

## Compact Muon Solenoid (CMS) Electromagnetic Calorimeter (ECAL) Detector Control System (DCS)

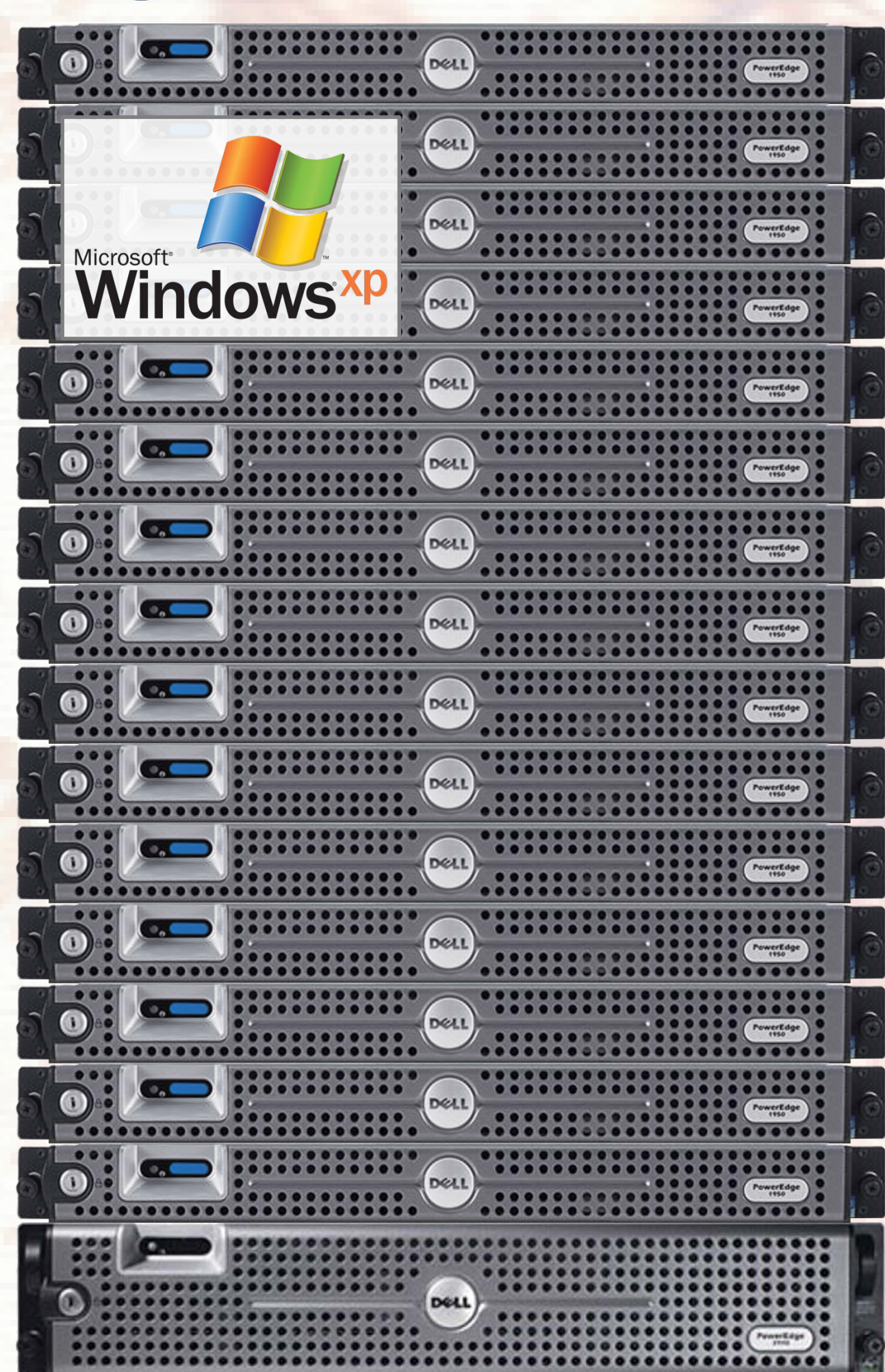
Built with many industrial technologies:

