ANS Annual Meeting 2018

DRIVING THE FUTURE OF NUCLEAR TECHNOLOGY

Human System Interface Improvements using Advanced Keyboard-Video-Mouse (KVM) Technology

TECHNOLOGY RESOURCES

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Human System Interface Improvements using Advanced Keyboard-Video-Mouse (KVM) Technology

- **Richard Turk**
- Technology Resources LLC
-
- **Richard Cooper**
- Vice President
- Thinklogical LLC

- **Bradley Yeates**
- Cyber Security Manager
- Plant Vogtle Units 3&4

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Generation III+ HSI

- Generation III+ Advanced Light Water Reactors with advanced digital I&C are nearing completion or already operational
- Step Change in Human System Interface

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Advanced Control Rooms

- Centralized Integrated Consoles
- Large panel multiple screen “wall” displays
- A key enabling technology: Keyboard-Video-Mouse (KVM) switching and extension.

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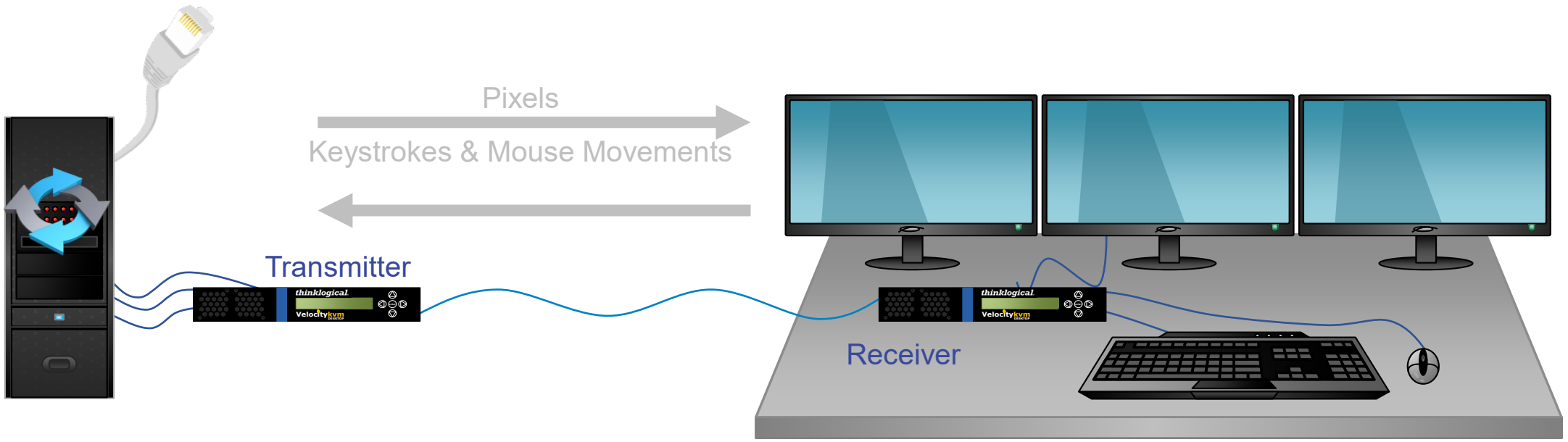
KVM Device Basic Function

- Present video information from multiple computer systems on single or multiple screens using a single keyboard and mouse
- Provides for centralized integrated control consoles instead of discrete control panels
- Simplifies Operator physical movement in task analysis



