Rotation Spotlight
FCS Distributed Fusion

Josh Clemm

April 1, 2009



Agenda

- Overview of the project
- Why the project is difficult
- Lockheed's solution
- What I did to contribute
- Conclusions and skills learned

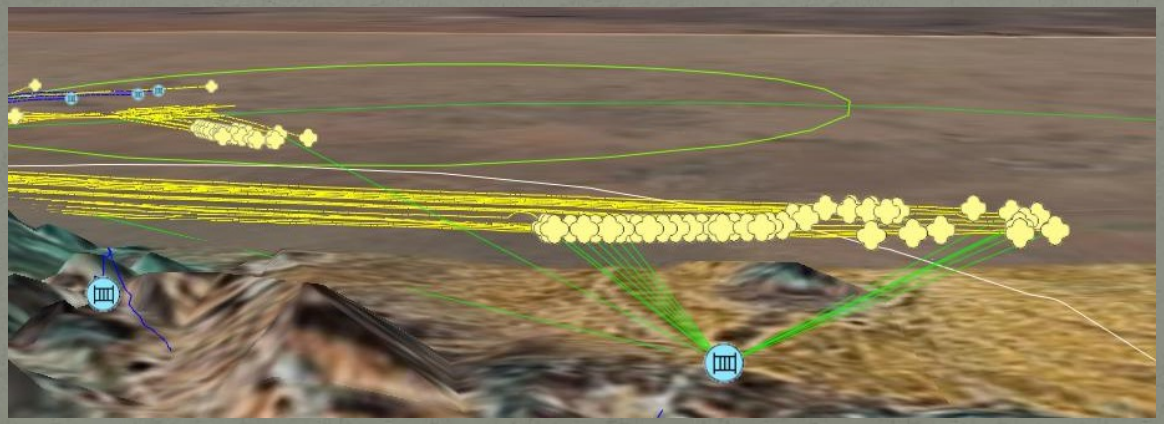
Overview of Project

- Provide a common picture of a battlefield
- Fuse and filter error-prone sensor measurements to improve accuracy
- Manage the movement of vehicles
- Demonstrate TRL6 capability
- Install software at customer site



What makes this task difficult?

- Managing sensor and fusion data flow among many moving vehicles
  - Unpredictable network communications
    - JTRS wireless radios (limited bandwidth, drops packets)
  - Sensor measurement degradation



