

## Genesis Spacecraft Crash

September 8, 2004

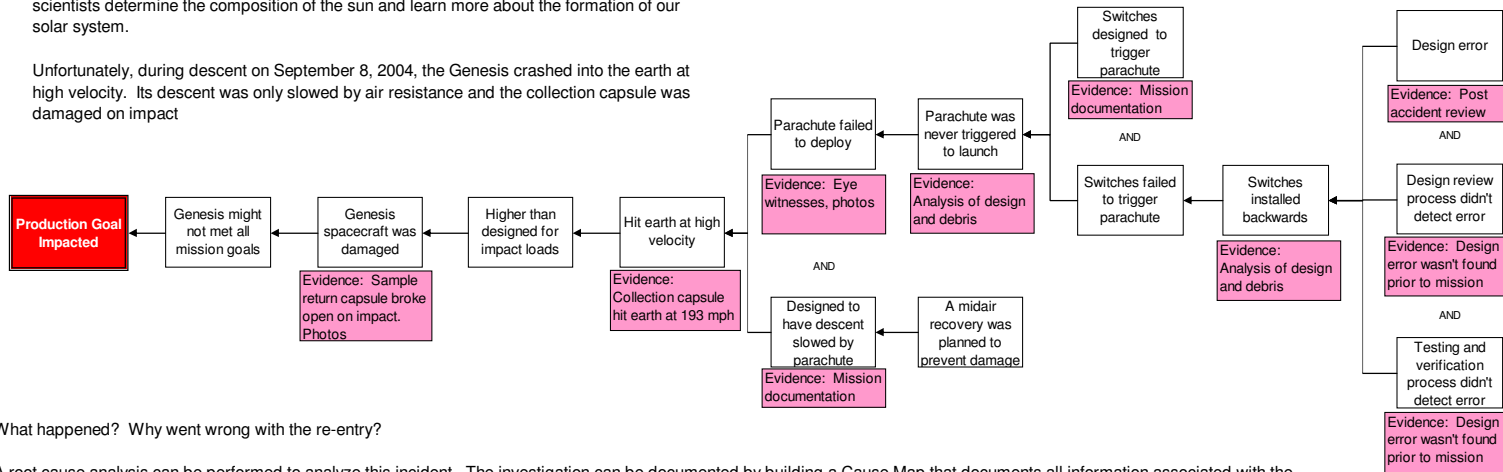
Tooele County, Utah

A thorough root cause analysis built as a Cause Map can capture all of the causes in a simple, intuitive format that fits on one page.

Even more detail can be added to this Cause Map as the analysis continues. As with any investigation the level of detail in the analysis is based on the impact of the incident on the organization's overall goals.

The mission of the Genesis spacecraft was to collect the first samples of the solar wind and return the samples to earth to be analyzed. The goal was to provide fundamental data to help scientists determine the composition of the sun and learn more about the formation of our solar system.

Unfortunately, during descent on September 8, 2004, the Genesis crashed into the earth at high velocity. Its descent was only slowed by air resistance and the collection capsule was damaged on impact.



What happened? Why went wrong with the re-entry?

A root cause analysis can be performed to analyze this incident. The investigation can be documented by building a Cause Map that documents all information associated with the incident in a visual format that is easy to follow.

In this case, the main goal we'll consider is the production goal. The production goal was impacted because the collection capsule was damaged, which had the potential to destroy all the physical data collected during the three year mission.

The investigation can proceed by asking "why" questions and adding the causes to the Cause Map. In this scenario, the collection capsule was damaged because it impacted the earth at high velocity. This occurred because the parachute that was intended to slow the descent to allow for a midair recovery by helicopter, failed to deploy.

Post accident investigation determined that the parachute was never triggered to deploy because gravity switches were installed backwards. The backward installation occurred for several reasons; the design was flawed, the design review process didn't detect the error and the testing performed didn't detect the error.

Luckily, the impact to the production goals has been less significant than it might have been in this case. The collection capsule was cushioned somewhat by the soft ground and while dessert dirt entered the capsule, liquid water did not. The solar wind particles were embedded in the collection materials and the contaminating dirt was able to be removed for the most part. NASA has been able to retrieve significant amounts of data from the mission.

Utah Level



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