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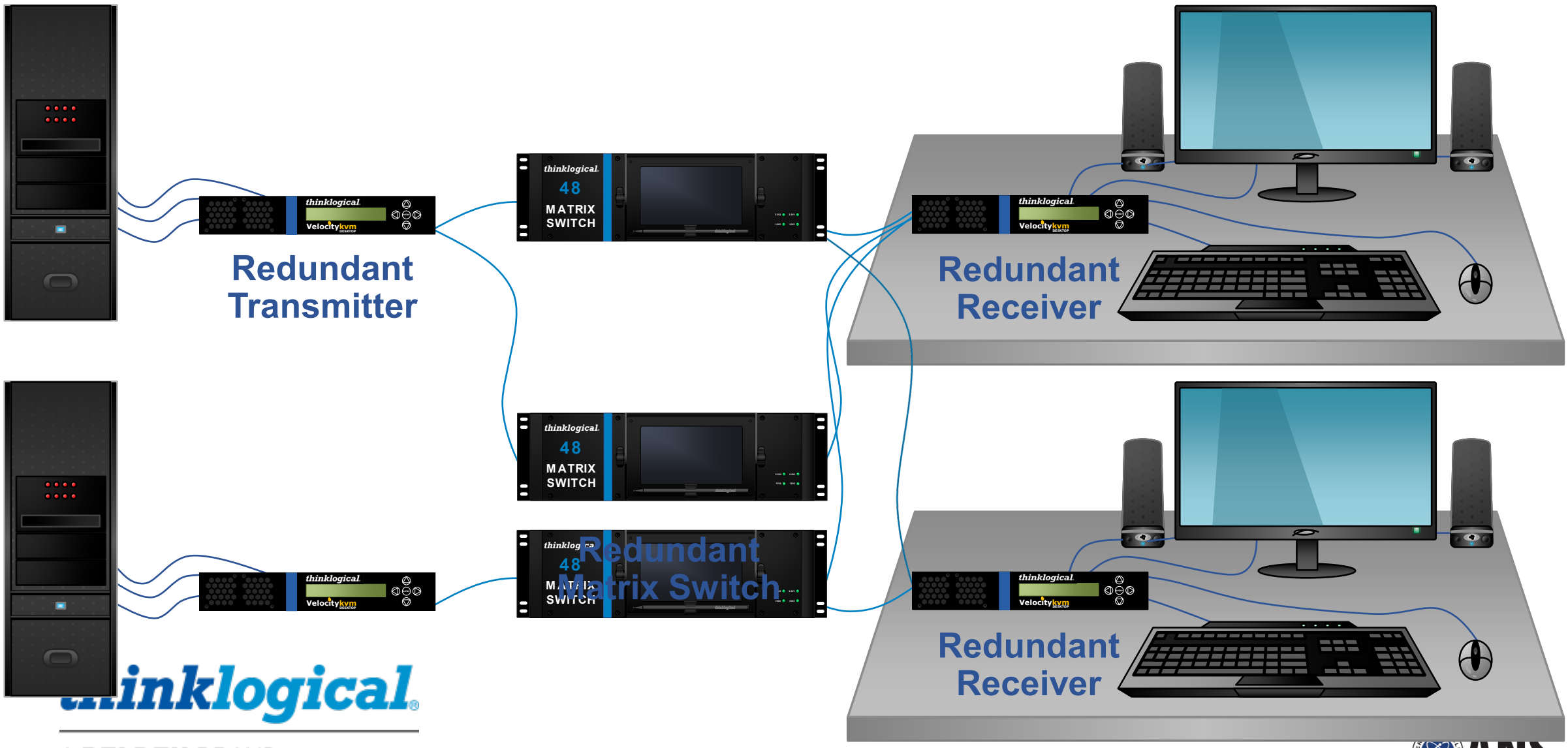
Matrix Switch & Extension



