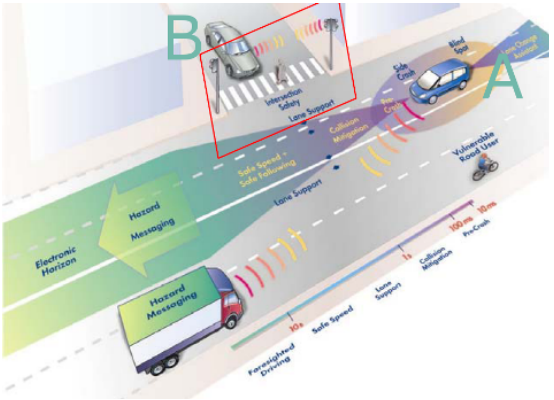
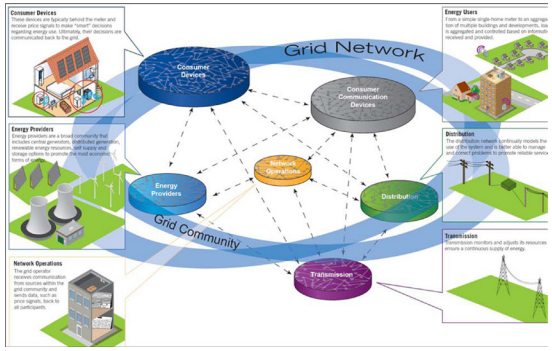
Grand Challenges

- **Challenge**: Verification of Control systems - provably correct algorithms and code
  - Air Traffic Control and UAVs in the NAS - with onboard sensing and limited intent knowledge
  - Automated car on the road
  - Cyber security

- **Challenge**: Performance and robustness of networked systems
  - Next Generation Air Transportation System (**NextGen**) - shift decision-making from ground to cockpit to enable aircraft to fly more closely together on more direct routes, reducing delays.



  - **V2V/V2I** communication-based automotive applications to improve safety, vehicle performance, road network throughput, and reduce environmental impact
    - Network-centric autonomy: enable scalable/sustainable autonomy through communication with other vehicles and the fixed infrastructure
    - Mobility on demand



  - **Smart grids** to improve the efficiency, utilization, and transportation of energy

Grand Challenges

- **Challenge**: Design learning algorithms that yield good, safe performance in a non-stationary world with limited data
  - Enable long-term robotic existence without necessarily requiring significant human intervention

- **Challenge**: Real-time optimization-based control of vehicles to improve efficiency and reduce emissions
  - Next NASA Centennial Challenges for aviation the Green Flight Challenge.
    - Aircraft must meet stringent safety and noise requirements as well as reasonable speed and range.
    - The driving requirement will be to exceed an equivalent fuel-efficiency of 200 passenger miles per gallon.

  - Progressive Insurance Automotive X PRIZE designed to inspire new generation of super-efficient vehicles
    - Cash prize for winning a long-distance stage race for clean, production-capable vehicles that exceed 100 mpg energy