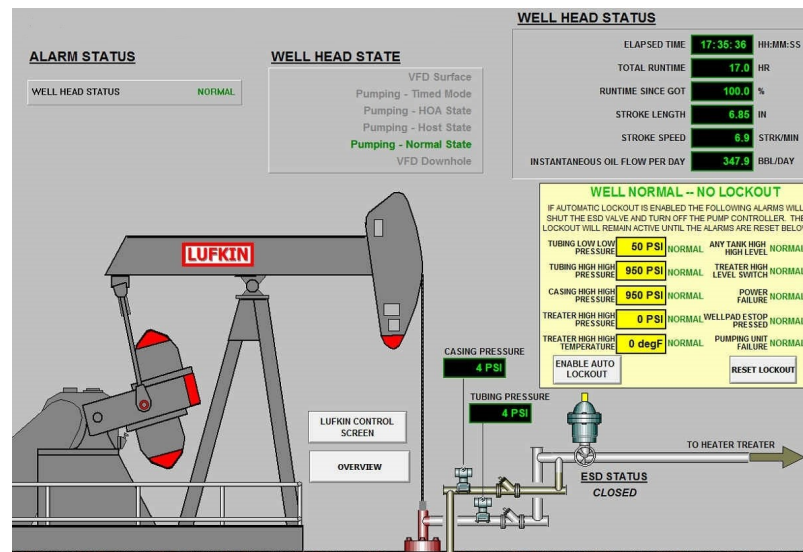


Supervisory Control And Data Acquisition (SCADA)

- What is a SCADA system
- Draft of our SCADA architecture
- PVSS vs. National instruments

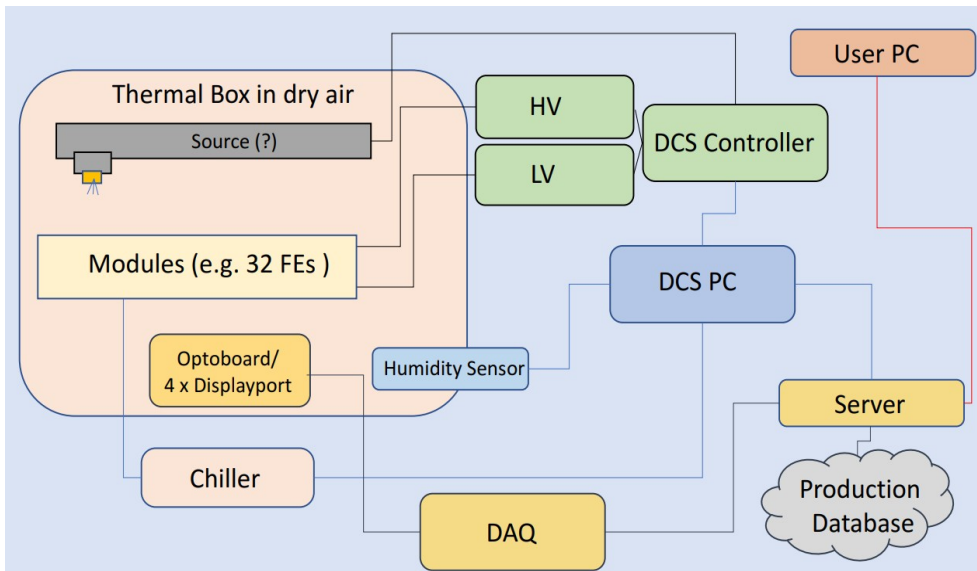
SCADA system

- Supervisory Control and Data Acquisition (SCADA)
Control and monitor a complete system
Uses computers, networked data communications and Human Machine Interface (HMI)
Uses other devices such as programmable logic controller (PLC) and discrete PID controllers
- PLC → Modular devices with inputs and outputs (I/O) and which are often networked to SCADA host computer
- HMI → Human-Machine Interface → Display of the complete SCADA system

