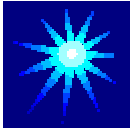


Accelerator and Experiment Control and Monitor Systems

Ralph Lange
BESSY, Berlin, Germany



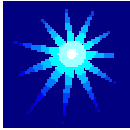


Outline



- Functional demands and technical environment
- Warehouse: bits and pieces
- Integration: the glue in-between
- EPICS: What, why and how
- Conclusions

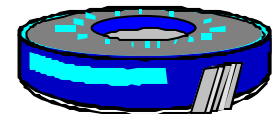


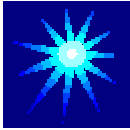


Functional Demands



- Remote (slow) control
- Procedures
 - setup
 - state transitions
 - system tuning
- Measurement supervisory tasks
(dedicated high speed measurement systems)



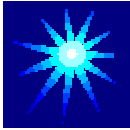


Technical Environment



- System size:
from ~ 1,000 signals (single beamline)
up to ~ 300,000 signals (accelerator)
- Device types:
 - Power supplies
 - Stepper motors
 - Vacuum (pumps and valves)
 - Sensors (pressure and temperature)
 - Timing (generators and trigger)
 - Image processing systems

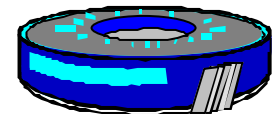


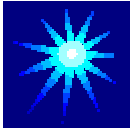


Controls Warehouse



- Some timing issues require **Hardware Solutions**
- Some security and reliability issues require **PLC Solutions**
- Some industrial subsystem modules may be equipped with **SCADA Systems**
- Some existing facility parts or subsystems provide **Legacy Systems**

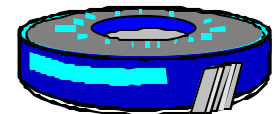


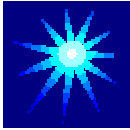


Controls Integration



- Well-defined **interfaces and protocols** on all levels are needed for successful integration of different systems
- **Scalability** is important as systems always tend to grow
- **Interconnectivity**: polymorphic modules allow implementation of a specific function in different ways and places



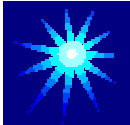


What is EPICS?



- **Collaboration** of ~120 institutes
- Control system **Toolbox** containing a large collection of client applications
- Network protocol based on publish/subscribe mechanism: **Channel Access**
- Real-time function **Database**

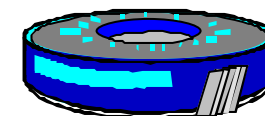


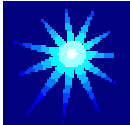


What made EPICS successful?



- Supports a wide variety of **platforms** and operating systems
- Performance and functionality are easily configured and **highly scalable**
- **Well-defined interfaces** for clients, record types and hardware
 - promote modular independent development
 - support easy reintegration and reuse
 - protect against obsolescence



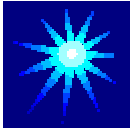


What made EPICS successful?



- Cooperative **collaboration** gives member laboratories a larger pool of talent to support their controls
- **Continuing improvements** allow members to expand performance, reliability and functionality of their system while taking advantage of latest technology



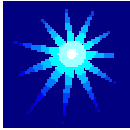


How does EPICS spread?



- Manufacturer solution:
Buy / unpack / install / call support
- EPICS approach:
 - Public domain: low cost
 - Wide range of participation
 - No hotline and no support contract ... but:
 - Support via email exploder: most questions are answered within 24 hours
 - Classroom and special trainings available
 - Collaboration meetings twice a year
 - Improvements: persuade original author or do-it-yourself + reintegrate into distribution





Conclusion



- All solutions (commercial and EPICS) use a similar architecture and have similar features
- EPICS is de-facto standard – other solutions need to have important advantages
- Some issues of today and tomorrow:
 - Configuration management
 - *Large installations*: RDB as a glue between all system parts
 - Meta data, device profiles, configuration
 - *Small installations*: EPICS in a box (DESY)

