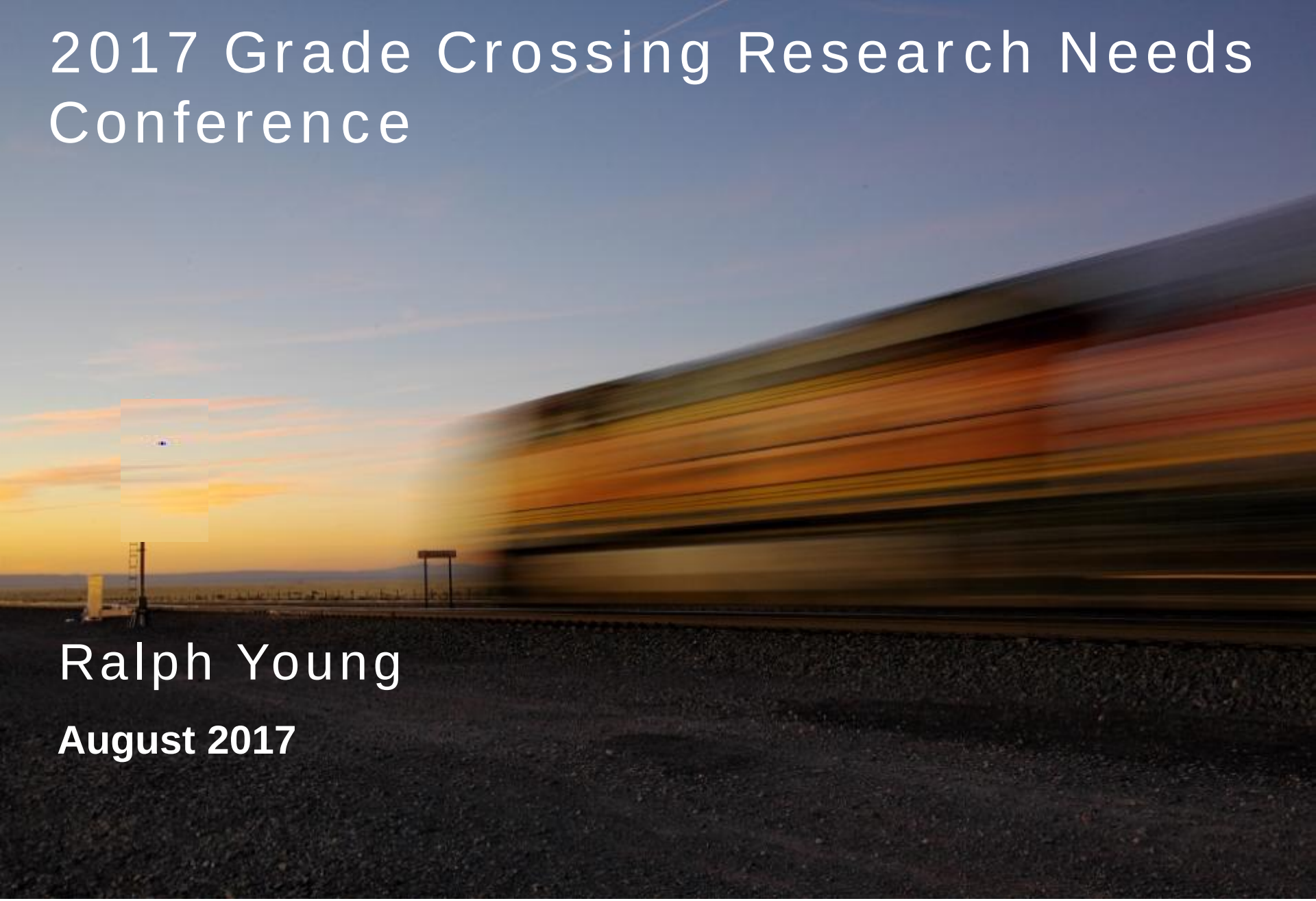
2017 Grade Crossing Research Needs Conference



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Topics

- **Wireless Crossing**
- **Next Generation Technology**
- **Highway / Rail Interconnection**

Wireless Crossing

Conventional Highway Grade Train detection

- **Based 1970's track circuit technology**
- **Custom to each specific road/ track configuration**
- **Expensive to install and maintain**
- **"Loss of Shunt " conditions**
- **Bad ballast conditions**

Wireless Crossing System

System Components:

