

1. Case Study: Data Not Available

The capstone project was to determine if “justice is blind” by looking at legislation data from judges in Michigan. Students were given links to a website with a database and were able to successfully build a web scraper. Unfortunately, the data did not include key information (race and gender) needed to answer any of the research questions. Some students felt the project “failed,” were frustrated, didn’t know how to proceed and lost motivation.

- What could be done to recover from missing this key data?
- What could the team do to pivot?
- What could be added to your team charter that may help avoid this type of problem?

2. Case Study: Visit from the CEO

The team’s community partner was a very large corporation, and the students had the opportunity mid-semester to give a presentation to the CEO. This was a big deal, and the community partner contact asked the students to give a “practice” presentation a month before the CEO visit. The students were already stressed because this course is a lot of work, and neither of these presentations were required as part of the course milestones. The students figured that these presentations wouldn’t count toward their actual grade, and delayed working on the practice presentation until the last minute. The practice went poorly, and the community partner contact was so unhappy with the students’ work that they cancelled the CEO visit. The students felt relieved that they didn’t have to talk to the CEO, and continued on with the project. The students never told the instructor about the presentation requests, so the instructor was blindsided when the community partner contact complained about the students’ poor performance.

- What was the professional thing to do in this situation?
- What could the team have done differently to address their concerns about “extra” work?
- What could be added to your team charter that may help avoid this type of problem?

3. Case Study: Conference Presentation

The team was asked by their community partner to present their progress at a conference mid-semester. Like the last case study, the students decided that they didn’t want to do any extra work so they told their community partner no – without ever consulting their instructor, who learned that the community partner was unhappy afterwards.

- Are there legitimate reasons for students to refuse to do any extra work (beyond course milestones) when requested by the community partner? What are the potential consequences of saying no to your community partner? What are the potential consequences of saying yes?
- What could the team do to help balance extra work requested by a community partner with the regular workload for this course? What resources or information should the team seek before deciding about a community partner’s request?
- What could be added to your team charter that may help avoid this type of problem in your own team?

4. Case Study: Team Conflict

Two weeks before the final project was due, the instructor received a long email from a student complaining about another team member who they felt was not contributing sufficiently to the project. The email was extremely detailed and documented various interactions that raised concerns within the team throughout the semester – but this email was the first time that anyone told the instructor there were problems. The student wanted the team member to get a lower grade than everyone else, and wanted the instructor to intervene and tell the student that they were not meeting expectations.

- What responsibilities do team members have for setting clear expectations and for holding each other accountable? How could the team have addressed concerns earlier in the semester?
- What is the appropriate role for the instructor when there are conflicts within a team?
- What could be added to your team charter that may help avoid this type of problem?

5. Case Study: Data Overload

The scope of this capstone project was to find freely available data to answer a set of research questions about “Smart Cities.” The problem is that there were too many data sources (for example, WIFI networks, types and locations of businesses, city websites etc.) and none of the data sources was organized with specific information that would answer any of the research questions directly. It would require a lot of work to clean and organize the data, by hand, representing many hours of manual labor. and even after the work was done there was no clear indication that the data would be sufficient to answer their research questions. Students became overwhelmed with the options and had no clear path forward. Unfortunately, the project community partners where not data experts so didn’t have the ability to guild the team who lost a lot of time continuing their search for the “perfect” dataset.

- What are some things the team could do to move forward on the project?
- What could be added to your team charter that may help avoid this type of problem?

6. Case Study: What is the best accuracy?

A capstone team is assigned a classification project (i.e., a project where they are given labeled data and need to use machine learning to train a classifier). After a discussion with the community partner there was consensus that at least 85% accuracy seemed like a reasonable accuracy to do what they needed.

The team got into trouble when they kept trying different algorithms with different hyperparameters and couldn’t get their accuracy above 72%. The team took a long time telling the community partner there was a problem and when they did the community partner was very upset at such a terrible result and told the team to keep trying.

- What was the fundamental technical problem?
- Where were the failures of communication?
- What could be done to better manage expectations?
- What could be added to your team charter that may help avoid this type of problem?

7. Case Study: Not Enough Training Data

A community partner wanted to analyze high dimensional, 3D data of material and build a regression model that connected the data to mechanical measurements. This project included a paper (from the 1990's) that did a similar study that required quite a bit of expensive manual measurements (i.e., no 3D data) of materials and used simple linear correlation.

The community partner wanted to take advantage of the automatic method of gathering data using 3D scanning technology and then use deep learning methods to make an automated model similar to the 1990 paper. Unfortunately, we didn't know until late in the semester that they only had seven (7) 3D models with 7 labeled points.

- What is the “curse of dimensionality” and how does it relate to this problem?
- What is the “rule of 10” and how does it relate to this problem?
- What could be done to better manage the community partner’s expectations?
- What could be done to recover from the lack of data?
- What could be added to your team charter that may help avoid this type of problem?

8. Case Study: Working Alone

Members of a team came to the instructors asking for help with a fellow teammate. The teammate was given the task of building a front-end GUI for their project. The problem wasn't that the teammate was slacking in their role. In fact, you could say that the opposite was true, the teammate was working hard on the GUI and the design of the result looked impressive. The problem the teammate was not sharing everything they needed to get the code working on their own machines and just wanted to work alone. The team was worried the GUI was getting too complex and the teammate was not looping any of the other teammates into the design. Because they didn't understand how the GUI worked, they didn't feel confident that their parts of the project (the back end) were going to fit in or even work with the front end. The teammate didn't seem too concerned and just wanted to work independently from the rest of the team. The team decided to just let the teammate work alone and behind their back built a second GUI backup. In the end they ended up submitting both solutions that really didn't work together.

- Does building a backup GUI seem like the right response to rouge teammate?
- How should the instructor grade a working project from a team that ostracized one of their teammates?
- What are some other ways the team could have addressed their concerns with their teammate?
- What could be added to your team charter that may help avoid this type of problem?



Written by Dr. Dirk Colbry, Michigan State University

This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).