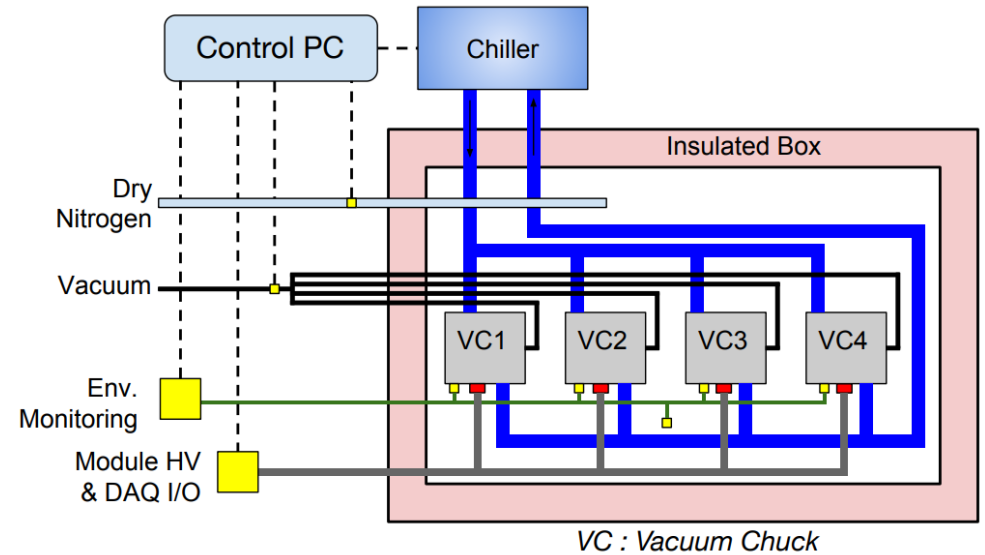


Previous systems

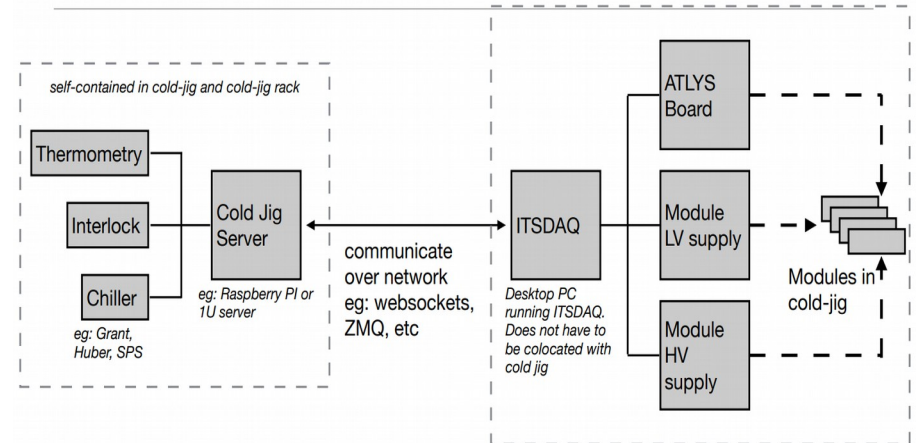
- Looked at previous systems
- Implement some ideas into our SCADA architecture
- Warwick -> Controls Vacuum (Unnecessary)
- Add interlock systems to X-ray generator