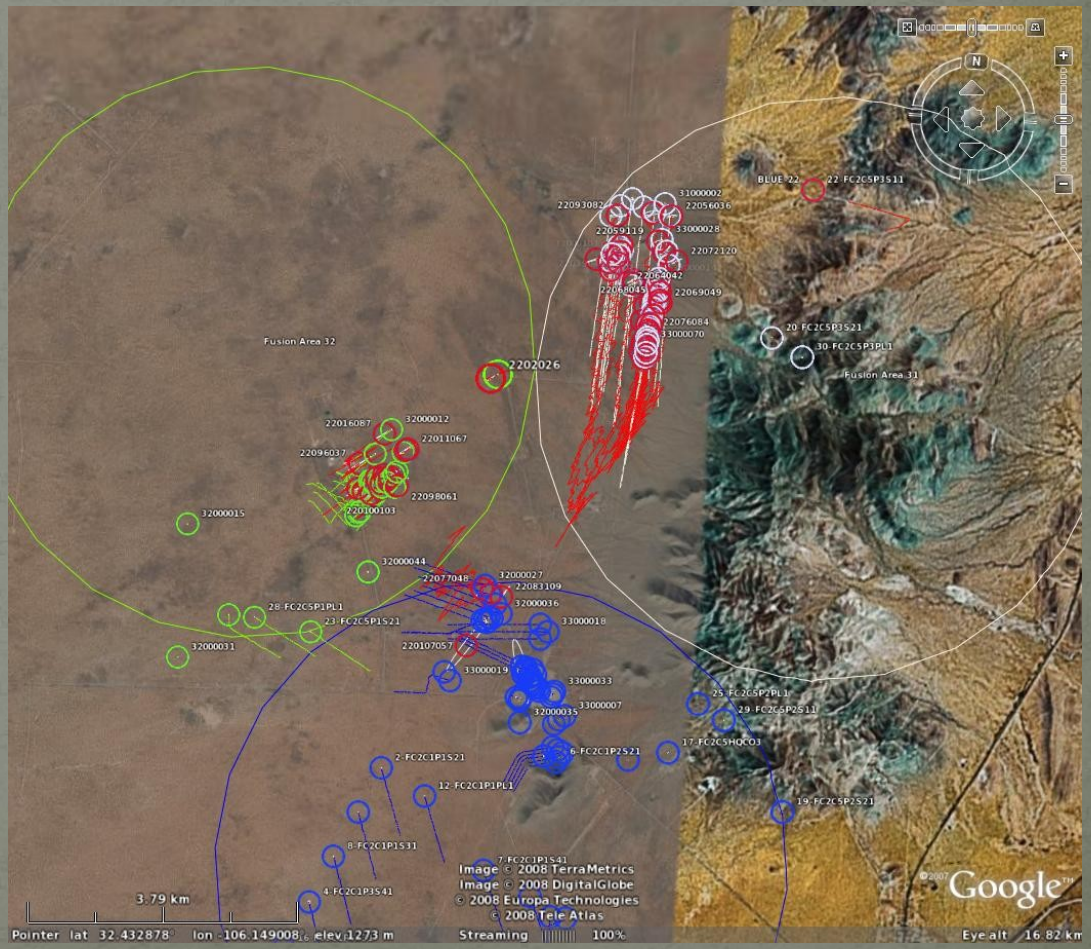
Our Solution

- Use a distributed fusion architecture

- Advantages:
  - Avoidance of potential single points of failure
  - Reduced network traffic
  - Adjust dynamically to changes in battlefield geometry, available sensors, and network failure

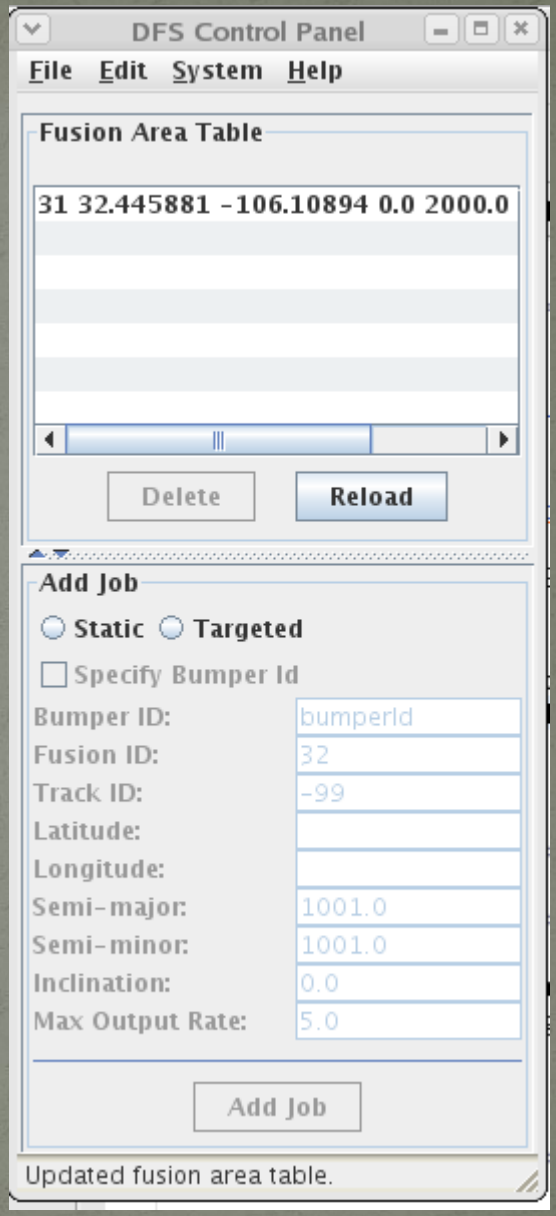
Our Solution (cont.)

