Assignment #1—Risks of Computing

Due: Friday, February 4

For the first paper of the quarter, your task is to write a 5–7 page article describing a historical software failure other than the ones discussed in detail in the reader: the Therac-25 case from the Leveson/Turner article and the “bug heard ’round the world” discussed in the Garman paper. Your article should be addressed to someone who has a general familiarity with science and the use of computers but who may not have any particular expertise in programming. As a model, you might think of your paper as if it were a report in *Science* or a short article from *Scientific American*.

In terms of content, your paper must include discussion of the following issues, although you need not limit yourself to these questions or address them in precisely this order:

- A reasonably detailed and accurate analysis describing the technical nature of the software failure, understandable to someone with the background you expect for your target audience. Identifying the technical reasons for a failure often requires you to consult primary sources written by technical people who are as close to the incident as possible; secondary sources—particularly newspaper accounts—have a tendency to gloss over technical details, sometimes to the point that the explanation is wrong.

- A discussion of the costs of the failure, either in terms of injuries sustained, economic losses, reprogramming costs, or some other tangible measure.

- An assessment of where responsibility for the failure lies. Is it reasonable, for example, to ascribe the failure to programmer error, incorrect specifications, inadequate testing, overly ambitious requirements, unforeseeable events, or some similar cause?

Your paper must also meet the following technical requirements:

- There must be enough material about the case to write a paper that falls within the length guidelines. The page count (5–7) assumes a double-spaced paper set in Times 12 with the default margins in Microsoft Word® (1.25" on the sides, 1" at the top and bottom). If you feel that your topic forces you to stretch these limits, please talk to me first.

- You must be able to integrate material from at least three sources. For example, you might use material from books, a newspaper account, and an electronic newsgroup report.

- At least one of your sources must be electronic. One of the most important such sources is the archive for the *comp.risks* newsgroup, moderated by Peter Neumann. You can read current issues of *comp.risks* using any news reader. The end of each issue describes how to get back issues from ftp://ftp.sri.com/risks. In addition to *comp.risks*, you will find a wealth of information about this topic at various sites on the World-Wide Web.

Finding a topic

Several software failures that might make useful topics are mentioned in the assigned reading. The best source is Peter Neumann’s “Illustrative risks to the public in the use of computer systems and related technology” beginning on page 91 of the reader. Other
sources, however, will describe these incidents in more detail. For example, Peter Neumann has published a book entitled *Computer Related Risks* (Addison-Wesley, 1995). In addition, many textbooks covering the topic “computers and society” (as opposed to “computers and ethics”) have longer sections in this area.

Besides books, there are also conference proceedings, journals, and periodical indices that may prove useful. Among technical journals, the best source is *Software Engineering Notes*, which is published by the ACM special-interest group on software engineering (SIGSOFT). The Garman paper comes from this journal, which also includes occasional digests of software failures.

**Suggestions on style**

Remember that you are writing this analysis as if it were an article in a popular journal like *Science* or *Scientific American*, and not simply as a paper. As such, it is a good idea to look at those sources and see how they present material in a way that makes it easy to understand. Headings, sidebars, and diagrams—which you would not necessarily think to include in an academic paper—are very helpful in this type of writing. It is also very important to keep your intended audience in mind. The readers of your article may not know much about software and how it might fail. You must write to them and should not assume that the only reader is a computer scientist with extensive experience in this area.