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# Crashing into Law

## Year

1998

## Description

This case dicusses engineering design, risk assessment, mistakes in design and specifically focuse son questions such as: what rules should govern the use of models? and how to protect the interests of science and the public through judicious use of models?

## Body

Part 1

Part 2

In designing aircraft, it is important to understand how an aircraft might be damaged in a crash. This information can be used to create safer planes. Sven Svensen, a graduate student studying under Dr. Ole Oleson, has developed a model that predicts the damage to a 747 after a crash onto a hard surface. Oleson provided the early conceptual ideas, but Sven has done most of the work in developing and testing the model. Sven validated his model by comparing its predictions of damage to the actual damage seen on three 747s that had crashed in mountainous regions.

After a Budgetair crash in the Dismal Swamp, a lawyer approached Oleson. He wanted to know whether Sven's model could be used to show what damage to the aircraft was due to the crash and what might have been due to another cause, such

as explosion or fire. Oleson assured the lawyer that the model should be able to determine the source of the damage. They agreed to a contract, and the lawyer faxed data about the crash to Oleson. Oleson was pleased: The money from this work would help to pay some of his graduate students until an expected grant came through. He was particularly excited at the prospect of more work from the lawyers if this went well.

Oleson called Sven into his office and asked him to run his model using the data from the Budgetair crash. Sven ran his model for the Budgetair plane's speed and altitude and found that the model predicted a damage pattern that differed from that seen on the plane. Oleson then asked him to modify the shape of the plane in the model to conform to the DC-9 that had crashed. This change still produced a different damage pattern. Oleson then suggested they add a soft surface to the model to represent the swampy qualities of conditions in the Dismal Swamp. Sven ran the model with the new parameters and found that the model predicted some, but not all of the damage to the aircraft.

As Sven was leaving Oleson's office, Oleson picked up the phone and called the lawyer. Sven overheard him tell the lawyer that the model showed that some of the damage was not caused by the crash.

Back to Top

# Part 1

That evening, Sven thought about Oleson's assurances to the lawyer that some of the damage was not caused by the crash. He was uncomfortable with Oleson's statement. Sven went into Oleson's office the next day and stated that he did not think the model could accurately establish that the damage was caused by factors other than the crash. He argued that 1) the model was not validated with the new input conditions and 2) the model was not created to rule out damage but rather to describe possible damage.

After Sven stated his case, Oleson replied, "I know the model isn't perfect. However, that is the problem for the defense. I promised the lawyer I could show there was evidence of an explosion. Just print out what damage the model didn't predict and let the lawyers worry about it."

### Discussion Questions

1. Was Sven's model being used inappropriately? Why or why not?

2. Did Oleson have a responsibility to inform the attorney and the court about the limitations of the model?

3. Should Sven try to do something? If so, what?

Back to Top

# Part 2

In an alternate scenario, Oleson stated, "You have an interesting argument, but I am afraid I can't agree. The principles behind the model are slid enough to encompass the new input conditions and still maintain validity. Also, the model predicted all of the crash damage in the validation cases. That is sufficient to justify believing that any damage that is not predicted by the model must be caused by something other than the crash."

Sven remained unconvinced. However, he couldn't seem to change Oleson's mind.

Oleson testified that the damage to the plane could not have come solely from the crash and that a fire or explosion must have occurred.

### Discussion Questions

4. Now Oleson believes in his testimony. Does his belief in the model matter?

#### Notes

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