Step 1. Outline the Problem

Washington Metro Train Collision
November 29, 2009

What	Problem(s)	Metro train collision, derailment
When	Date	November 29, 2009
	Time	4:27 a.m.
	Differences	"Mechanical and electrical issues" with 5000 series cars
Where	Physical Location	West Falls Church rail yard, Virginia
	Unit/Process/Equipment	5000 and 1000 series cars

Impact to the Goals

Safety	3 workers injured (not seriously)	
Property	3 cars damaged beyond repair ($3 M to replace each car)	$9 M
	Damage to other 9 cars	Up to $36 M
	This incident	>$9 M
Frequency	At least 5 Metro incidents this year	
	Annual Total	?

In the early morning hours of Sunday, November 29th, after the Washington D.C. Metro shut down for the night, train 902 pulled into the West Falls Church station for cleaning. However, instead of stopping just behind the parked train already on the tracks, it rammed into it.

We can put this incident into a Cause Map, or a visual form of root cause analysis. 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. The first step in the Cause Mapping process is to outline the problem. After entering the "what, when and where" we frame the incident with respect to the Washington Transity Authority's goals.

The operator, plus two other employees who were on the parked car cleaning, suffered minor injuries. This is an impact to the safety goal. The train cars, however, suffered extensive damage. Three of the cars will have to be replaced (at a cost of $3 million per car) and the extent of the damage to the other 9 cars involved is unclear. These are both impacts to the property goal. There may have been other goals that were impacted, but these are the main concerns.

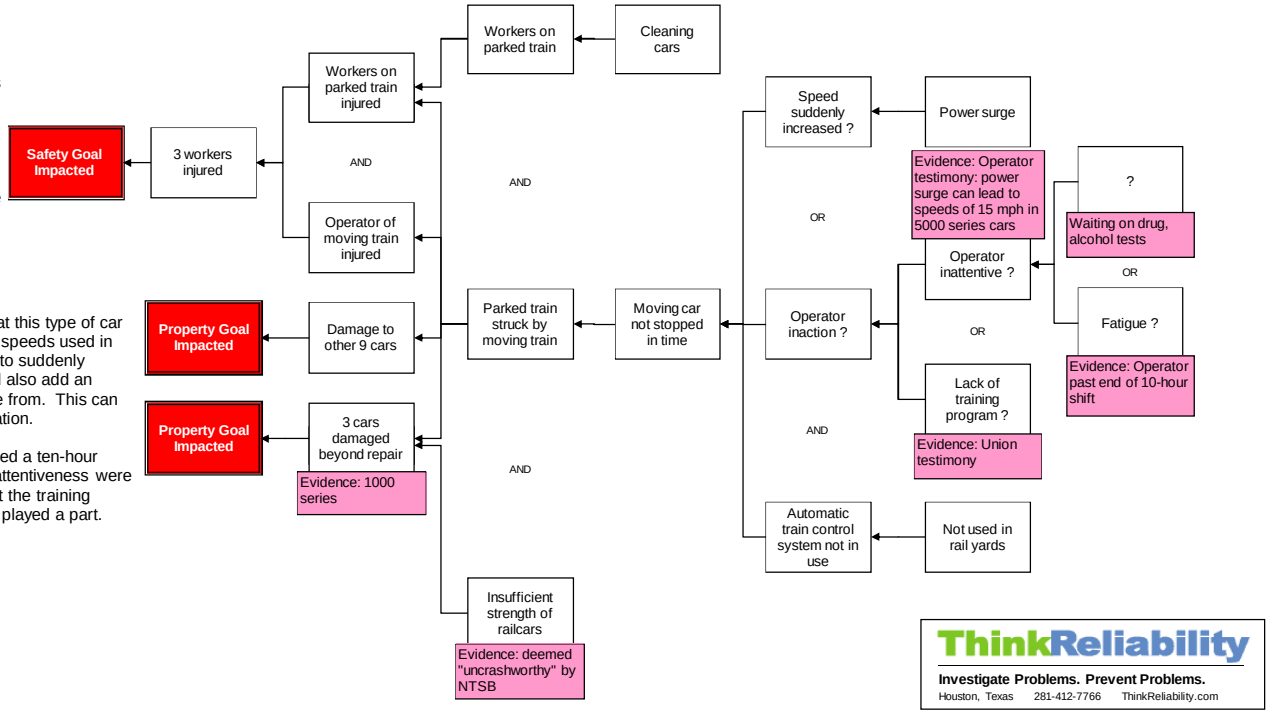
Step 2. Cause Map

Detail Level

The second step of the Cause Mapping process is the Cause Map itself, or the analysis of the problem. To fill out the Cause Map, we begin with the goals that were impacted and ask why questions. The injuries and damage were caused by the parked train being struck by a moving train. The moving train was not stopped in time because the automatic train control system was not on (it's not used in the railyard) and the speed suddenly increased, OR
the operator wasn't paying attention. (We don't know yet, at this point of the investigation.)

Another train operator has come forward to say that this type of car suffers from power surges at low speeds (such as speeds used in the rail yard), which could have caused the speed to suddenly increase. We add this information to the map, and also add an evidence box showing where the information came from. This can be invaluable when sorting through a lot of information.

Although it is known that the operator had surpassed a ten-hour shift, it's not known if fatigue or other causes of inattentiveness were involved. A union representative has asserted that the training program was unsatisfactory, which may have also played a part.



Why?

Effect ← Cause

NOTE: Read the Cause Map from left to right with the phrase "Was Caused By" in place of each arrow.

As the National Transportation Safety Board (NTSB) and the Transit Authority continues their investigation, more detail can be added to this Cause Map as the analysis. 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.