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Empowering Capstone Students in Client Interactions

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Introduction

In the final weeks of a recent Capstone course in software engineering, student teams were asked to give a presentation to the rest of the class about their process. While students regularly present their designs and deliverables for the class, this assignment asked them to "Think of this as almost a mini-TED talk about one aspect of software engineering. Each team should choose one aspect of their work where they can share their experiences and what they learned with the rest of the class." More than half of the teams chose to present on some version of the topic, "Managing Sponsor Expectations." For these students, one of the most important things that they were learning in the Capstone was how to have a productive disagreement with a client/sponsor.

The undergraduate Capstone in Informatics and Software Engineering at the University of California, Irvine matches students with external sponsors. Students spend two quarters developing software for their sponsor. Sponsors range across commercial, non-profit, academic, and government sectors, and vary widely in their level of technical knowledge/skill and in their experience working with students. Students follow both an Agile development approach[1] as well as an "outsourcing model", where they act as a software development and consulting outfit toward the sponsor, while the sponsor provides a liaison ("product owner") to meet with the team regularly and provide design input, feedback, and advice. Teams meet weekly with instructors for project and professional mentorship. Class sessions provide opportunities for lectures, discussion, student presentations, and critique.

Learning goals for the Capstone course focus not only on the technical aspects of software design and development, but also on the practical organizational aspects of software projects. Students are expected to gain experience with all aspects of the software project, including defining project requirements and outcomes, making design and implementation decisions, day-to-day project management, and delivering working software.

Students generally come into the Capstone course with a strong and broad technical knowledge, and are generally well-prepared for the design and implementation work. However, we have found that most students have less preparation for the organizational aspects of their projects. In particular, most student training has been in classroom settings where the structure of tasks is well defined, the expectations are clear, and the instructor is an absolute authority. One skill that is particularly difficult to learn in the classroom but is crucial in organizational life is the ability to say "No" to an authority figure (a manager, employer, client, etc.).

Moments of Disagreement

Research and business literature show the importance of managing client expectations,[2] facilitating client learning,[3] "managing up,"[4] and similar concepts. Client management is a key "soft skill" for people in many fields, including software engineering.[5] Part of learning to manage up is to be able to "disagree [with a superior] in a respectful, productive way."[4] Here, we have identified a number of different situations where students may find themselves in disagreement with their sponsors, including:

- *Effort and Knowledge Expectations.* Even though instructors work to manage sponsor expectations about student preparation and student time commitment, sponsors sometimes expect students to work as if they are professional, full-time software developers with years of experience.

- *Lack of Sponsor Technical Knowledge.* Many of our sponsor organizations do not have internal software development expertise. Students' own technical knowledge often exceeds their sponsor's, leading to situations in which students can see that their sponsor's plans are infeasible, poorly designed, or otherwise problematic.
- *Disregarding Capstone Course Requirements*. Students in the Capstone are expected to fulfill a number of course requirements, but sponsors sometimes do not take into account these aspects of the project. For example, sponsors may want students to prioritize producing software over completing documentation or other required course deliverables. Similarly, some sponsors want to take control over work assignments and schedules, even though allowing students to practice project management is a key learning goal for the course.
- *Late Project Changes and "Scope Creep."* Students are on a strict schedule tied to the academic calendar and need to finish their project work by a specific date. Making significant project modifications can seriously disrupt student work and increases the risk of failure. A common problem in software development projects is "scope creep," in which new features or requirements are added at a late stage. Conflict can also arise due to personnel or business changes in the sponsor organization that lead to changes in project expectations.
- *Unethical or Illegal Requests*. While rare and usually unwitting, there are times when students were asked to do something deemed unethical or even illegal. For example, sponsors may request features that would infringe on intellectual property, create a potential for privacy violations or, most rarely, a suspicious or illegal activity.
- *Bad Sponsor Behavior*. Unfortunately, students in our Capstone have also had experiences where their sponsor behaves poorly. In one case, a Capstone instructor had to intervene when a sponsor liaison yelled at and belittled a student in front of her teammates.

Mentoring to Empower

A key skill that we hope our students will learn is to be able to competently and productively disagree with someone in a position of authority. However, we have found that students tend to feel overwhelmed and unsure of how to proceed when faced with conflict with their sponsor. A goal of our mentorship is to help students feel empowered in these situations. This mentorship involves three key components:

1. Encourage students to recognize their own expertise and the value of their contribution. The students have earned their voice and are expected to use it to improve the project.
2. Help students analyze and present the reasoning behind their position. Encourage students to propose alternative paths forward.
3. Make sure that students know that the Capstone instructors have their best interests at heart and will intervene in egregious cases.

In most cases, sponsors report that the project is improved when students share their opinions, even if they are not in line with the sponsor's. In all cases, working through these kinds of disagreements in the structure of the Capstone course provides an opportunity for students to become more professionally competent.

References

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