Boeing 737 MAX Case Study

Issues identified by Nancy Levenson regarding Therac 25

- Overconfidence in software
- Confusing reliability with safety
- Lack of defensive design
- Unrealistic risk assessments
- Inadequate investigation / followup of incidents
- Inadequate software and software engineering practices
- Software reuse
- Safe vs friendly user interfaces
- User and government oversight and standards

Which of these issues played a role in the Boeing 737 Max incidents?

1. Inadequate software and software engineering practices
   - Faulty sensors not detected properly
   - Pilots not allowed to do their own checks
   - Should have caught some of these issues in the design phase. Was there even a design phase?

2. Government oversight
   - Govt believed Boeing when they said the planes were safe
   - What does the FAA consider as a “new” plane

3. Overconfidence in software
   - Locking out the pilots and preventing overrides
   - Would be good to have the software explain its actions
   - Using software to fix hardware issues is a bad idea in general

4. Lack of defensive design
• Only two sensors on the plane?
• Didn’t work with pilots in the design phase
• Had other checks and balances that could have been referenced but the system just didn’t use them

5. Pilot training
• Many pilots trained on simulators only
• Pilots previously certified to fly 737s were automatically approved to fly the MAX even though they were different

6. Safe vs friendly user interface
• Locking pilots out of autopilot and forcing override hack

7. Financial motivation
• Profit-driven motivation can put people at risk
• Keeping up with airbus
• Someone had to have final approval on the design.

What should Boeing do? (from students)
• Regulatory body within Boeing to ensure safety? But there is one already. Need to restructure it or fire some people?
  o Every engineer now reports to the lead engineer
• Add more sensors and software to check for redundancy. This fixes the technical side (possibly) but what about public perception?
• (FAA side) More resources to do more complete audit
• Go through design process and revisit best practices. Possibly use 3rd party input here.
• Compensation for crash victims’ families. Boeing did compensate the families $144,000 to each family.
• Cultural issues regarding chain of command. Could you standardize this?
• Get rid of the MAX? Was only the plane model affected and not the company?
• Run more tests than the FAA?
• Be up front with changes to planes. Designate MAX as a new plane
• Publicize how they are fixing the issues. Videos lacked sincerity due to scriptedness.
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