- One vehicle only can see part of the picture. (the red tracks)
- A second level of fusion takes each local picture to create a bigger picture. (large circles)



My Role

- Wrote support tools in C and Java
- Wrote scripts in Bash and Perl
- Wrote/tested algorithms to improve track accuracy, lower bandwidth, network error correction

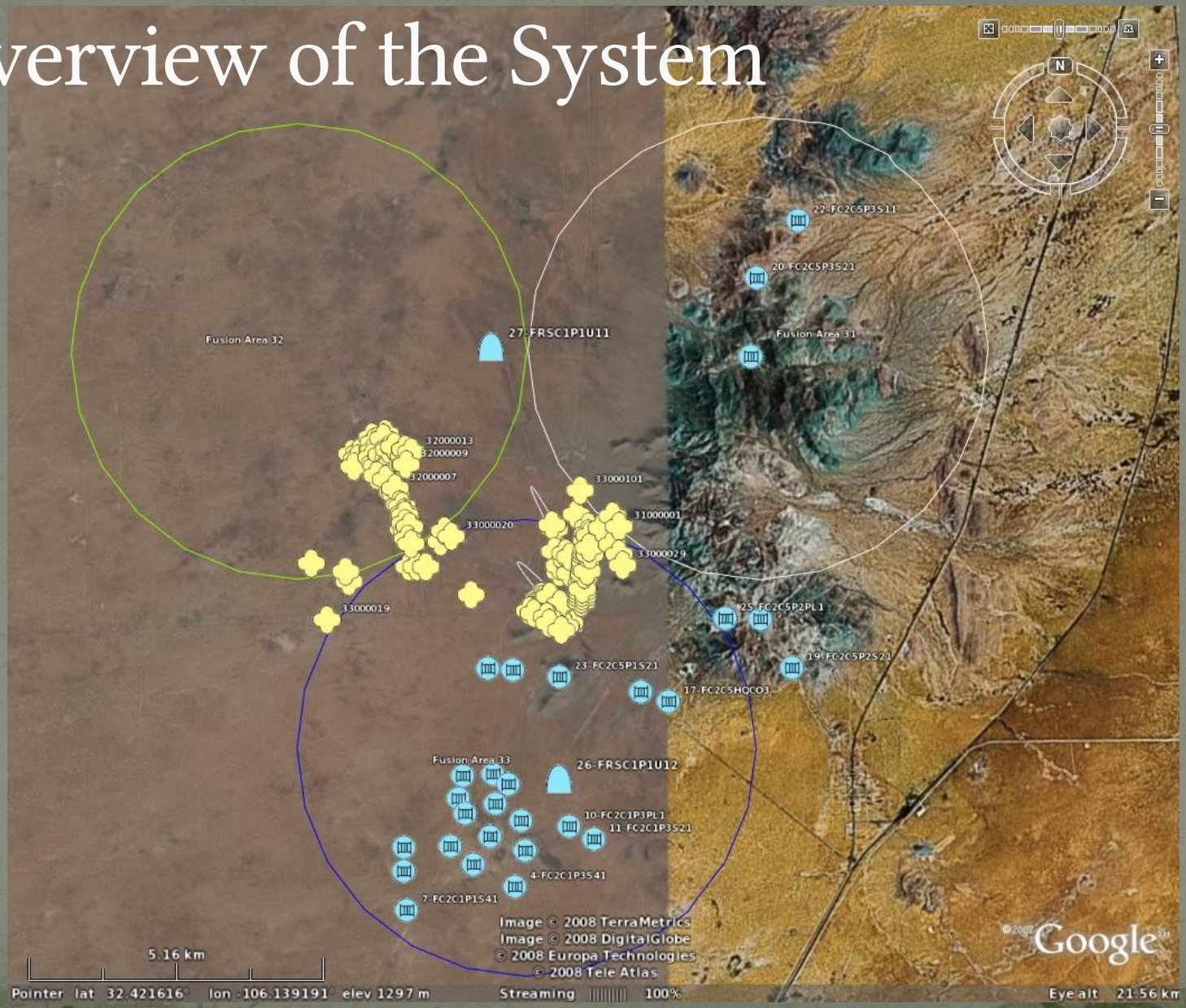


My Role (cont.)

