

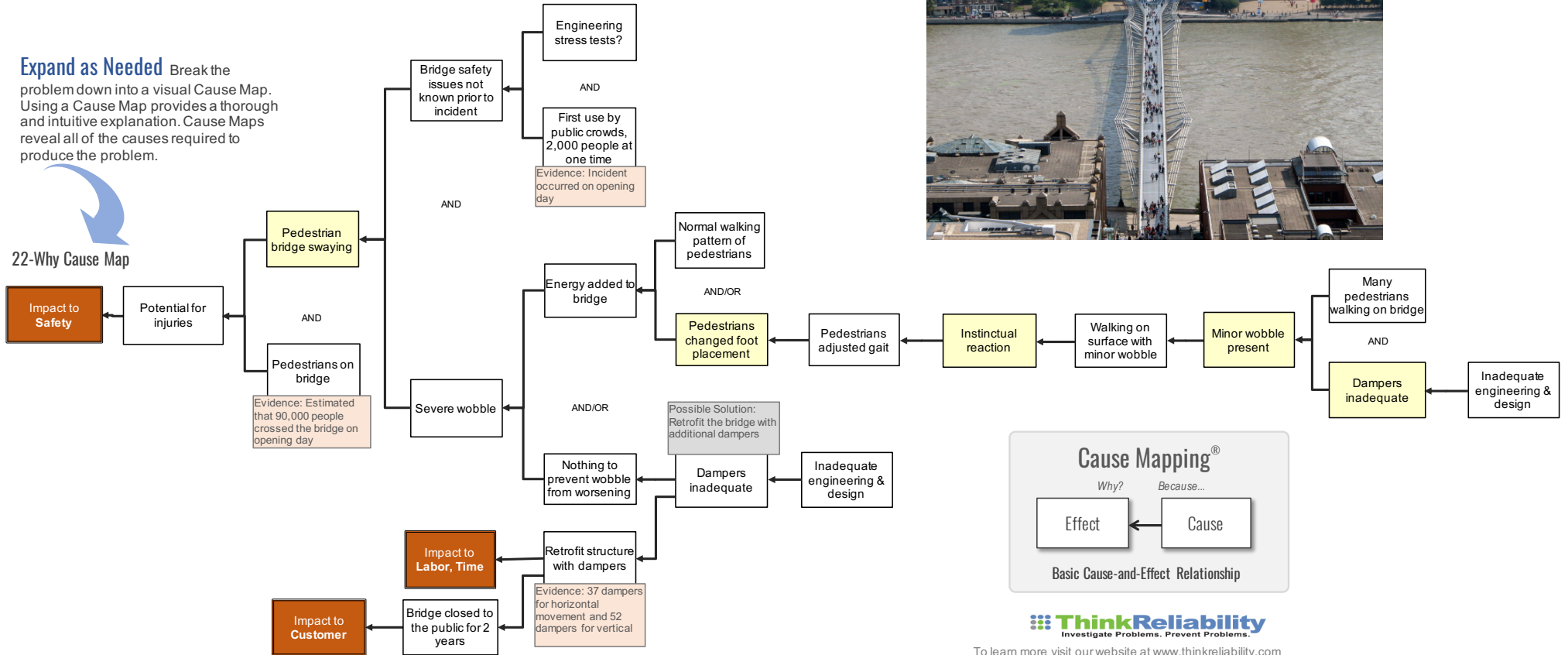
Millennium Bridge Wobble

The London Millennium Footbridge opened to the public on June 10, 2000. It was 320 meters long and crossed the River Thames. Pedestrians walked across the bridge and, to their surprise, it began to sway. While some bridge sway is normal, the swaying got larger and larger until it was deemed unsafe. Luckily there were no serious injuries, but the bridge was immediately closed. Although the bridge was designed to withstand wind and weight, the engineering design did not factor in human behavior.

When the surface beneath our feet becomes unstable, we instinctively widen our stance. In this case, when pedestrians widened their stances, they inadvertently added energy to the bridge's already present small wobble. The pedestrians were acting as a negative damper on the bridge. Thus, the small wobble turned into a large wobble. However, it was recently discovered that this is not the only cause of bridge wobble. Pedestrians walking randomly and normally can also cause bridge wobble.

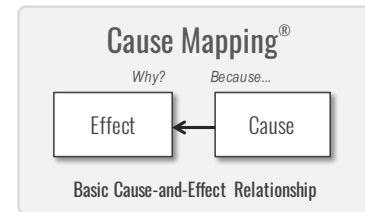
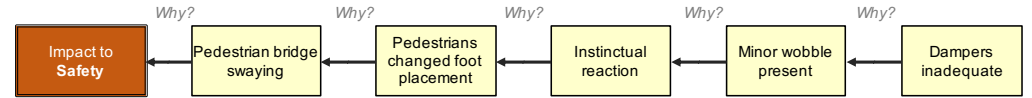
Expand as Needed Break the problem down into a visual Cause Map. Using a Cause Map provides a thorough and intuitive explanation. Cause Maps reveal all of the causes required to produce the problem.

22-Why Cause Map



Start Simple Start with one goal that was impacted and ask why that goal was impacted. Investigating a problem begins with the problem and then backs into the causes by asking Why questions. If there were multiple goals impacted, you can start a 5-Why with any of them.

5-Why Cause Map



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