ITk Italy 2017

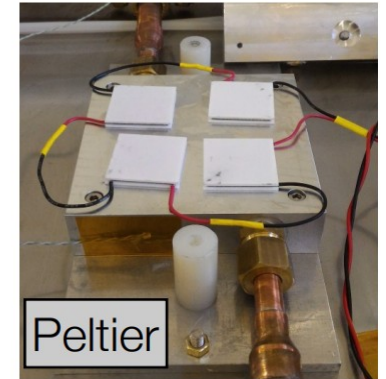
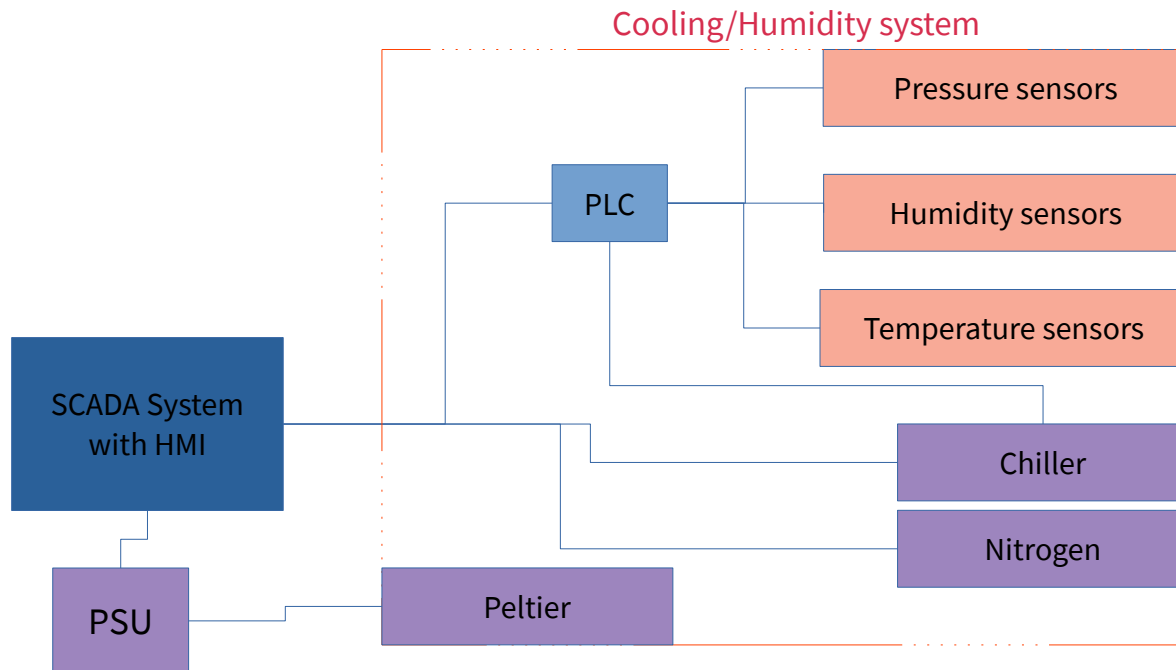


Warwick ITk 2017

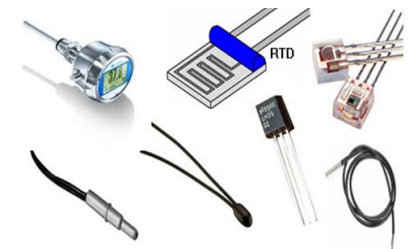


Cooling system

- Sensors → PCL
- PLC calculates average temperature and send input to chiller
- PID system in chiller -> Set the correct temperature
- Want to control Nitrogen and Peltier elements
- Interlock system on SCADA based on the sensors