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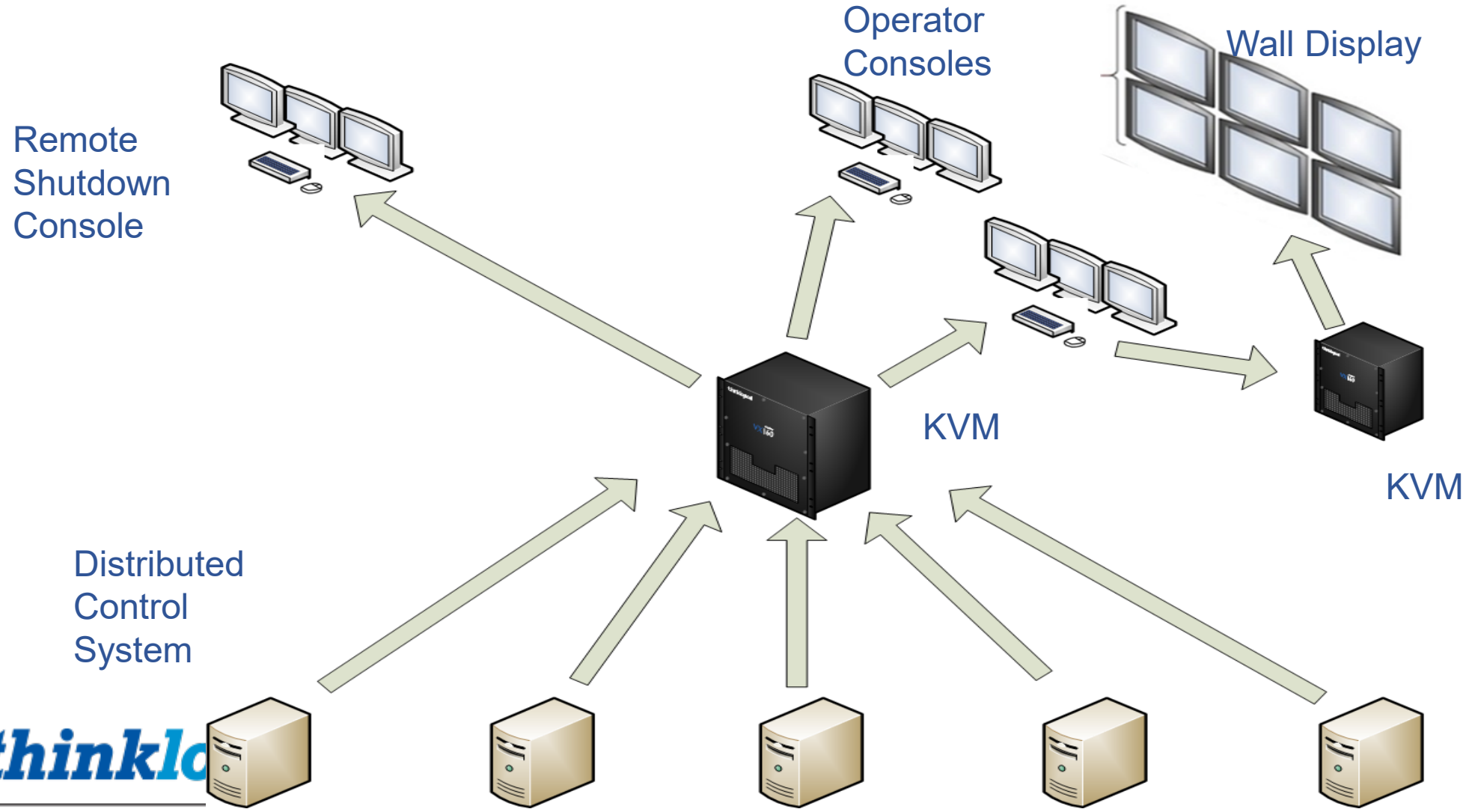
AP1000 & APR 1400 Use of KVM



