Industrial Controls in the Injectors:

"You (will) know that they are here"

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On behalf of EN/ICE

IEFC workshop 2011
Outline

- Involvement in injectors
  - PVSS based application and its integration
    - POPS
    - Vacuum Isolde
    - WIC PS/SPS
    - CIS
  - RADE based application and its integration
    - PS beam spectrum analyzer
    - Linac 4 emittance scanner

- Future projects
- Support
- Summary
POPS supervision

- Use of UNICOS framework with custom development
  - E.g.: Event list
- EN/ICE:
  - Widget, device development
  - Deployment
  - Correct functioning of the PVSS infrastructure
  - Interface to knob/working set
- TE/EPC:
  - View drawing
Vacuum Isolette

- Re-engineering: by TE/VSC, EN/ICE:
  - Functional analysis and specifications
- Continuous Process Control UNICOS application
- EN/ICE:
  - Turn key for the first implementation
  - Coaching TE/VSC
- Transferred to TE/VSC
- EN/ICE:
  - Correct functioning of the PVSS infrastructure
Warm Interlock Controller (WIC)  
PS complex/SPS complex

- Re-use of WIC LHC software
- EN/ICE:
  - Standard and safety Siemens PLC: programming, bug fixing, update, etc.
  - PVSS: turn key application
    - deployment, device, monitoring
  - Correct functioning of the PVSS infrastructure
- TE/MI:
  - Cabling
  - Hardware deployment in situ
- PS complex:
  - Linac 3, LEIR
- SPS complex:
  - TI2, TI8, TT40, TT60
  - HiRadMat (03/2011)
Control Interlock System (CIS)

- EN/ICE:
  - Reverse engineering of supervision based on HP/UX and PLC adaptation
  - Monitoring, backup of HP/UX supervision
  - Next Christmas technical stop: replacement
UNICOS: integration within the accelerator complex

- Expert applications, operational applications

### Bar Chart

- UNICOS Supervision layer
- UNICORE
- UNICOS CPC package (Vacuum, ...)
- Application packages (WIC, ..)
- Application packages (POPS, ..)
- PLCs CPC
- PLCs (non CPC)

### Diagram Elements

- LHC Logging
- CMW (Full interface)
- LASER/DIAMON
- Post-Mortem (Linux only)

### Technical Details

- Java
- CPC package
- RBAC
- CMW (full interface)
- Linux only
PS beam spectrum analyzer

- EN/ICE:
  - Correct functioning of the application

- EN/ICE:

- LabVIEW

- Ethernet (TN)

- PXI

- Analog input (1 GHz)

- LabVIEW-RT
Linac 4 Emittance scanner

LabVIEW + RADE

EN/ICE

BE/BI

Ethernet (TN)
RADE: integration within the accelerator complex

- MD applications, expert application, prototyping

![Diagram showing the integration of various components within the accelerator complex](image)
Future Projects

- **Applications**
  - All CV applications in the injectors: new systems and renovations (e.g. RFQ cooling)
    - Use of UNICOS CPC: PVSS and PLC (Siemens & Schneider)
  - WIC for HIE ISOLDE, Booster
  - POPS post mortem
  - Dashboard
  - ...

- **Support to the injectors projects**
  - Vacuum
  - Cryo Instrumentation Expert Tool (HIE ISOLDE)
  - Cryogenics (HIE ISOLDE)
  - ...
Support: Spare parts

- List of equipment established with CERN PLC user community
- Spare part PLC (Siemens and Schneider):
  - Critical spare equipment handled by EN/ICE
  - Fast delivery for replacement of equipment in critical stock
- If missing equipment, contact EN/ICE
- Will be extended to PXI (Q3 2011)
Support: Applications

- Depends on the project responsibilities
  - EN/ICE: control infrastructure, e.g. link with the PLC, CMW interface.
  - Expert/equipment group: controlled process, e.g. interlock problem.
- Request via the application expert or equipment group

- EN/ICE: Monitoring of control infrastructure of the application
  - In order to anticipate the problems
  - 3 times a day
  - With an extended diagnostic tool, complementary to DIAMON
- EN/ICE rely on BE/CO for servers, front-end and console
Support: Whom to contact

- EN/ICE standby service:
  - Outside working hours on call
  - Control infrastructure of the PVSS based Applications (not the controlled process)
  - PS beam spectrum analyzer
  - Post Mortem SDDS software
  - Spare parts PLC & PXI

- EN/ICE application expert on best effort during working hours
  - PVSS based Applications infrastructure (interfaces, etc.)
  - RADE based application
Industrial systems are already deployed and used in the injectors.
  - ICE involvement according to the needs

Use standard CERN accelerator hardware and software frameworks.

EN-ICE is providing a Standby Service, to cope with hardware and software failures.
Questions?