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

**Step 1. Problem**

**Step 2. Analysis**

**Step 3. Solutions**

What's the Problem? Why did it happen? What will be done?

## Cause Mapping

**Problem Solving • Incident Investigation • Root Cause Analysis**

**Antares Cargo Rocket Explodes Seconds After Launch**

Russian engines from the 1960s eyed as possible cause

### Analysis

**Property/Equipment Goal Impacted**

- Cargo rocket exploded
- Cargo rocket destroyed
- Damage to launch pad and facility

**Customer Service Goal Impacted**

- Negative publicity for space programs
- Investigation/clean-up effort

**Safety Goal Impacted**

- Potential for injuries

**Labor/Time Goal Impacted**

- Investigation/clean-up effort

**Economic Goal Impacted**

- Company's stock price fell
- Ability to self-destruct designed into the rocket
- Designed to minimize possible damage

### Problem

- What? Antares rocket exploded seconds after take-off
- Where? Wallops Flight Facility, Virginia
- Different, unusual, unique? Yes
- U.S. mission, cargo rocket
- Task being performed? Carrying supplies to the International Space Station (ISS)

### Impact to the Goals

**Customer Service**

- Potential for injuries

**Production/Schedule**

- Delay in delivering supplies to ISS

**Property/Equipment**

- Cargo rocket destroyed

**Economic**

- Company's stock price fell

### Evidence

- Video and eye witness accounts of explosion.
- Company had contract to deliver supplies to ISS.
- Establishment of cargo rockets.
- Flight-termination system engaged.
- Turbo pump malfunctioned.
- Age of engines?
- Evidence: Engines were originally built in the 1960s.

### Solutions

- Problem with main engine?
- Turbo pump malfunctioned?
- Evidence: Initial findings from investigation of data from rocket prior to explosion.
- Evidence: Video of launch shows change in plume of one engine prior to explosion.

### Why?

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

For a free copy of our Root Cause Analysis Template in Microsoft Excel, used to create this page, visit our website.


Both photos are from the NASA website.

Installation of the rocket's payload fairing by Orbital Sciences Corp.'s Antares rocket on Oct. 23, 2014.