MICHIGAN STATE
U N I V E R S I T Y

Project Plan
MSU Next Generation Flight Deck

The Capstone Experience

Team GE Aviation

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From Students…
…to Professionals

Project Overview

- Create the MSU Next-Generation Flight Deck

- Make flying:
  - Easier
  - Safer
  - Ready to meet the demands of the future

Fact

- Regardless of how advanced a flight deck is, the human pilot is still its most vital asset.

- Pilots need to make decisions:
  - Quickly
  - Informatively
  - Correctly

Functional Specifications

- Integrate previous capstone projects

- Each display can run on its own computer

- The pilot/end-user interacts with the display

- Intercommunication and Cross Functionality
  - Industry research
  - Limited by functional capabilities

- Simulated Environment
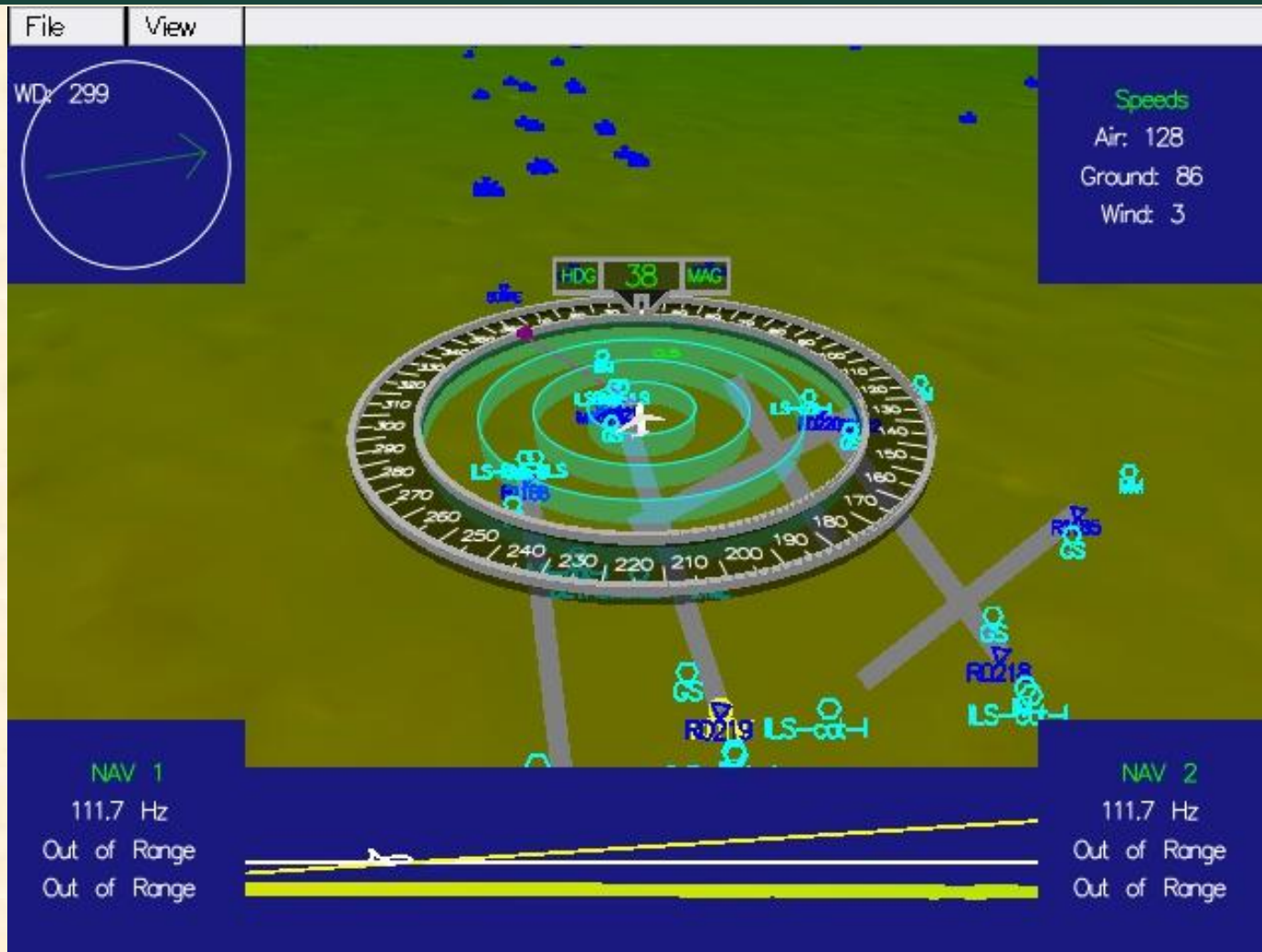
Design Specifications

