. Discuss if/how your Functional Requirements will need to change as a result of this feedback from your Customer.

d. Coding (Implementation).

N/A for this milestone.

e. Testing.

N/A for this milestone.

f. Paper Presentation: Emergence of Software Engineering as a Discipline: Each team is to prepare and deliver an oral presentation of an assigned software engineering related paper. See the course's Resources page for which paper your team has been assigned to present. Each team is to present the author's work using appropriate visual aids to include:

1. a title slide (include the exact citation information of your paper)
2. an introductory/background slide (include a discussion of the main focus of your paper),
3. a few slides (no more than 3) that give a detailed discussion of the main points of your paper, and
4. a conclusions slide that summarizes the main takeaway points of the paper.

Paper Number	**Paper** (See the Resources page for which paper your team is to present)
I	F. Brooks, No Silver Bullet, *IEEE Computer*, April 1987, pp. 10-19
II	N. Leveson, Medical Devices: The Therac-25, Appendix from *Safeware: System Safety and Computers*, Addison-Wesley, 1995. **Note**: This is a 49 page appendix, so please limit this part of your presentation to sections 1, 2, and 4 of the paper, as well as your choice of just one of the case studies from section 3 of the paper.
III	M. Fowler, and J Highsmith, The Agile Manifesto, Dr. Dobb's Digest, Aug 2001, available at http://www.ddj.com/architect/184414755.
IV	The Scrum Alliance, The State of Scrum Report, Released: July 2015, available at: https://www.scrumalliance.org (Note: In your presentation define "Scrum," and then discuss what you feel are the three most compelling findings in the report.
V	Ferreira, J., Noble, J., and Biddle, R. 2007. Agile Development Iterations and UI Design. In *Proceedings of the AGILE 2007* (August 13 - 17, 2007). AGILE. IEEE Computer Society, Washington, DC, 50-58.

Notes:

- Each team is to be fully ready to go at the beginning of the presentation period to include handing in a paper copy of all slides and GUI screen shots used in the presentation/software demonstration. Also, each team is to turn in a copy of the oral-presentation grading sheet (available from the course web page), with your team members' names filled in, at the *start* of the period *prior* to beginning your oral presentation. You will have a maximum of 15 minutes to complete your presentation.
- Any team not ready to hand in their paper copies of the above, or to deliver their presentation/demonstration when called upon, will have 10 points deducted from their presentation grade and will go to the end of the presentation cycle for that day. Presentations not delivered during class on the due date will earn a grade of zero, but will still have to be completed and turned in to receive a passing grade for the course. Each team member must participate in all portions of the term project, including *each* oral presentation.