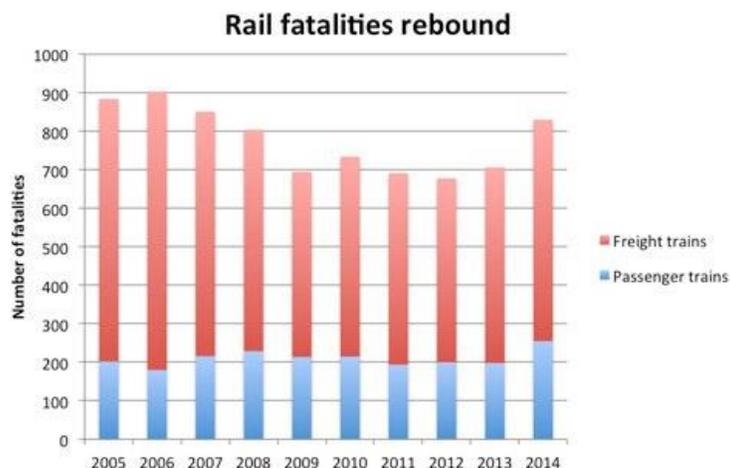# OpenSAP Ideation Challenge - Title of Idea: SmartTrax using IOT Solutions

**Background:** In recent times, travel in locomotives are becoming more affordable and time saving owing to the increased connectivity to remote locations as well as the ease of travelling at short notices. In many developing and developed countries around the globe, rail travel is the main mode of transport as it helps in mass transportation at low costs. Moreover, as the rail tracks become the major conduits for oil, petroleum products, and—not as widely noticed—materials like industrial sand, pipe, and chemicals for the hydraulic fracturing of oil and natural gas wells, some states are grappling with changed train routes, speeds and traffic patterns that spell new hazards for pedestrians and motorists.

**Some Sobering Facts:** With the increased passenger traffic, the frequency, the scale of the rail accidents and the costs of damages seem to only grow. **On an average, in US alone, every year close to 1,000 people are killed in train related accidents.** Additionally, the United States train and railroad accident statistics estimate that almost **every two weeks a train derailment** leads to some sort of chemical spill. Some of these spills, especially those involving hazardous materials, are so serious that they require the evacuation of the surrounding town residents plus closure of schools and businesses, thus resulting in mounting costs in overall losses due to damages.

- Most of the existing technology in rail industry was developed more than 70 years ago, and very little research and improvement has been made to update these dated safety measures. At least the adoption of latest technical solutions seems to be very slow.
- Local governments often have no voice over the train traffic in their area, which can result in delays for local emergency responders.
- According to the DOT's Federal Railroad Administration, about 80% of railroad crossings do not have adequate warning devices.
- Railroads plan record capital spending of $29 billion this year. They'll lay new track, double existing track, buy locomotives and build terminals. But none of this expense would help prevent accidents. On the contrary these would add more rail cars in the circuit!
- The most populous states had the greatest number of train fatalities. California, with **141 deaths**, and Texas, with **65 deaths**, together accounted for **25 percent** of the total. California was one of the few places that most of the fatalities were due to passenger trains. Across the country, **70 percent** of those who died on railroads in 2014, some 575 people, were killed by freight trains.



*Credit: U.S. Federal Railroad Administration Office of Safety Analysis*

# OpenSAP Ideation Challenge - Title of Idea: SmartTrax using IOT Solutions

**Solution:** The issue can be significantly addressed using IOT solutions. My idea would be to implement a cost-effective network of sensors along the tracks that could help transmit data such as rail track temperature, existing weather conditions, moisture in the air/soil, track conditions fed by look-ahead sensors (video/audio range of 1 to 2 mile distances) mounted on the rail engines and carriages, etc. along with other data points. The sensor based IOT solutions could be used for identifying the ambient conditions on the rail tracks and the automated quality inspections of the tracks in a periodic manner. The sensors would continuously send bursts of sensing data back to the central monitoring stations that are housed in the nearest rail stations. This data would be further consolidated at major terminals or a central warehouse wherein additional data analysis could be done to seek insights on prevention of accidents. As the sensor data would indicate some definite wear and tear of equipment or unfriendly weather or soil conditions, the rail authorities can proactively take preventive measures to either slow down or completely stop the rail services until better conditions prevail.

Though this idea is primarily aimed to help the Transportation industry, it could be expanded to also bring in increased effectiveness in other application areas such as Healthcare and Insurance – especially in the aftermath of such tragic accidents.
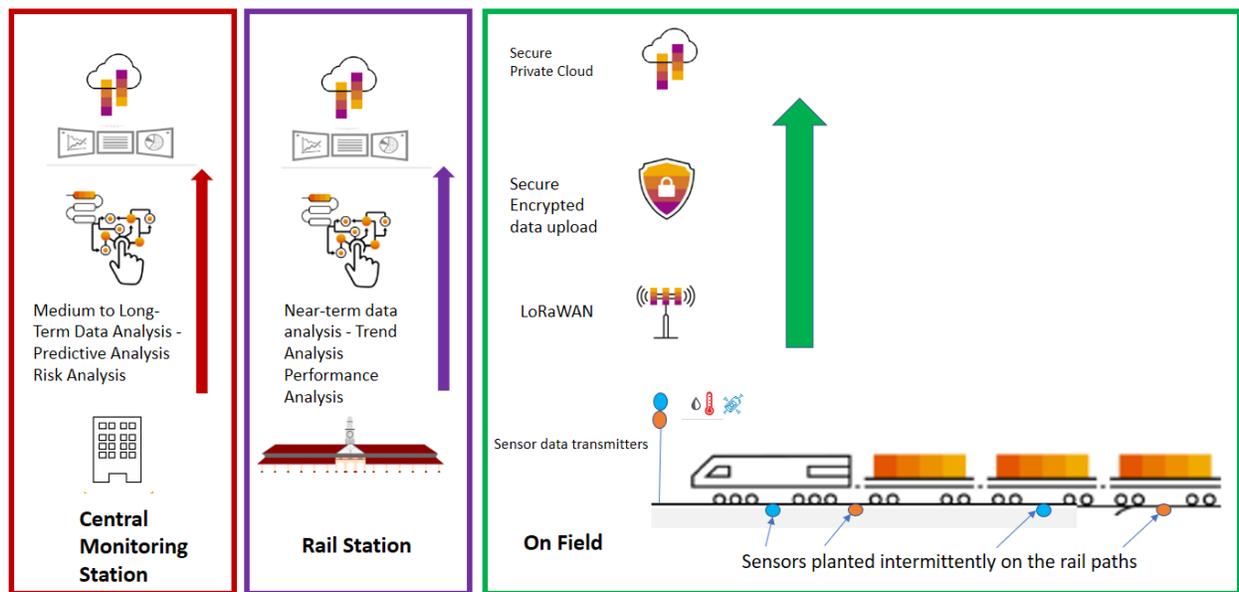


**Schematic Representation of the IOT solution for Railroad Transportation**

**Benefits:** In terms of value, the top three benefits are– a) **Save Precious Lives** - Reduction in loss of life and property due to preventable accidents, b) **Tighter control on Quality** due to having more visibility into areas of repeat occurrences either in hardware or software indicating quality of parts and components and c) **Tremendously lower the costs** of insurance and overall transportation of goods due to decrease in preventable accidents.