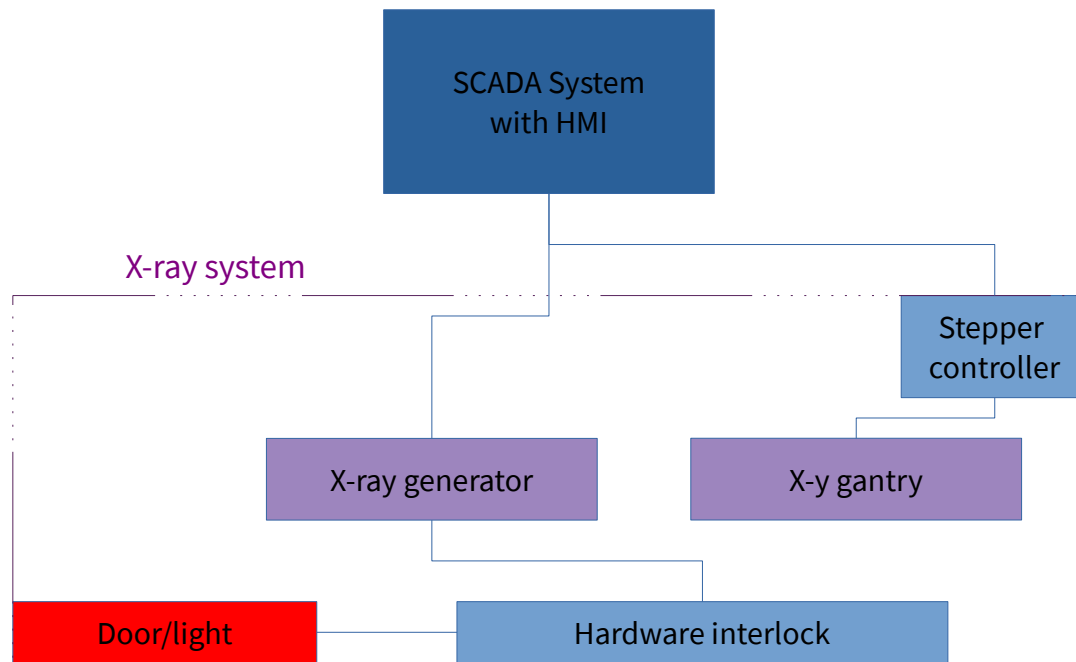


Sensors



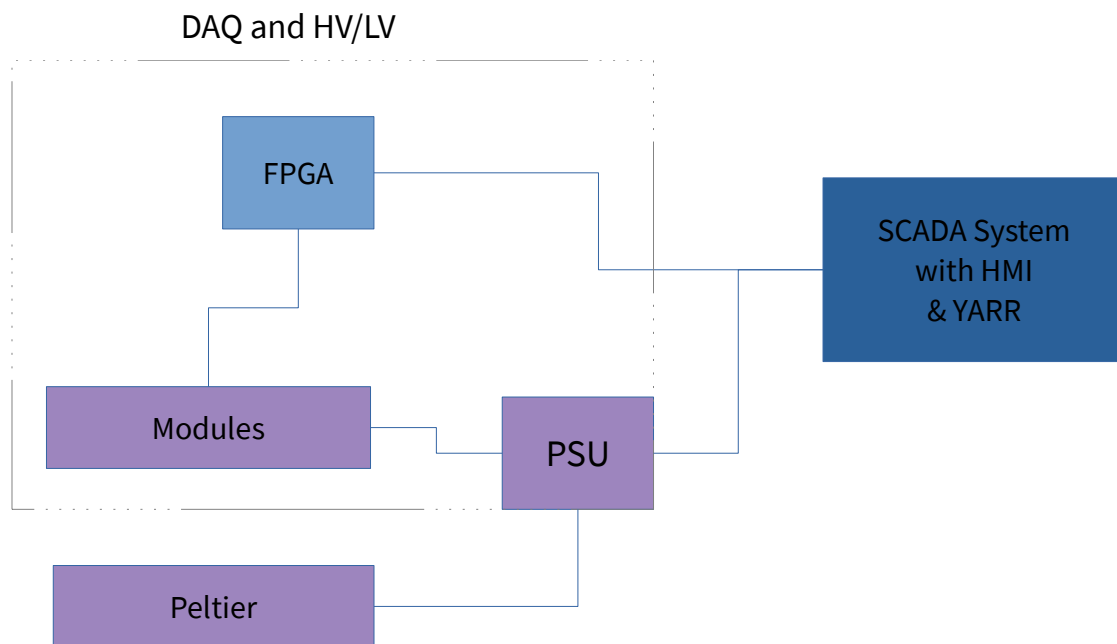
X-ray system

- Control the X-y gantry via. Stepper controller
- Turn on and off the X-ray generator
- Door and light interlock system which enables current to the X-ray generator