- Microsoft Windows
- SIMATIC WinCC Open Architecture supervisory control and data acquisition toolkit
- Open Platform Communications (OPC)
- Ethernet, CAN and RS-485 for data transfer
- S7, Modbus, CANopen and vendor specific protocols



Uses the CERN Joint Controls Project (JCOP) Framework

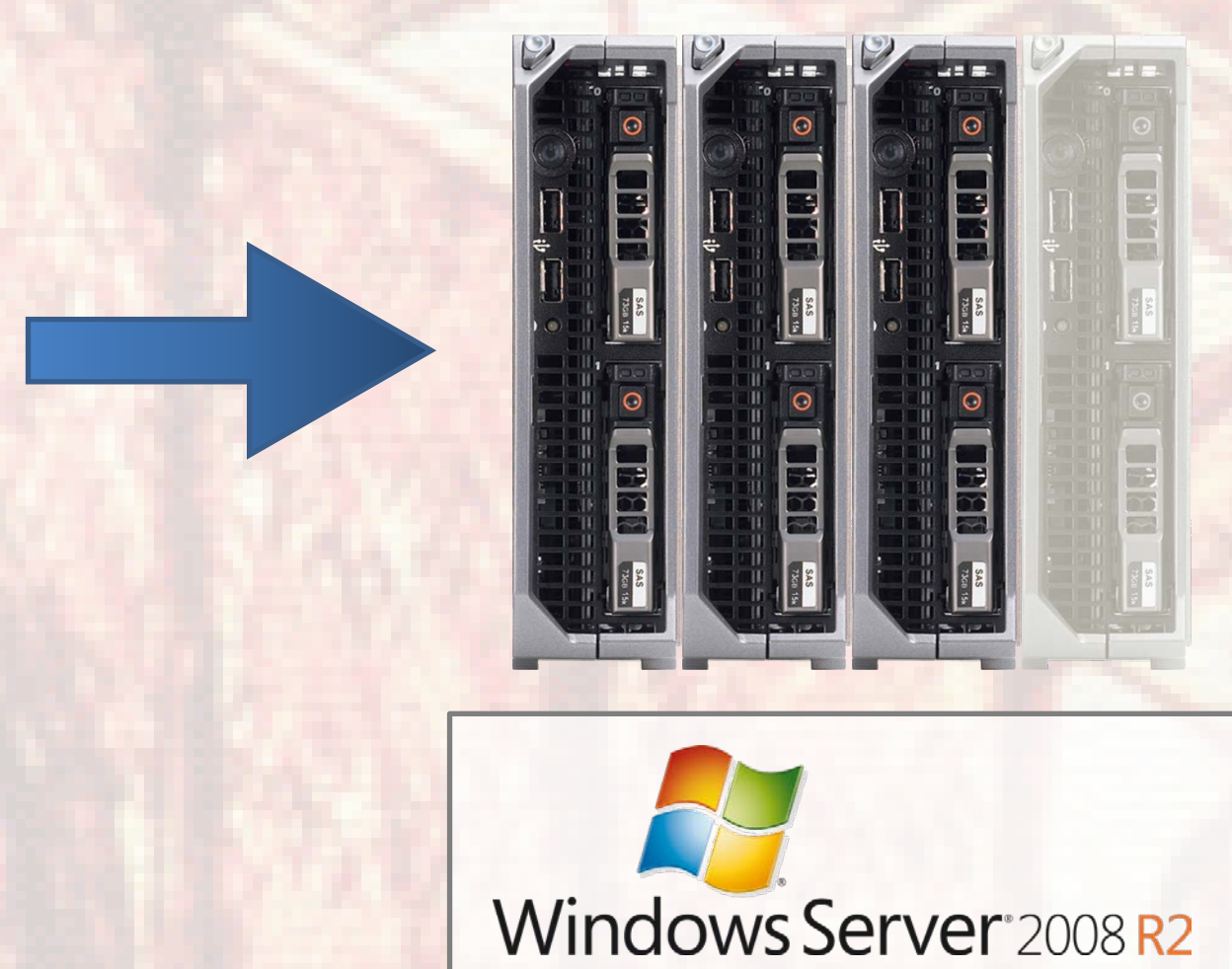
## Migration to new computers



Old computers: DELL 1950/2950

New computers: M610 blades

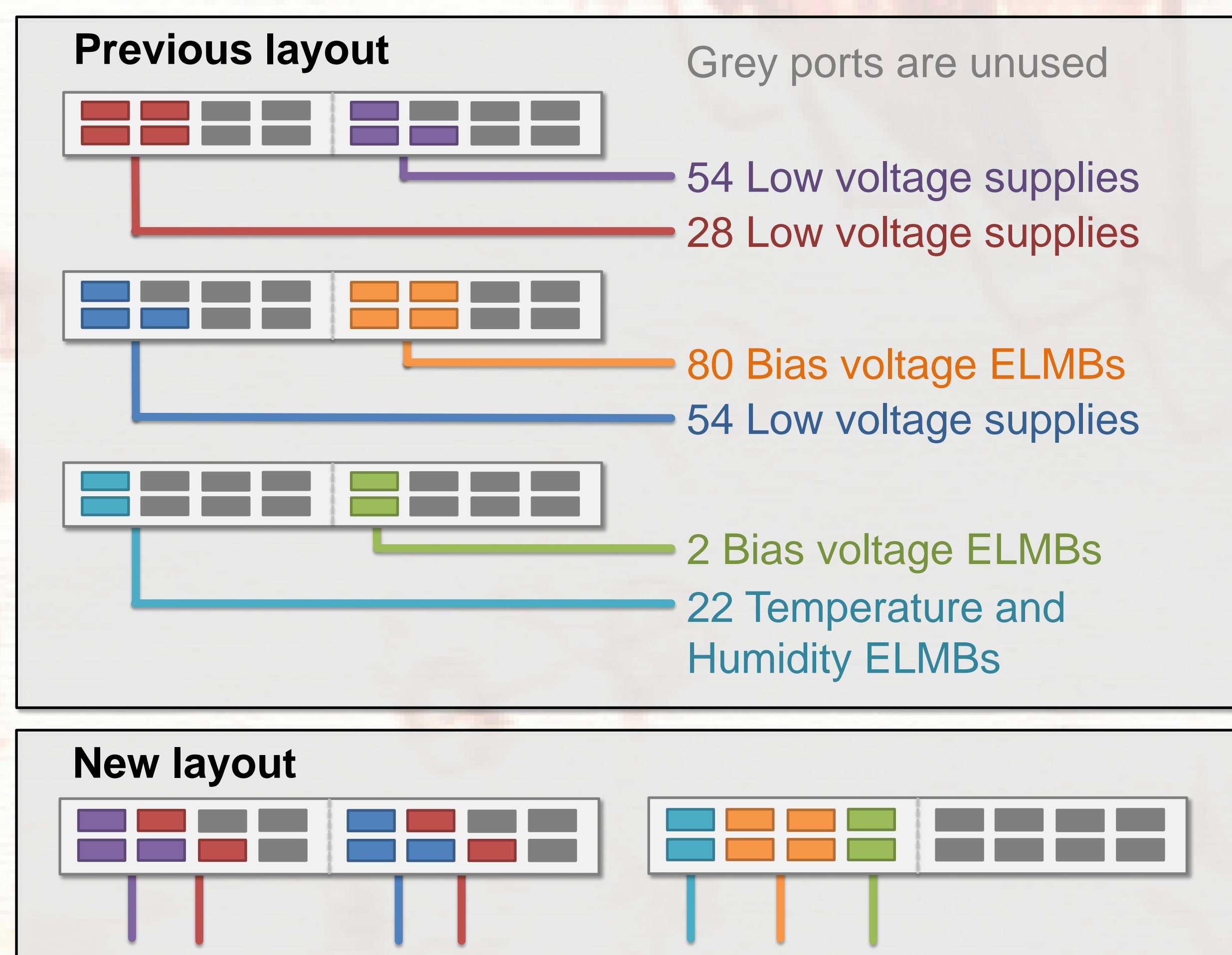
- Reduction to 3 servers
- Additional server available for load distribution (if necessary)



