**Problem**

**What**
Hurricane Katrina devastated New Orleans, 1100+ fatalities, levees failed to protect low lying areas, evacuation and rescue/response ineffective

**When**
Date: August 29, 2005

**Where**
State, city: New Orleans, LA

**Task being performed**
Preparation and response to Category 3 hurricane

**Impact to the Goals**

- **Safety Goal Impact**: 1100+ fatalities
- **Environmental Impact**: Significant impact, beach erosion, contamination of Lake Pontchartrain
- **Community Impact**: Significant impact - loss of homes, displacement
- **Production-Schedule Impact**: Significant impact to economy, significant unemployment
- **Property, Equity, Wtr Impact**: Significant damage to homes, infrastructure, businesses, etc.
- **Labor, Time Impact**: Significant rescue and clean-up efforts

**Frequency**: First time levees failed, location of city makes exposure to hurricanes frequent

**Problem(s)**
Hurricane Katrina devastated New Orleans, 1100+ deaths, levees failed to protect low lying areas, evacuation and rescue/response ineffective

**Devastation in New Orleans**

- On August 29, 2005 Hurricane Katrina, a large Category 3 hurricane, hit the coast of Louisiana. Although it was not a direct hit to New Orleans, as feared, the impact of the hurricane storm surge, the failure of the levee system to hold back flood waters, and the ineffective evacuation and rescue of city residents made the impact on the city a devastation that has had lasting effects.

**Safety Goal**

- **Goal**: Protect low lying areas
- **Effect**: People drowned, impact of storm surge
- **Cause**: 80% of New Orleans flooded
- **Solution**: 1100+ fatalities

**Analysis**

Basic Level Cause Map - Start with simple Why questions.

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**Impact to**: First time levees failed, location of city makes exposure to hurricanes frequent

**More Detailed Cause Map** - Add detail as information becomes available.

**3 Solutions**

<table>
<thead>
<tr>
<th>No.</th>
<th>Action Item</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Review elevation data and correct levee heights where needed</td>
<td>Some floodwalls not high enough</td>
</tr>
<tr>
<td>2</td>
<td>Use 1.4-1.5 as safety factor in all future design projects</td>
<td>Margin of safety in design too low (1.3)</td>
</tr>
<tr>
<td>3</td>
<td>Increase pump capacity to cover 100 year rainfall event and levees overtopping</td>
<td>Pumps' design capacity too low</td>
</tr>
<tr>
<td>4</td>
<td>Order emergency evacuation 30+ hours prior to landfall to allow adequate time for evacuation</td>
<td>Emergency evacuation order issued late</td>
</tr>
<tr>
<td>5</td>
<td>Require emergency response experience for anyone filling FEMA director role</td>
<td>Lack of experience</td>
</tr>
<tr>
<td>6</td>
<td>Redirect funding back to natural disaster preparedness</td>
<td>Resources directed away from FEMA</td>
</tr>
</tbody>
</table>

**HURRICANE KATRINA**

**Devastation in New Orleans**

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