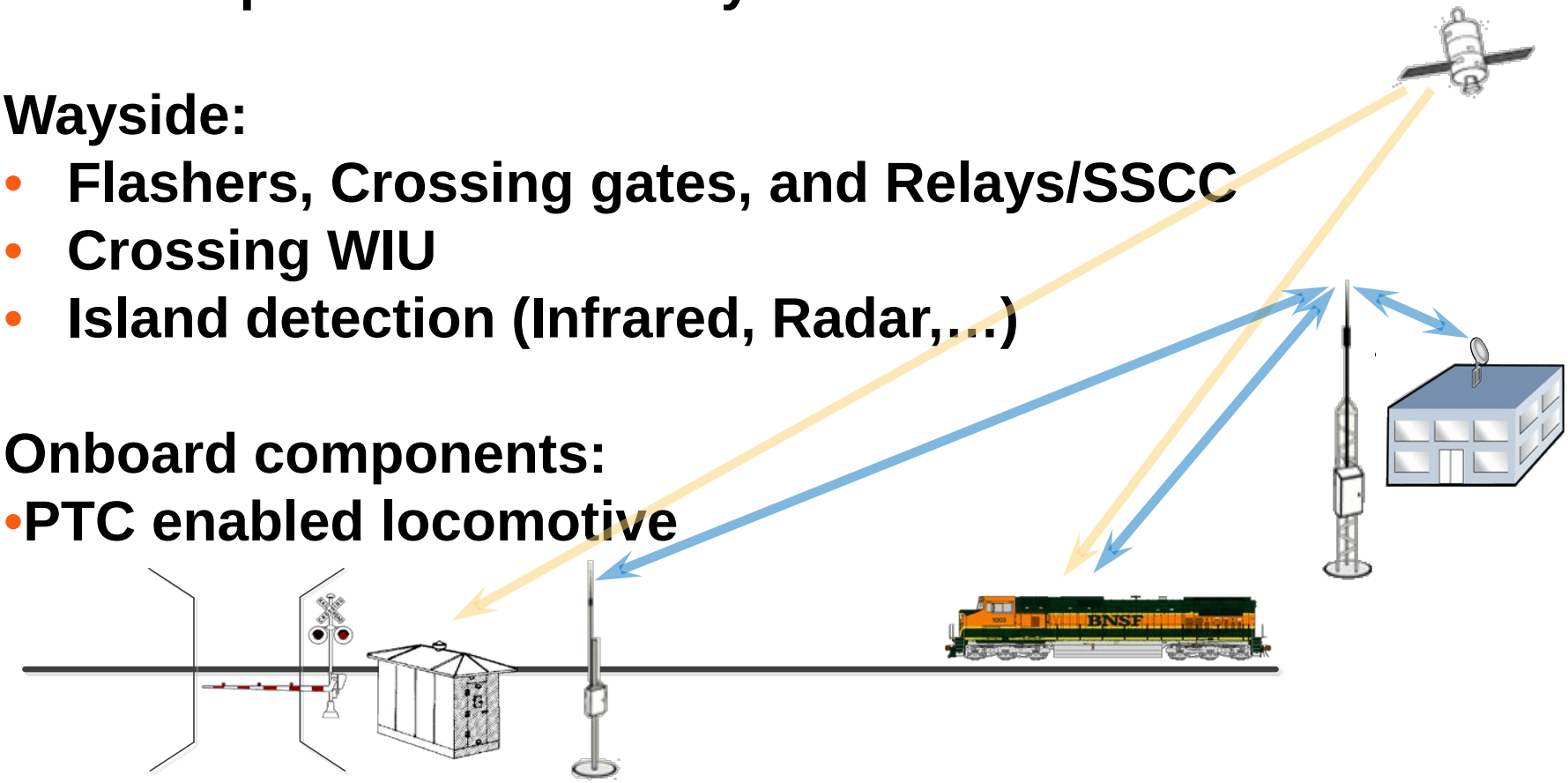
- **PTC Operational Territory**

Wayside:

- **Flashers, Crossing gates, and Relays/SSCC**
- **Crossing WIU**
- **Island detection (Infrared, Radar,…)**

Onboard components:

- **PTC enabled locomotive**



Wireless Crossings

- **Coordinated with Locomotive**
- **Fewer exposures (20,000 annually)**
- **Improved reliability**
- **Continuous remote health monitoring**
- **Lower cost to install and maintain**

