

The Struggles with Technology (*or human*)

CSCI3250+3251

Computers and Society + Engineering Practicum

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This lecture is loosely adapted from Chapters 7–8 of “A Gift of Fire”



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The New Use of Information

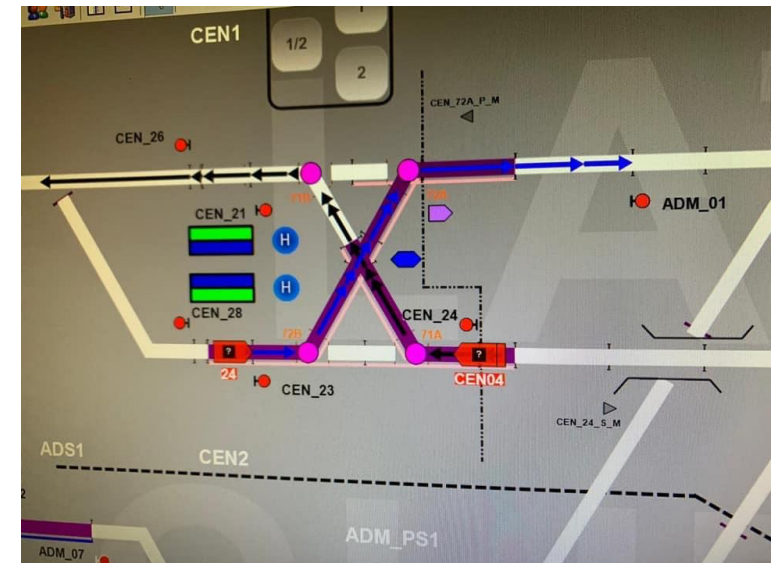
- Evaluating information
 - What is real? What is fake?
 - Why does it matter?
- “Wisdom of the Crowd”
 - Is Wikipedia a reliable source?
 - Who is reliable?
- Presentation of information
 - Rating of everything
 - Who is “powered” to rank the information for you?

The New Use of Information

- Control of our devices and data
 - Remote deletion on devices by manufacturers
 - To avoid spreading of malicious contents?
 - Auto upgrades of software
 - To bring UI enhancements?
- When your data is stored online, who have **total control** of the data?

Failures and Errors

- Incorrect handling of numerical data
- Inaccurate and misinterpreted data
- System failures
 - Hardware
 - Software
- Security flaws



“From the Internet”!

What Goes Wrong?

- Poor communication with client
 - Unclear or incorrect requirements
- Inadequate attention to potential safety risks
- Unexpected interaction with physical devices
- **Incompatibility** of software and hardware
- Unplanned or unexpected inputs or circumstances
- Confusing UI
- **Overconfidence** and insufficient testing
- Reuse of software from another system
- Insufficient market or legal incentives for a better job
- Carelessness
- Hiding problems during development
- Inadequate response to reported problems

What Goes Wrong?

- Data-entry errors
- Lack of risk management
- Inadequate training of users
- Errors in *interpreting* results or output
- Failure to keep information in databases up to date
- **Overconfidence** in software by users
- Insufficient planning for failures
- No backup systems or procedures
- Misrepresentation

Professional Techniques for Reliability

- Development methodologies
 - Safety and risk management
- User interfaces and human factors
 - The system should behave as an experienced user expects
- Redundancy and self-checking
 - Backup systems
- Who to trust? Human or technology?
 - Are we too dependent on computers?

Destroying careers and summer vacations¹²

CTB/McGraw-Hill develops and scores standardized tests for schools. Millions of students take its tests each year. An error in CTB's software caused it to report test results incorrectly—substantially lower than the correct scores—in several states. In New York City, school principals and superintendents lost their jobs because their schools appeared to be doing a poor job of teaching students to read. Educators endured personal and professional disgrace. One man said he applied for 30 other superintendent jobs in the state but did not get one. Parents were upset. Nearly 9000 students had to attend summer school because of the incorrect scores. Eventually, CTB corrected the error. New York City's reading scores had actually risen five percentage points.

Why was the problem not detected sooner, soon enough to avoid firings and summer school? School testing officials in several states were skeptical of the scores showing sudden, unexpected drops. They questioned CTB, but CTB told them nothing was wrong. They said CTB did not tell them that other states experienced similar problems and also complained. When CTB discovered the software error, the company did not inform the schools for many

weeks, even though the president of CTB met with school officials about the problem during those weeks.

What lessons can we learn from this case? Software errors happen, of course. People usually notice significant mistakes, and they did here. But the company did not take seriously enough the questions about the accuracy of the results and was reluctant to admit the possibility—and later the certainty—of errors. It is this behavior that must change. The damage from an error can be small if the error is found and corrected quickly.

CTB recommended that school districts not use scores on its standardized tests as the sole factor in deciding which students should attend summer school. But New York City did so. In a case with a similar lesson, Florida state officials relied on computer-generated lists of possible felons to prevent some people from voting, even though the database company supplying the lists said the state should do additional verification.¹³ Relying solely on one factor or on data from one database is temptingly easy. It is a temptation that people responsible for critical decisions in many situations should resist.

Checkpoint Question

How can this be avoided?