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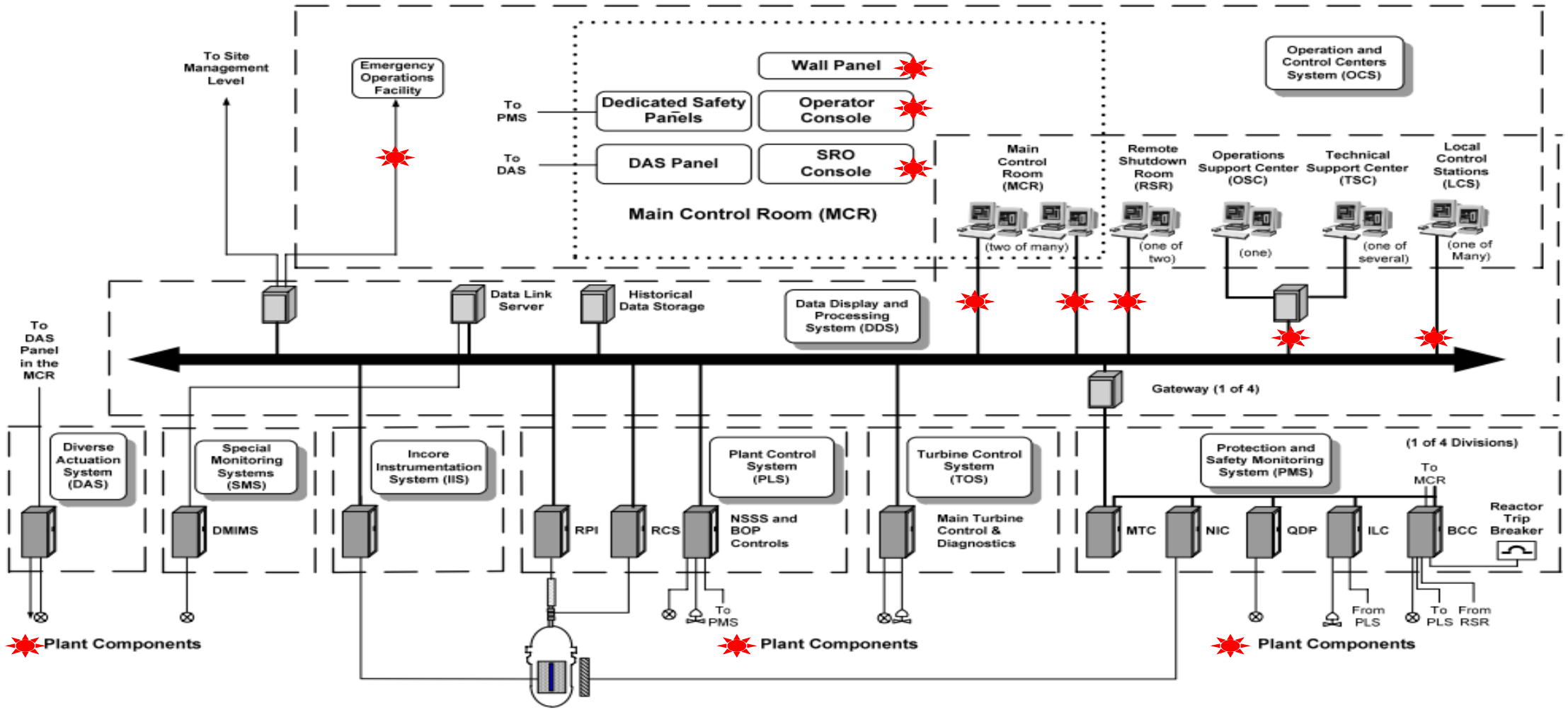
AP1000 Use of KVM