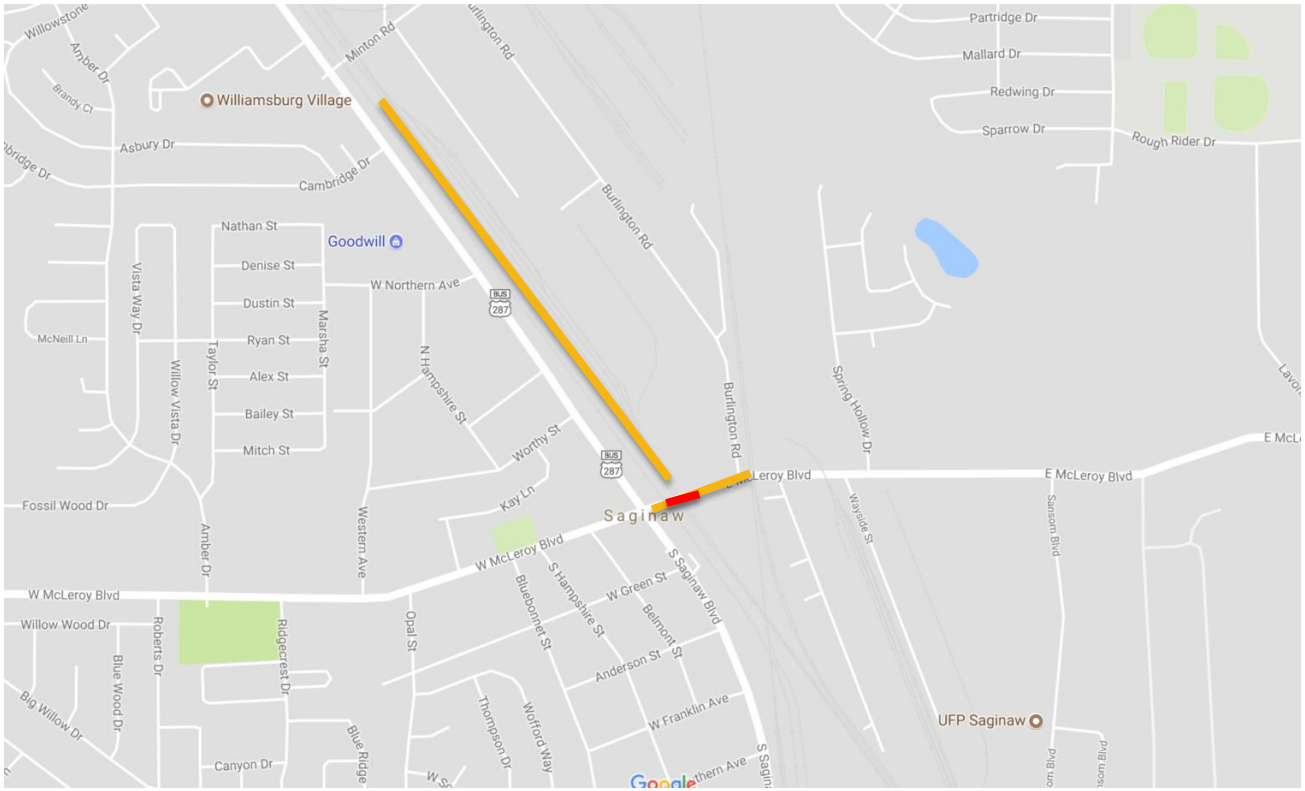
Next Generation Technology

Next Generation Technology

- **Internet of Things**
- **Eliminating the Human factor**

IoT

- **Use train position data to influence drivers to seek alternate routes via GPS based mapping applications**



IoT

- **Train presence information for Emergency Services**
- **Very low cost**

- **Requires common standards and support by**
  - **Railroads**
  - **Traffic agencies**
  - **Application builders**

- **Unquantifiable impact**

Eliminating Human Error

- **62% of highway rail crossing accidents are at crossings equipped with active warning devices**
- **A significant number of these were due to human error of the vehicle operator**

- **Automotive Industry is developing "autonomous" vehicle technology**
  - **Must prevent vehicles from colliding with trains**

Eliminating Human Error

- **62% of highway rail crossing accidents are at crossings equipped with active warning devices**
- **90+%of these were due to human error of the vehicle operator**

Eliminating Human Error

- **Active and /or Passive Warning devices alone will not achieve the goal of eliminating highway rail grade crossings accidents.**

Eliminating Human Error

- **Autonomous vehicles**
  - **Must prevent highway rail grade crossings accidents to be successful**

    Technological Approach:

    Automotive based sensing

    Rail based sensing

    GPS based positioning of both rail and auto

    All would most likely require some universal communications network
  - **Since it is a "must do" where is the priority?**
  - **Can this come ahead of autonomous operation?**

Lead or Follow?

Eliminating Human Error

- **From as safety perspective this must be a universal active system**
  - **Must include the participation of all railroads, all auto manufacturers and all road authorities**
  - **Will likely involve FCC, FHWA and FRA**

Highway / Rail Interconnection

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- **Current FHWA- MUTCD recommendations are not universally applied**

Highway / Rail Interconnection

- **To achieve “Zero”, Safety is not optional**
  - **Safety at Highway grade crossings must be of significant importance and Not be an afterthought**
  - **Safety requirements must applied universally by traffic agencies**

Highway / Rail Interconnection

- **A unified vision for highway grade crossing safety including all involved is critical to achieve zero accidents**