Maintaining an Engineering Notebook (ENB) is considered an engineering best practice. They reduce project and company risks, preserve design decisions, support follow-up and team communications, protect against lost knowledge due to employee departures and reassignments, and in some cases, are essential to maintaining your company’s and/or your own intellectual property rights, especially as they may relate to patents.

This document describes the rationale and guidelines for maintaining an ongoing engineering notebook. It also identifies a mechanism for maintaining a companion binder of reference materials for the project.

History

Leonardo Da Vinci recorded some 13,000 pages of engineering and scientific notes and drawings recording his designs in the 15th and 16th centuries. This was in addition to his numerous famous works of art. Since the early days of the industrial revolution, engineers have maintained logs documenting their objectives, designs and measurements. Today we refer to such logs as “engineering notebooks” or “ENBs” for short.

What is the Rationale for Maintaining an ENB?

You may ask “Why devote time and effort to this? Seems like so much overhead to me and I am not planning to file a patent anyway.”

One answer: “to protect your intellectual property.” For example, engineering notebooks have been used to document patent claims in the US since 1832 and even earlier in Europe. Patents are granted to the first person to invent something, not the first person to file for the patent. So having dated notes and drawings may be more valuable than you think. Although there are differing opinions about the true value of software patents, there are numerous cases where software patents have been used to protect unique ideas or generate large financial awards or settlements.

Possibly a stronger justification for documenting your work is that by doing so, you, your team and your company will significantly reduce project risks. For example, if you forget to document or miss-document a requirement or a design decision, you should be able to track it down in your notebook.

Maintaining an ENB will also make it easier for you to communicate vital information to colleagues and other stakeholders. For example, you might use it to record important problems or possible solutions when they occur to you, and then bring them to the next team meeting or customer session. Or you may be the leader or recorder for a meeting and your job is to distill
the key actions coming out of the meeting and email these to your project team so that everyone is on the same page. Using your ENB to capture information during the meeting will help you with this task.

Another situation that we tend to ignore is the possible departure of a team member. That team member’s current status and design decisions are preserved in the notebook and can be used to pass on the knowledge to others.

**Witnessing and Proof**

For projects that may lead to patents or where the system is “mission critical” (like an air traffic control system), some information and events may need to be witnessed to provide objective evidence that independent verification and validation was accomplished. The company or the customer may require that someone other than the ENB owner date and sign the ENB, either on a periodic basis (say daily or weekly) or at some critical milestone(s). The aim is to provide proof as to when the work was done and if the work and/or the outcomes were satisfactory: for example, when the requirements were finalized; when the demonstration was made; when the customer witnessed and agreed to the successful completion of all required tests. Another example: If a major breakthrough or discovery is recorded, a witness such as an independent QA engineer might annotate something like "performance observed and understood" and affix their name and signature in the ENB.

**Guidelines You Are Expected to Follow** (these are written for bound notebooks, follow them if you use a bound notebook. Online notebooks are fine too. If you choose an online method, follow the intent of the guidelines below)

Capstone students are expected to maintain an ENB and abide by the following guidelines which will be used for course evaluation/grading purposes:

- Notebooks must be permanently bound. A notebook where a page can be surreptitiously added or removed, such as a 3-ring binder, is not acceptable as an ENB!

- Devote the Engineering Notebook to the Capstone Project. If it overflows into a 2nd ENB, clearly serialize the books (#1, #2)

- Turn in your ENB(s) at the end of the project. They will be returned.

- All data is to be recorded directly into the notebook. Notes and algorithms should be done in the notebook, NOT on loose paper.

- Everything must be written in permanent ink. Blue or black ink may be used, but a pencil should never be used since pencil can be erased.
• Clearly label the ENB cover with your name, “CS 499 Capstone” and the date it was opened. Add your project identification / team name once you are assigned to a team.

• Leave several pages at the beginning of the ENB for a table of contents so labeling them (e.g., “TOC” in the middle in the top margin). You can identify and point to key annotations in this way so you (and others) can locate key information quickly.

• Every page must be numbered consecutively to confirm that you have not added or removed pages after the fact.

• Entries should appear in chronological order.

• Start a new page each day you work on the project. At the top of the page clearly indicate the date and hours you worked on the Capstone that day. Write dates in the format Sept 11/05 rather than 9/11/05 (to avoid confusion with Nov 9/05).

• Either one side of each page or both sides of each page may be written on, but it must be done consistently. If only one side of a page is used, an oblique line should be drawn through the blank side of the page.

• At the end of the day, draw a line through any space left on the page and the next day begin on a new page.

• Do not leave any blank pages - if a page is left blank, draw a line through the entire page.

• Similarly, you should not leave large blank areas on a page. Draw an oblique line through such areas.

• In the case of an error, to keep from obliterating the original text, draw a single line through the incorrect item (this is called “red-lining” or “red-lined text”). Do not erase or use correction fluid. Initial and date all such corrections that relate explicitly to customer requirements and critical design decisions.

• If information is summarized or rewritten elsewhere, a reference to that page should also be written next to the red-lined text.

• All work done by the author relating to the project, including visited web sites, readings, research, requirements, design, coding activities, documentation, testing, agenda and minutes/actions of team, sponsor and instructor meetings, etc. should be identified and key ideas/information annotated.

• The notebook is meant to be a permanent record of what has been done. It must be neat enough for someone else to understand what has been done a year or more
later. On the other hand, it need not be a polished document - these are the author's notes, not a document intended for publication.

- The material written into the ENB should not be transcribed from another piece of paper. To be credible, the ENB must reflect the author's original notes.

- If there is some potential that the work being done may have some value, students should have the instructor sign and date the ENB pages that document these significant events.

**Companion Binder of Reference Materials**

Throughout the project you will be collecting critical e-mails, articles, customer documents, relevant technical specifications, interface specifications, etc. The identity (e.g. title) of most if not all of these should appear in your ENB. You should collect these in clearly titled 3-ring binder(s). Use dividers to logically group and order these project artifacts.

**Online ENBs**

Online ENBs are fine:  *(online notebooks are fine (teams can consider Google Docs, Trac, Trello, or some other means of internal communication/collaboration if online)).*