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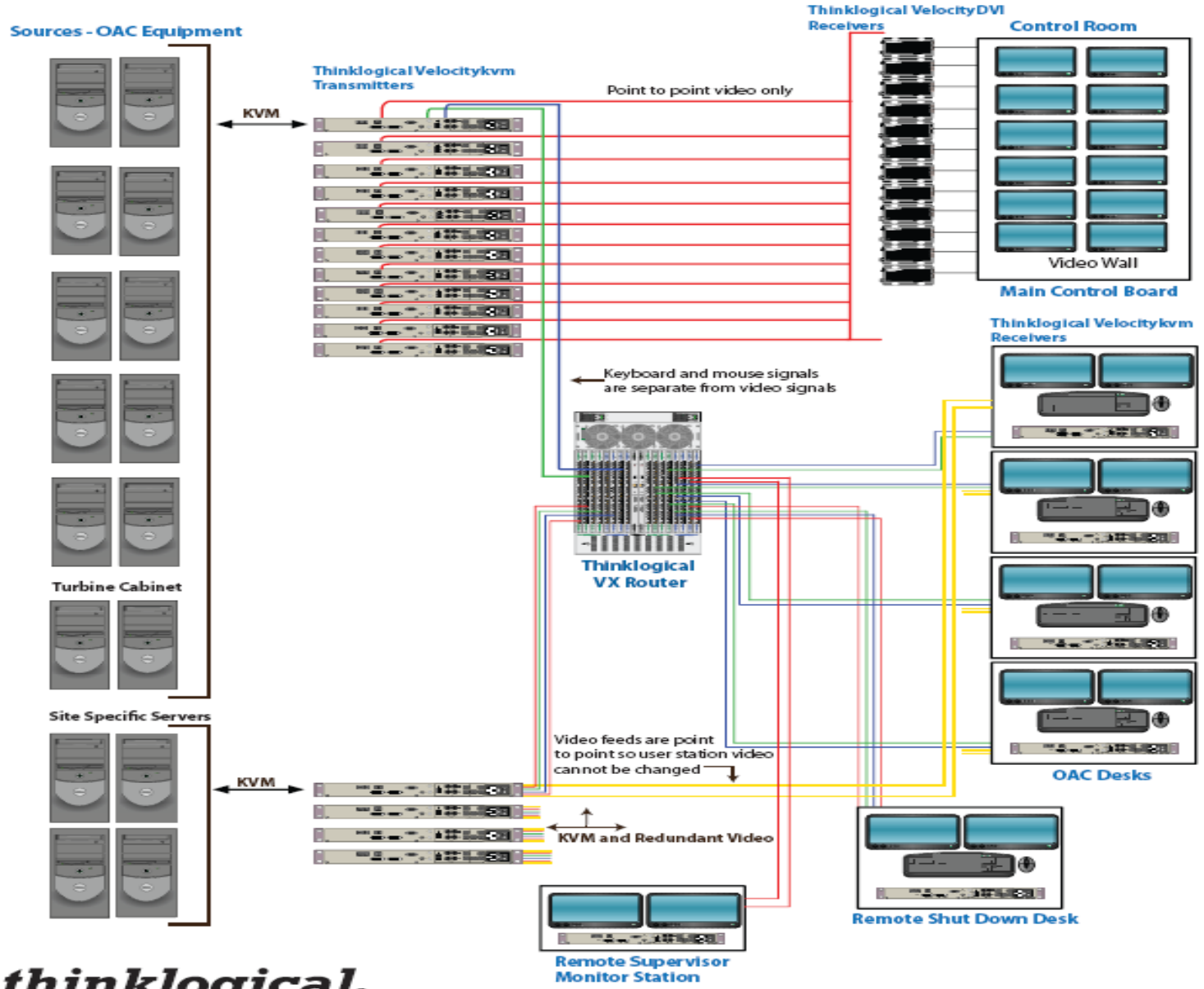
AP1000