Software and databases had to be merged to enable this transition

## CAN interface consolidation

- CAN interface for low voltage supplies and front-end ELMBs (Embedded Local Monitor Boards)
- SYS TEC USB-CANmodul16
- Previous underuse of CAN ports
- New architecture enables more efficient layout with fewer modules



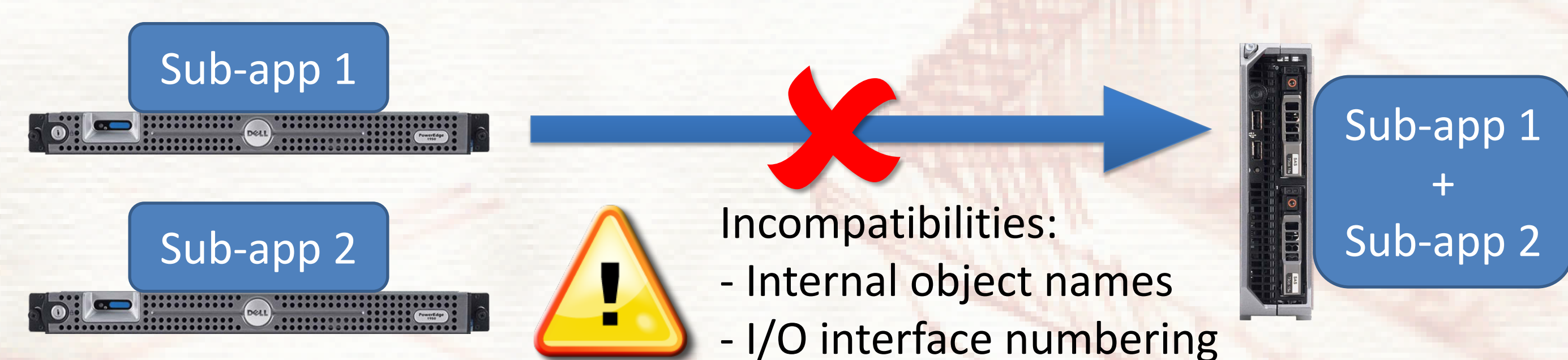
- Investigation with CERN and CMS for CAN-Ethernet solution

## Conclusions

- Significant consolidation and merging achieved
- Automatic testing ensured smooth re-integration
- Working towards goal of all readout via Ethernet