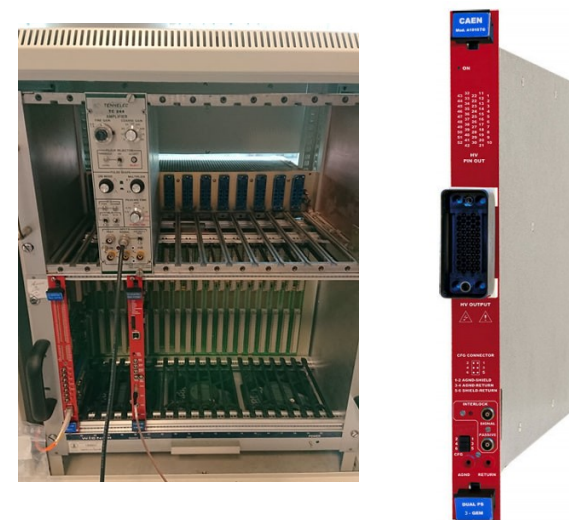


DAQ and HV LV system

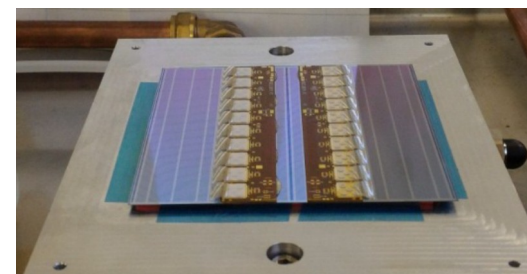
- Modules are connected to FPGA cards (Stack)
- Use YARR in DAQ
- Also read out NTC temperature of board
- YARR software <-> SCADA software
- PSU for HV and LV to modules, also to Peltier elements