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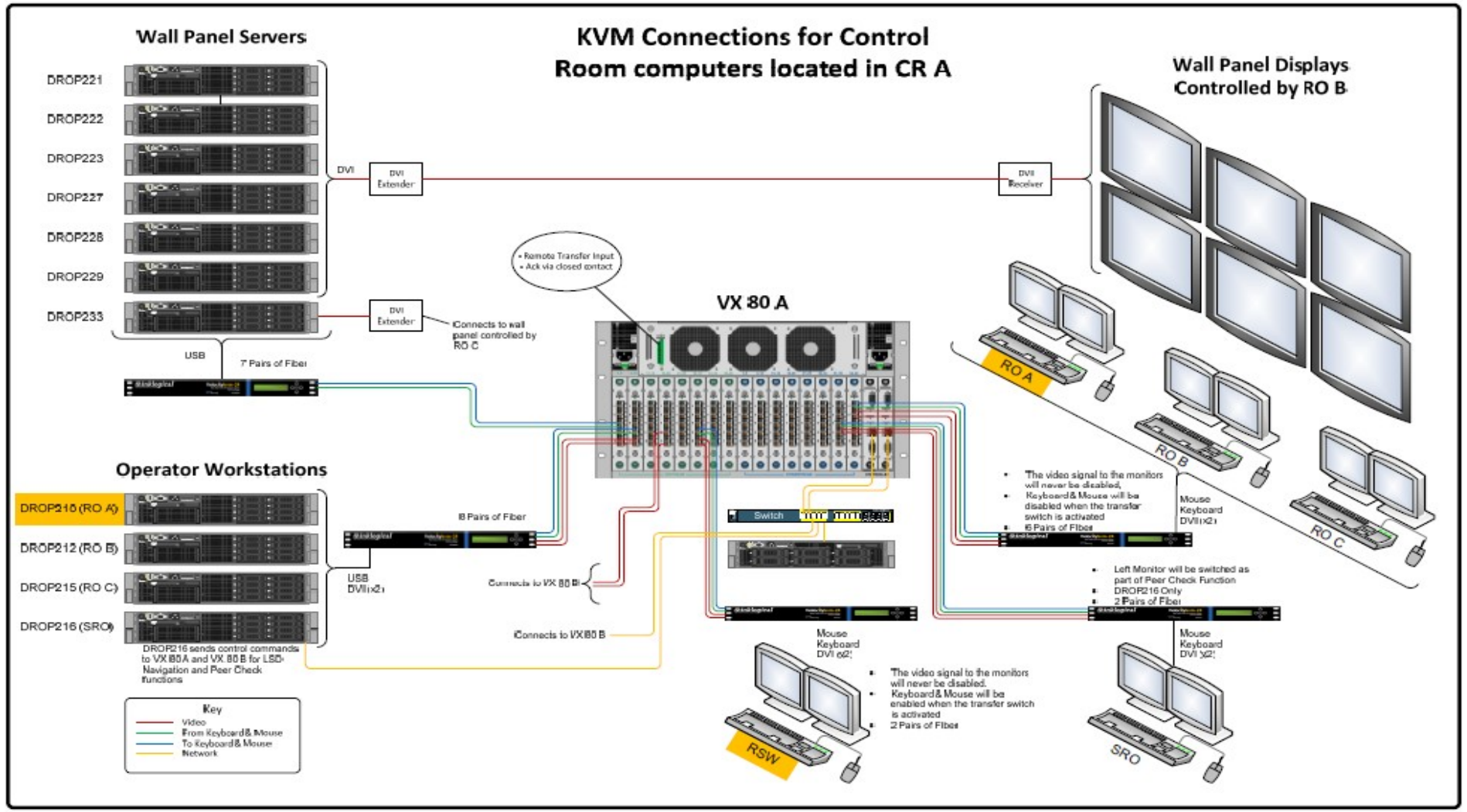
AP1000



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Key Features of the AP1000 Fiber Optic KVM Extension Network

Control Station layout optimization
Less heat & noise
Fiber optic isolation
No electrical emanations
Secure, no eavesdropping
Safer– no sparks
No interference with other equipment
Lightweight
Non conductive
Solid state drives for storage
FPGA architecture