- X-Plane 9 transmits data
  - Plug-in System
  - Network
  - Real-Time
- Separate applications simulate each display
  - Receive Data via network
  - Render data graphically in real time
  - Communicate within each other
- Configurable
  - All applications may run on a single computer
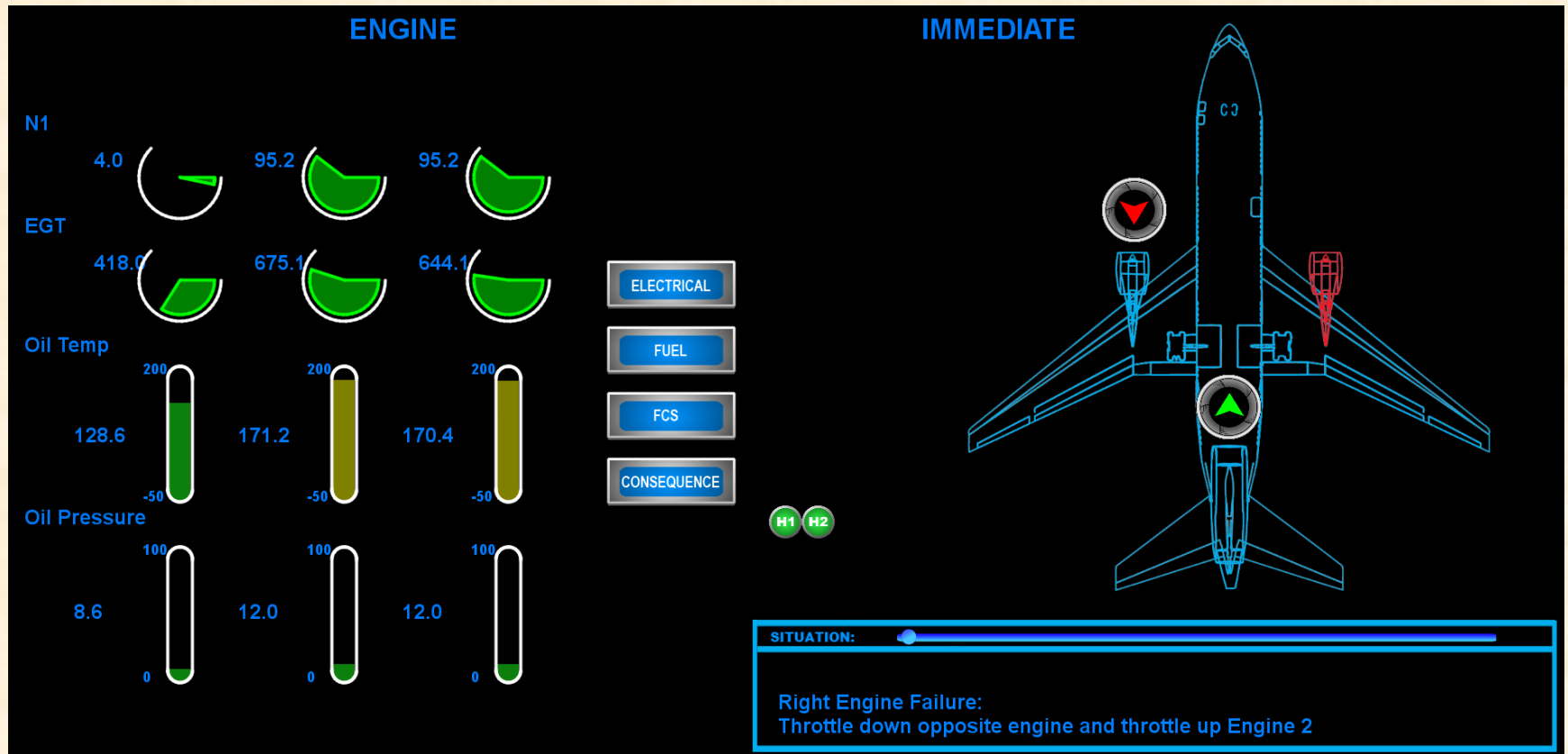   — OR—
  - Each application may run on its own system