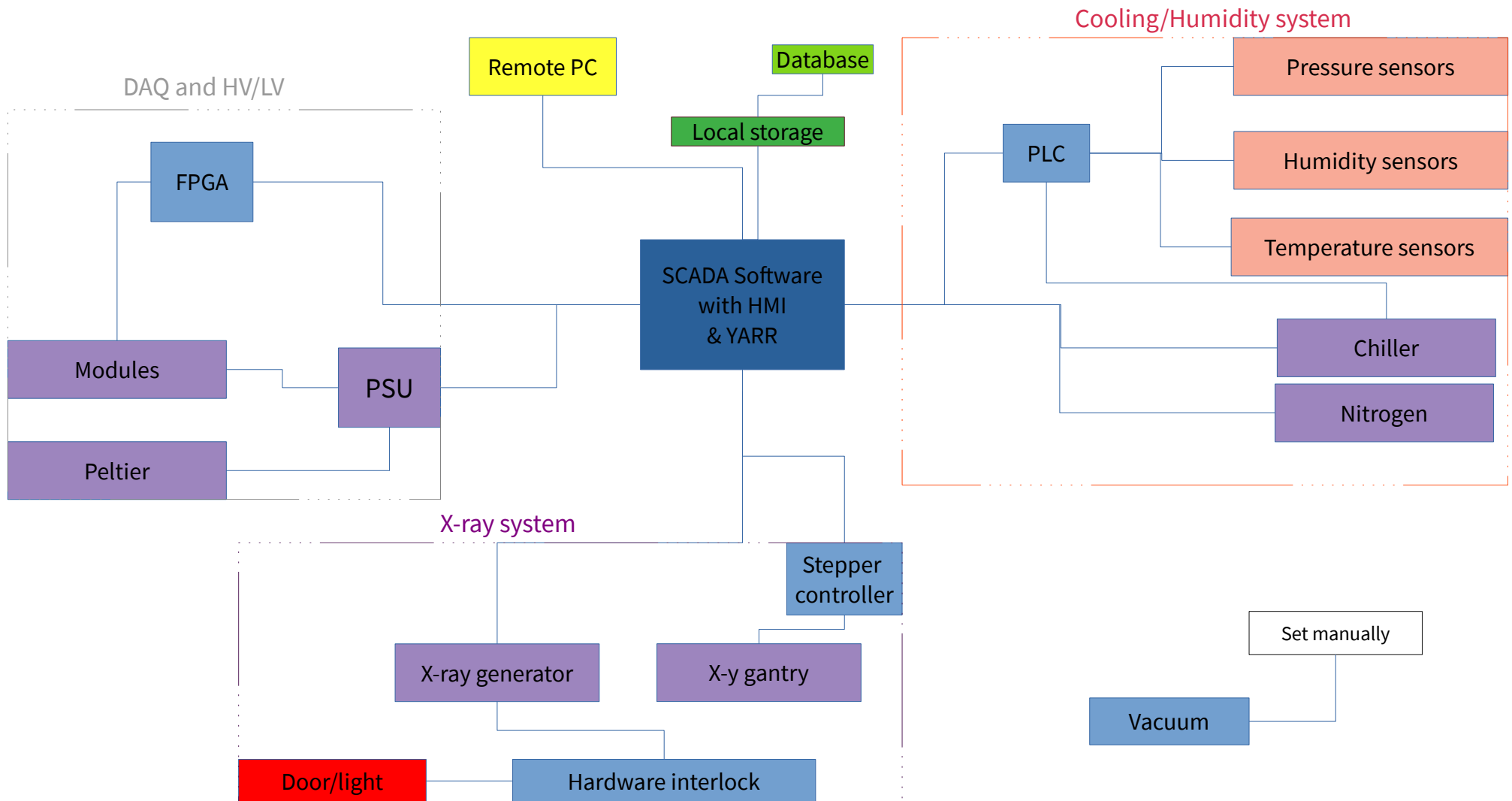
HV AND LV system



Modules



SCADA Architecture draft (Communication Network)

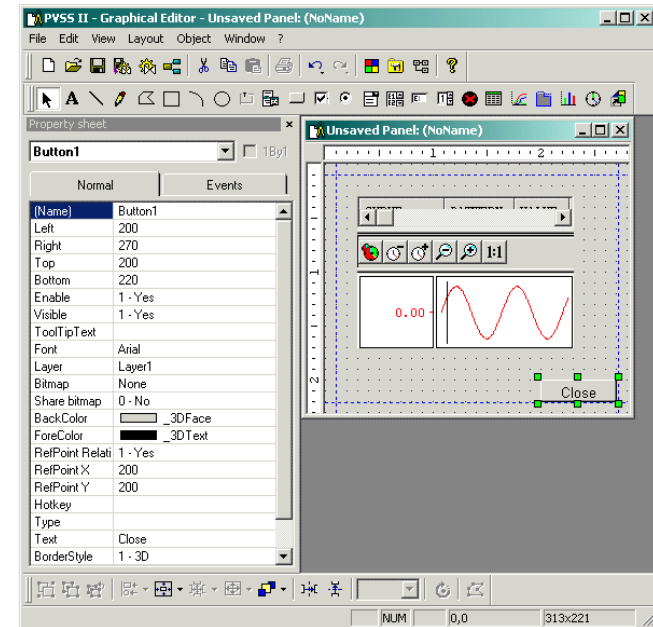


PVSS II

- SCADA system from Siemens (WinCC Open Architecture)
- Already in use at CERN & Oslo
- Use C++

- **Advantage:**
 - Platform Independence
 - Good scalability and flexibility
 - PVSS allows users to design their own user interfaces, in a “drag and drop” fashion
 - Support from our collaborators
 - “Have to learn it anyway”

- **Disadvantages:**
 - Buy and set up PLC and HV LV independently
 - Steep learning curve



PVSS can be used on various levels in the automation pyramid. As a HMI (human machine interface) down at the bottom of the pyramid for PLCs, field buses and sensors.

National Instruments

- American multinational company with international operation
- It is a producer of automated test equipment and virtual instrumentation software
- Common applications include data acquisition, instrument control and machine vision.
- Software → LabVIEW, ANSI C, Visual C#

- **Advantage:**

- Buy all necessary equipment (Crate with HV, LV, PLC, buy modules)
- Get software
- Easy to implement
- Lot of tutorials online and help from

- **Disadvantages:**

- More expensive
- “On our own”



PXI Temperature Input Module

Starting from **kr 22,420.00**

Takes measurements from thermocouples and resistance temperature detectors (RTDs) for PXI systems.