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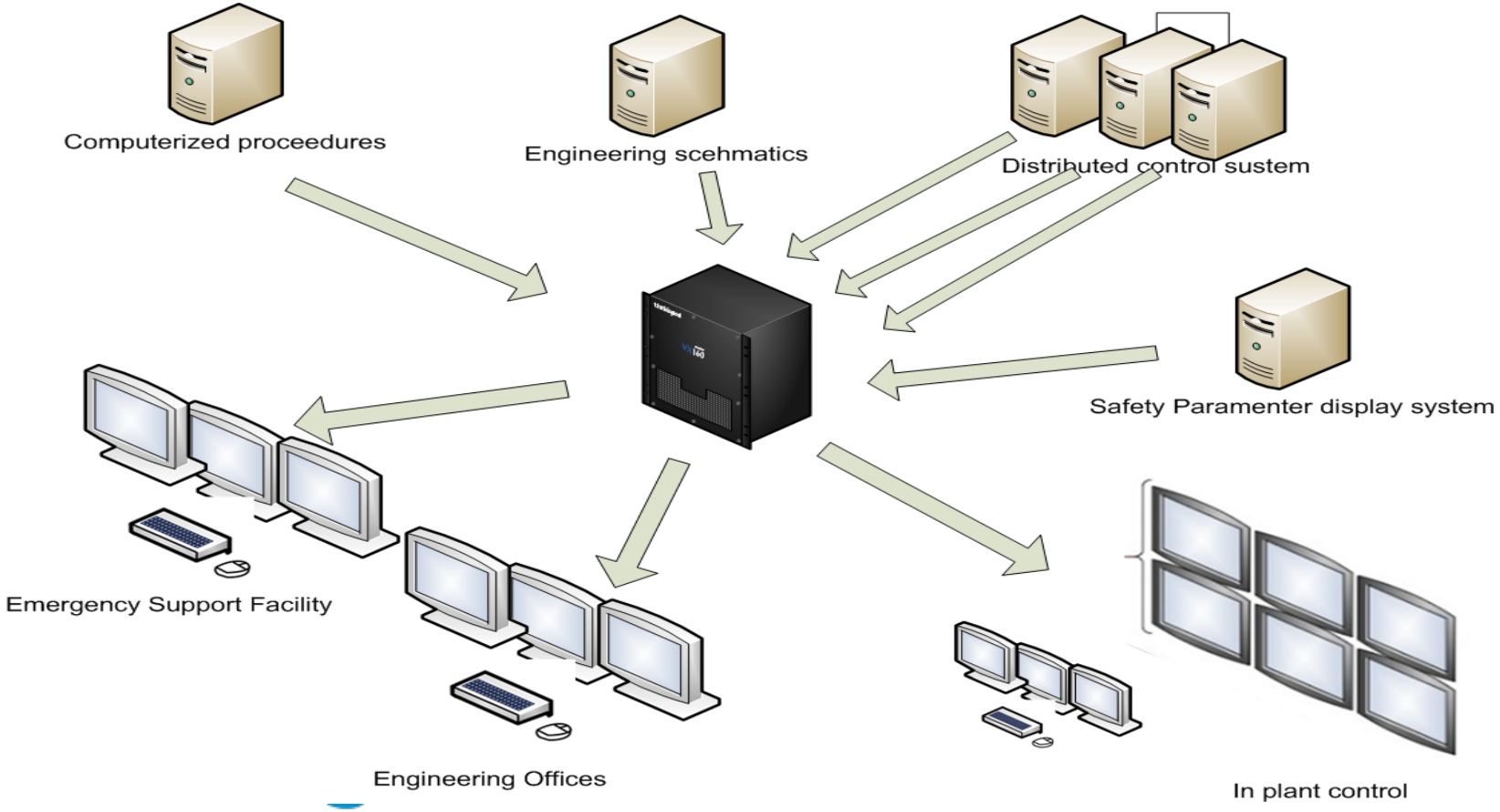
Key Features of the AP1000 Fiber Optic KVM Extension Network

- **2N (1 + 1) Redundancy**
  - Every component in question has an additional component available should that component fail
- **Automatic Failover**
  - A feature of the product in which it automatically switches from a component that fails to a backup component – without human intervention, powering down, rebooting or special programming beyond what is provided as standard
- **Hot Swappable**
  - A feature of the product where a component may be replaced during operation – without powering down, rebooting, or affecting other components of the system

Expanded usage of KVM Networks Digital Upgrades, SMRs, ANLWR



- Further HFE Task Simplification
- Computerized Procedures
- Enhanced Cyber Security
- Enhanced Fire Protection
- Flexible Layout
- On-site Off-site linkage

HSI & Human Factors Benefits of KVM

- Access and operate more than one computer with only one set of mouse, keyboard and video for less task complexity and increased productivity
- Functional selection of displays enables simpler and faster task execution, reducing operator burden.
- Increased cyber security: Fiber optic isolation, no USB data ports, hard drives or network cables accessible at operator station (insider threat)
- Move computers from operator station to secure IT machine room to reduce heat, noise, and clutter for improved work environment

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HSI & Human Factors Benefits of KVM

- Smooth keyboard and mouse performance for accurate human/system interactions with reduced frustration
- High resolution, low-latency video distribution for increased visibility and clarity, reduced eye strain
- Allows for display sharing for supervisory oversight, peer review or verification and Human Performance (HuP) monitoring.

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Thank You

The Northern Virginia Advanced Technology Concept Center (NVTACC)

- NVATCC is a 2,300-square-foot advanced concepts center, is located in Tysons Corner, Virginia.
- The center is home to a laboratory and conference room designed to highlight and demonstrate the most advanced technologies used in situational awareness, command and control, visualization, decision support, collaboration, training and briefing environments.
- The center provides hands on exposure to the latest in technology. not only about the each individual solution, but how they work together providing an overall concept for new facilities.

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Large Display Panel

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