Advances in Early Warning

EERI Annual Meeting & National Earthquake Conference

John McPartland, President BART Board of Directors
Location: Memphis, Tennessee
Date: April 12, 2012
San Francisco Bay Area

Advances in Early Warning

EQEW + BART = MCI – CA

Earthquake Early Warning + BART = Mass Casualty Incident – Catastrophe Avoidance
Advances in Early Warning

Defining the Equation:

\[ EQEW + BART = MCI – CA \]

Earthquake Early Warning = Seismic Advanced Notice
BART = Bay Area Rapid Transit
Mass Casualty Incident = More Patients Than Rescuers
Catastrophe = Disaster with Infrastructure Collapse

MCI EXAMPLE: 1989 LOMA PRIETA EARTHQUAKE
Advances in Early Warning

MCI EXAMPLE: 1989 LOMA PRIETA EARTHQUAKE
WAS THIS AN MCI? ABSOLUTELY!

Advances in Early Warning

CATASTROPHE EXAMPLE: 2005 HURRICANE KATRINA/SUPERDOME
Advances in Early Warning

**CATASTROPHE** 2005 HURRICANE
**EXAMPLE:** KATRINA/SUPERDOME

**WAS THIS A CATASTROPHE?**
**THIS WAS A MASS TRANSIT AND PLANNING FAILURE.**

---

Advances in Early Warning

**CONSIDER THIS:**

---
CONSIDER THIS:
A crowded bus can hold 80+ people.

What would happen if:
This bus ran off the road – at 70 MPH?

CONSIDER THIS:
Crowded BART Car
Crowded BART Car

CONSIDER THIS:
At “Peak Commute” each BART Car carries over 100 passengers.
There are 10 Cars on Most BART Trains.

What would happen if:
This BART Train DERAILED – at 70 MPH?

Crowded BART Car

CONSIDER THIS:
What is the Potential for Train Derailments in an Earthquake?
The Higher the Speed - The Greater The Risk!!
CONSIDER THIS:
Using EQEW, trains could begin braking seconds before strong shaking from a major EQ reaches BART.

Slower Trains = Lower Risk for Derailment

64 trains operating during peak commute
Of those: 40-45 trains traveling at 70 mph
How many trains will derail???
How many casualties from derailments?
**Advances in Early Warning**

**BART DERAILMENT POTENTIAL**

Higher Velocities = Greater Risk for Derailment  
Slower Trains = Lower Risk for Derailments

<table>
<thead>
<tr>
<th>SPEED</th>
<th>TIME</th>
<th>2 MPH/SEC</th>
<th>3 MPH/SEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>0</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>68</td>
<td>1</td>
<td>68</td>
<td>68</td>
</tr>
<tr>
<td>66</td>
<td>2</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td>64</td>
<td>3</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>61</td>
<td>4</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td>58</td>
<td>5</td>
<td>58</td>
<td>58</td>
</tr>
<tr>
<td>55</td>
<td>6</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>52</td>
<td>7</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>49</td>
<td>8</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>46</td>
<td>9</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td>43</td>
<td>10</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>40</td>
<td>11</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>37</td>
<td>12</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>34</td>
<td>13</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>31</td>
<td>14</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>28</td>
<td>15</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>25</td>
<td>16</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>22</td>
<td>17</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>19</td>
<td>18</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>16</td>
<td>19</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>13</td>
<td>20</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>10</td>
<td>21</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>22</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>23</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>24</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**CONSIDER THIS:**

When the Next Major EQ Hits the SF Bay Area- 
Roads, Bridges, Infrastructure Are Compromised

What is the Value of a 
Mass Transit (Rail) System in a 
Catastrophic Disaster?

That Will Require A Resilient Rail 
System *and NO DERAILMENTS*
THE CHOICE IS Ours!

We Have The EQEW Technology and Disaster Planning Tools!

Superdome
Katrina 2005

WHAT HAS BEEN

Hayward Fault
Oracle Arena 20??

WHAT CAN BE
Advances in Early Warning

Earthquake Early Warning!

What Can We Do With A Few Seconds Warning?
...As a Person
...As a Family
...In Our Business
...In Our Community

PANEL DISCUSSION