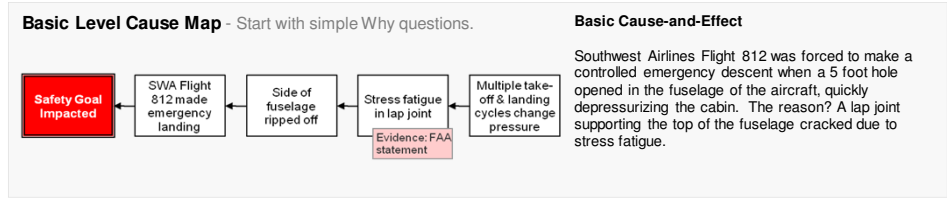


1 Problem

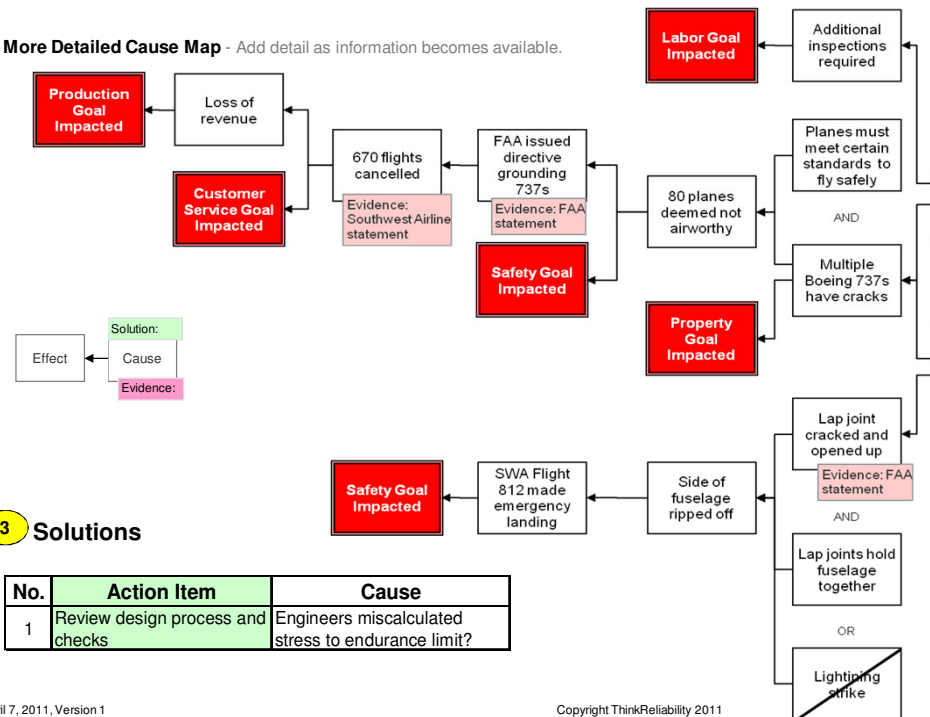
What	Problem(s)	Emergency descent due to hole in side of plane, Airline fleet grounded
When	Date	April 1, 2011
	Different, unusual, unique	Hole in fuselage
Where	State, city	Across United States
	Unit	Boeing 737-300, -400 and -500 aircraft
	Task being performed	Flying aircraft
Impact to the Goals		
	Safety	Plane made emergency landing
	Safety	80 planes deemed not airworthy
	Cust. Service	670 flights cancelled
	Production	Loss of revenue
	Property, Equip, MIs	Multiple planes have cracks
	Labor	Additional inspections required

2 Analysis



More Detailed Cause Map

- Add detail as information becomes available.



3 Solutions

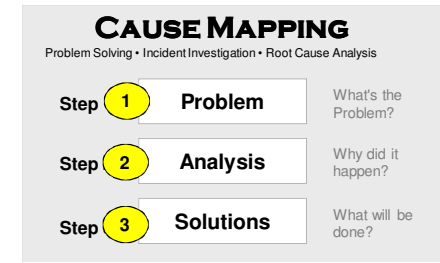
No.	Action Item	Cause
1	Review design process and checks	Engineers miscalculated stress to endurance limit?

GROUNDING THE 737'S

Cause Map Emergency Descent of SWA Flt 812

As new information comes to light, processes need to be reevaluated. A hole in the fuselage of a 15-year-old Boeing 737-300 led to the emergency descent of Southwest Airlines Flight 812. 737's have been grounded as federal investigators determine why the hole appeared.

Cause Mapping is a Root Cause Analysis method that captures basic cause-and-effect relationships supported with evidence.

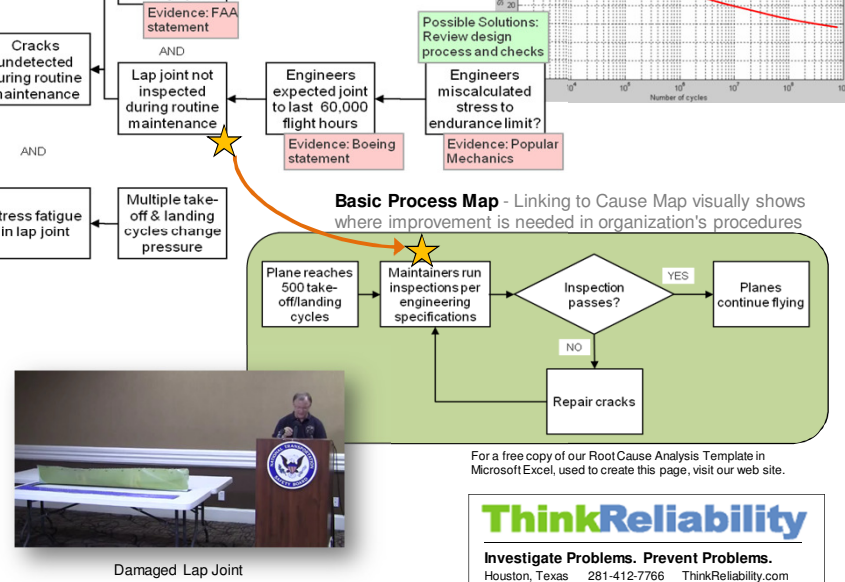
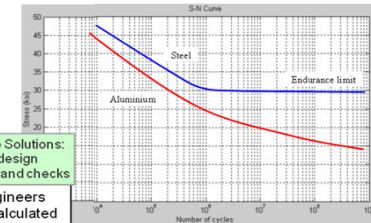


More Detailed Cause-and-Effect

While the investigation is still in the early stages, it appears that stress fatigue caused a lap joint near the top of fuselage to fail. Stress fatigue is a well known phenomenon, caused in aircraft by the constant pressurization and depressurization occurring during takeoff and landing. Mechanical engineers would have been well aware of this phenomenon. The S-N curve, which plots a metal's expected lifespan vs. stress, has been used for well over a century.

Just as a car needs preventative maintenance, planes are checked regularly for parts that are ready to fail. However, the crack in lap joint wasn't detected during routine maintenance. Often the design engineers are also set the maintenance schedule, because they hold the expertise needed. The engineers didn't expect the part to fail for at least 20,000 more flight hours. At the moment, it's unclear why that is.

In response to the incident, the FAA has grounded all similar aircraft and ordered inspections of flights nearing 30,000 flight hours.



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