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Handout #4
July 5, 2016

Calendar and Readings (July 5)

Lecture 1

I will introduce the topic of the risks of failure in complex systems. I will begin with an overview of Charles Perrow's idea of *normal accidents* and then particularize the discussion to consider how those ideas are manifest in the process of software development, concentrating on the example of the Therac-25 case and the Ariane 5 failure.

Reading: No Silver Bullet.

Study questions:

- The fundamental message in Perrow's *Normal Accidents* is that the chance of massive, unpredictable failure increases with complexity and interconnectedness. What aspects of software development make it particularly susceptible to this type of failure?
- What does Fred Brooks mean by his identification of *essential* and *accidental* difficulties? When you consider your experience in writing programs, to what extent do you feel the difficulties of the programming process arise from each of these categories?

Lecture 2

I will present an overview of classical ethics focusing on two major philosophical perspectives:

1. *Consequentialist theories.* Consequentialist theories, which are typified by the doctrine of utilitarianism defined by Jeremy Bentham and John Stuart Mill, judge the ethics of an action primarily by evaluating the overall effect of that action.
2. *Deontological theories.* Deontological theories, such as those described in Kant's *Metaphysics of Morals,* assess the ethics of an action based on its intrinsic character of the action itself, independent of its consequences.

Reading: Selections from Mill and Kant.

Thought questions:

- Scientists and engineers are often skeptical of philosophical arguments of the sort we will discuss in class. In most cases, it is easy to find counterexamples to philosophical principles, which is certainly the case for the deontological and consequentialist theories of ethics. In the hard sciences, counterexamples invalidate a theory. Why might the situation be different in philosophy?

- Which of the two broad categories of ethics—consequentialism and deontological theories—do you think comes closest to explaining your own ethical decision-making process?

Reaction paper assignment

In "No Silver Bullet," Fred Brooks proposes some possible "promising attacks" on the essential difficulties of developing software:

1) Buy versus build
2) Requirements refinement and rapid prototyping
3) Incremental development
4) Growing great designers

Choose one of these, and provide your assessment as to how likely it would be in successfully attacking the essential difficulties of software development. In particular, I'd like you to analyze his solution from a deontological (i.e. Kantian) as well as from a utilitarian (i.e. Mill's) perspective.

I do not want you to spend hours on this one to two page write-up. What you do need to do is convince me that you've read the material. And, I hope that your writing will help to lead to some productive conversations!