Screen Shot - Primary Flight Display
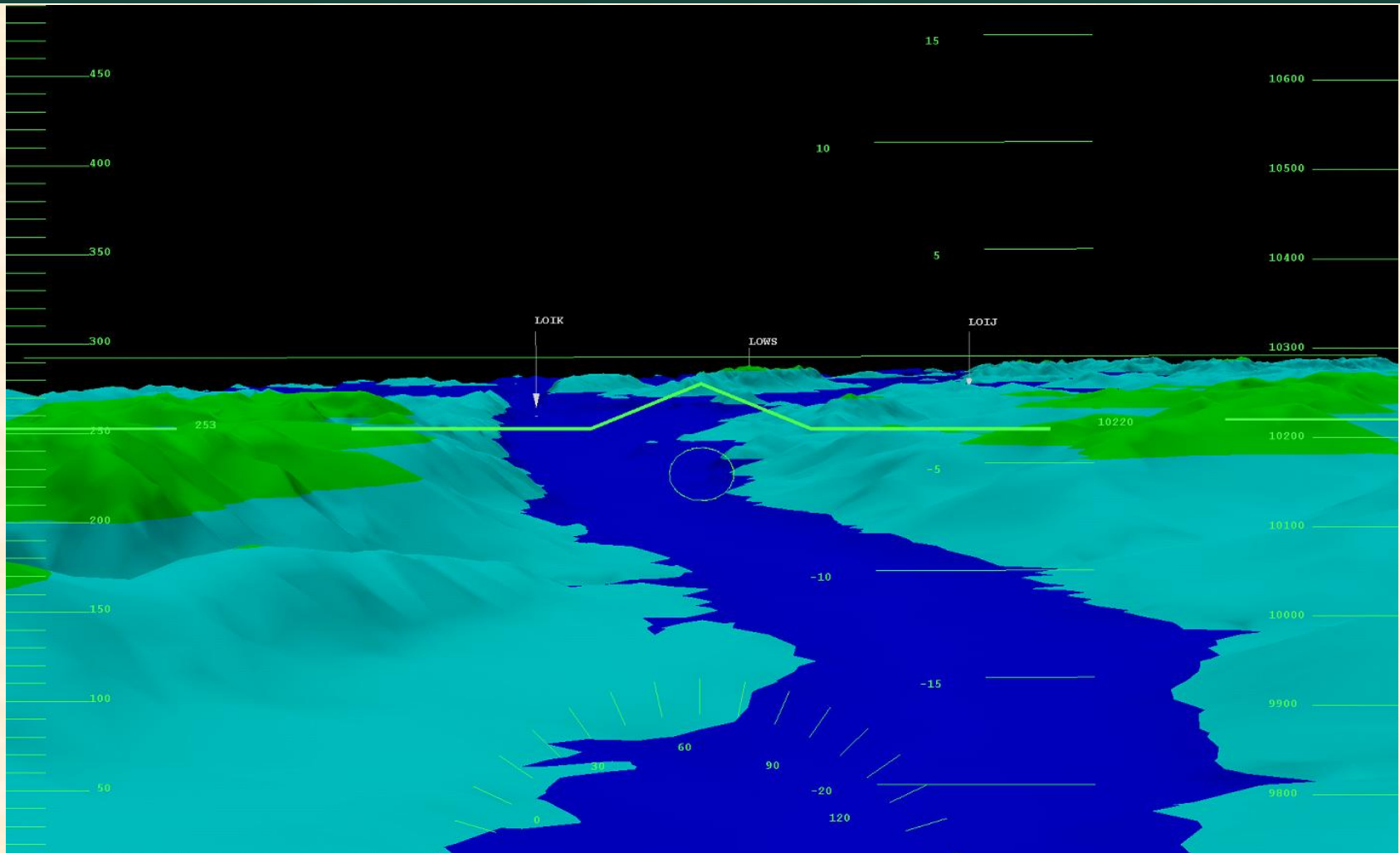
Screen Shot - Lateral Map Display
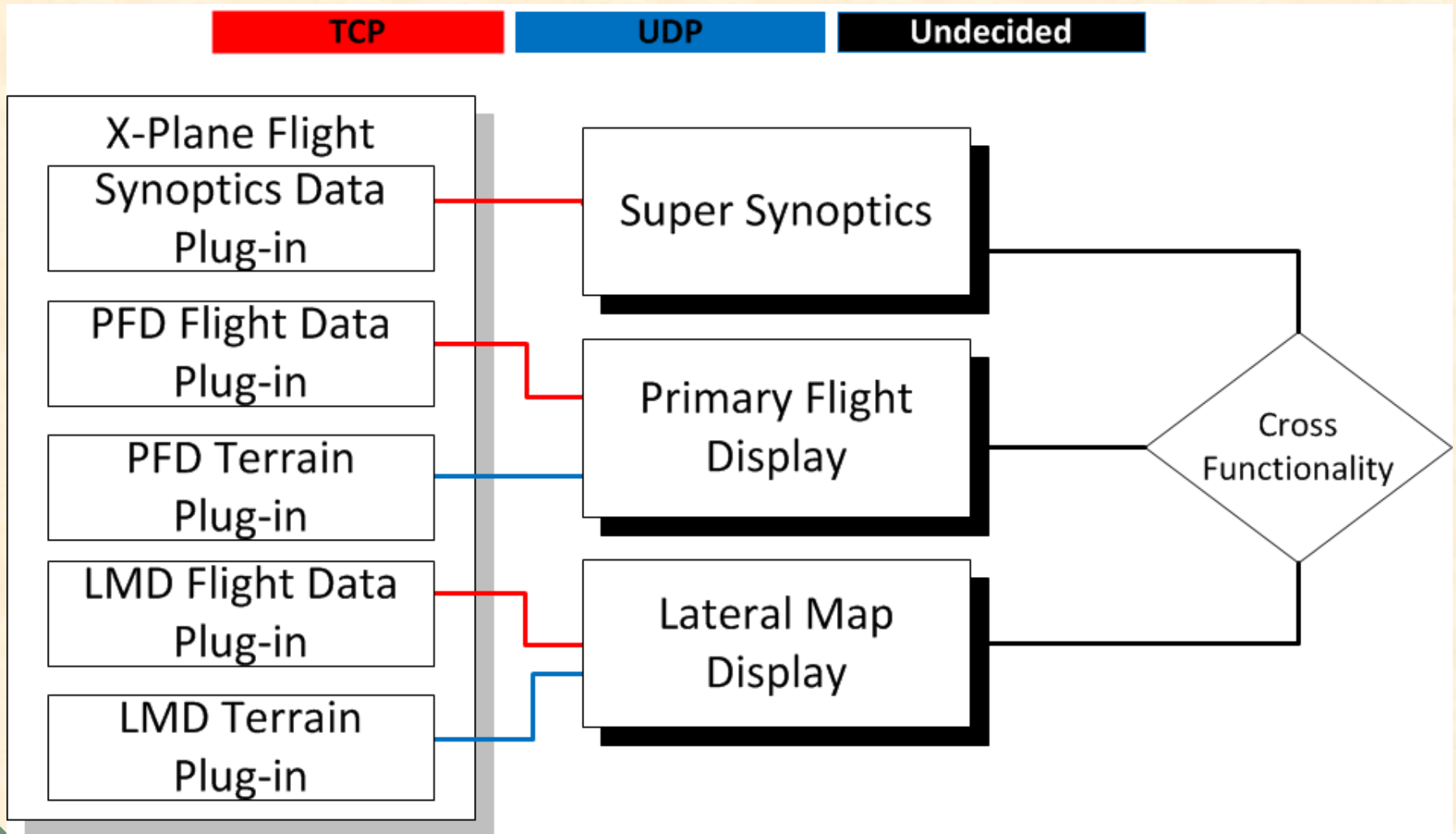
Screen Shot - Super Synoptics
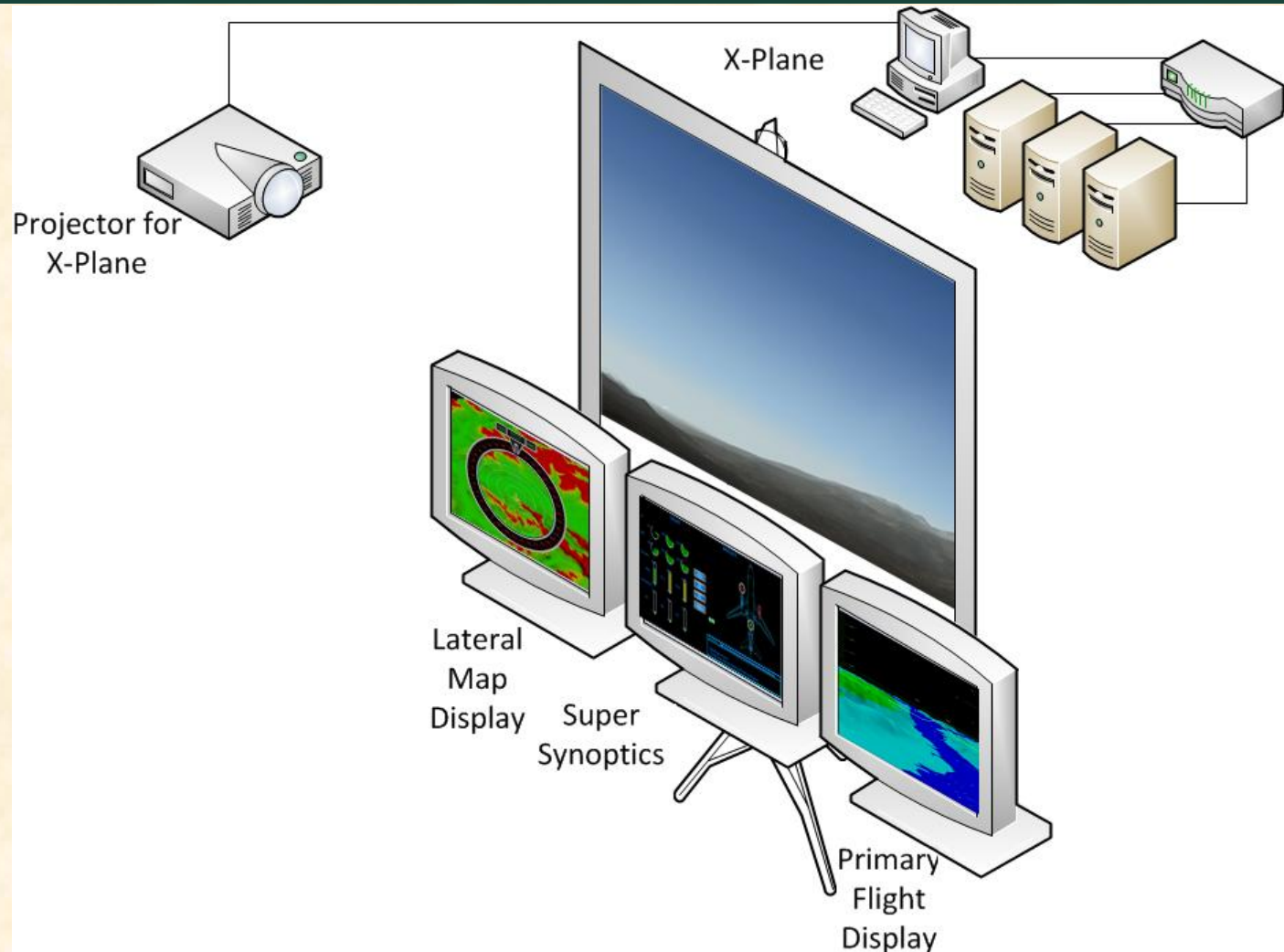
Technical Specifications

- Plugins
  - C and/or C++
  - X-Plane SDK
- Displays
  - C and C++
  - OpenGL
  - Boost, Xtools, nui, and other libraries
- Communication
  - TCP/UDP
- Project
  - Visual Studio 2008

System Architecture

Hardware Setup

System Components

- Hardware Platforms
  - Windows 7
  - One or more machines running avionics instruments
  - Machines networked to stream data
- Software Platforms / Technologies
  - X-Plane SDK
  - Visual Studio 2008
  - OpenGL, GLUT, XTools, Boost, nui

Testing

- Lots of research and prototyping
  - When will this functionality be useful?
  - Will this interfere with a display's existing functionality?
  - Can we make it better?
- Data Display
  - Synchronized with X-Plane, other displays
  - Data displayed is realistic
- Edge-Case Testing
  - Fault-tolerance between displays

Risks

- General avionics knowledge
  - Team members will research field via client suggested information
- Some ideas may have to be killed
  - Not completely avoidable
  - Risk reduced by research, visual prototyping
  - "1000 ways not to make a light bulb"
- Must rely on and utilize previous projects
  - Must heavily debug and optimize code
  - Adding cross functionality will prove difficult
- Networking conflicts within instrumental communication
  - Primary network specialist