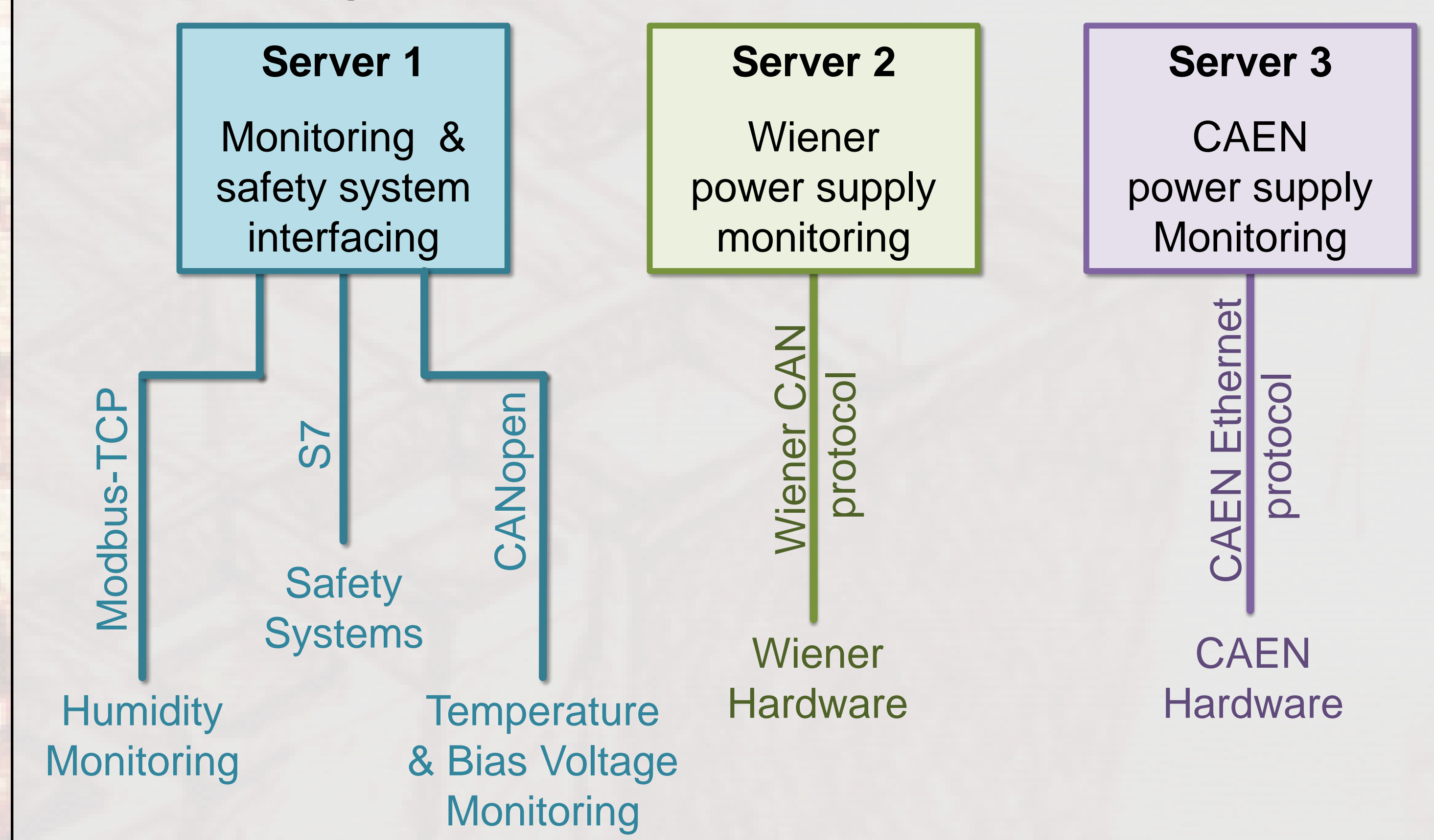


## Software application merging



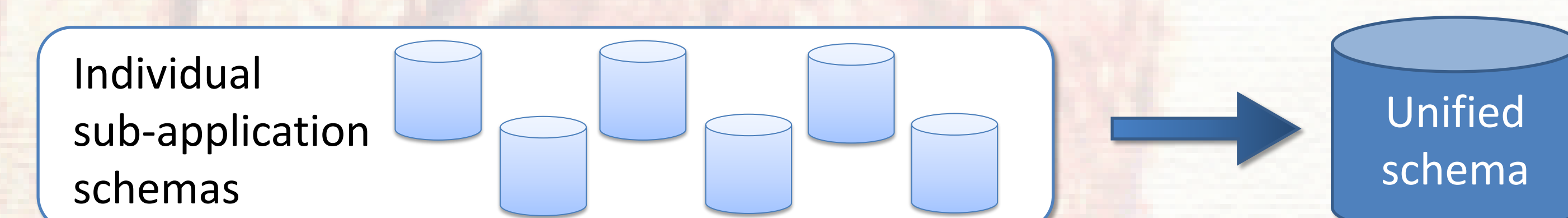
- All compatibility problems were removed
- Any combination of sub-applications was made possible
- Proposed merging minimized I/O interface complexity

## Proposed merged architecture



## Database schema merging

- Databases for application images (ConfDB) and historical data (CondDB)
- ConfDB merging simplifies deployment, maintenance and operations
- CondDB merging was essential due to WinCC OA design



## Regression testing

- Frequent modifications to software and DBs required testing
- Validation of new WinCC OA and JCOP Framework versions
- Automatic test environment created using Python & Jenkins CI