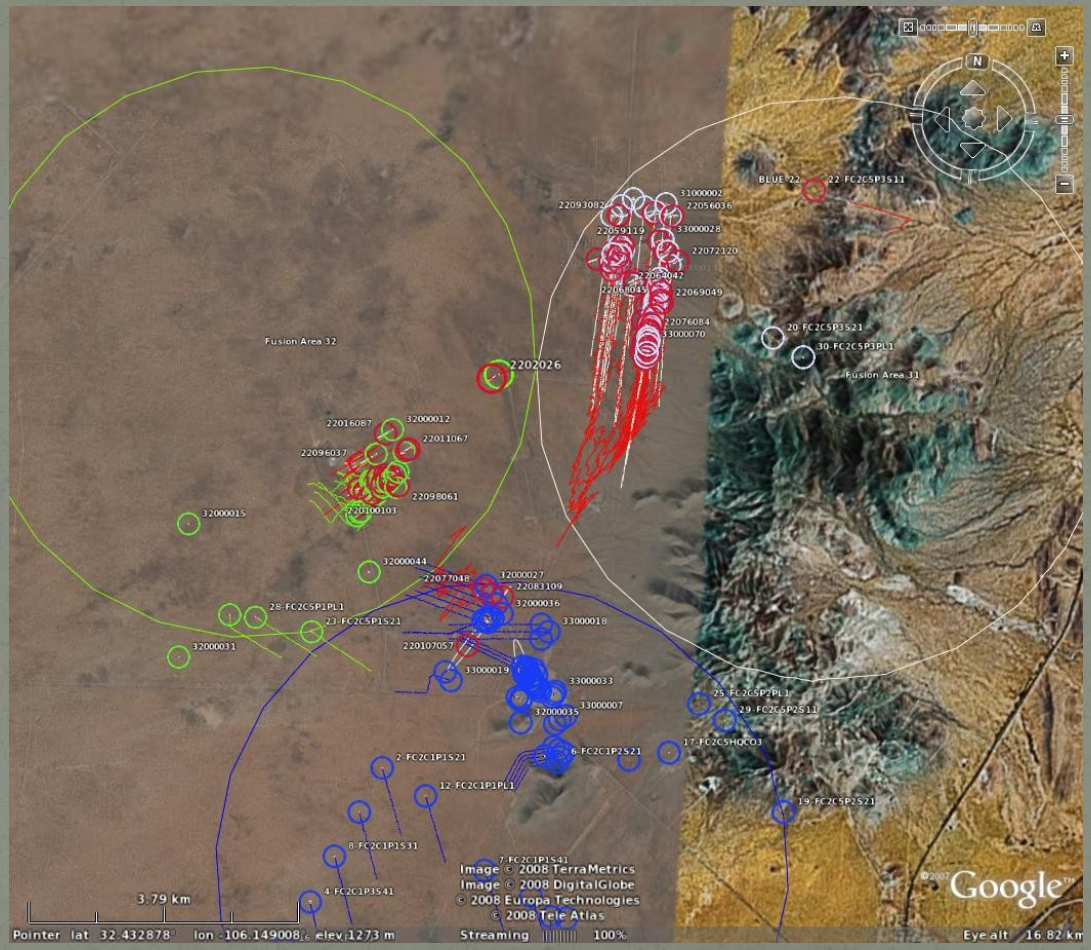
- Stress-tested the fusion system and network utilization
  - Ran multiple scenarios with hundreds of targets
  - Changed network to allow for varying levels of packet loss
- Frequent visits to customer site (Huntington Beach) for software installation, support, and design decisions.



Overview of the System



One Vehicle - Limited View



Create a regional fusion area to lighten the computational load or follow an important target.

