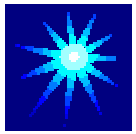
Accelerator and Experiment Control and Monitor Systems

Ralph Lange

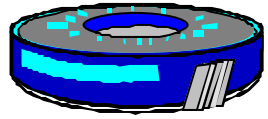
BESSY, Berlin, Germany



Outline

BESSY

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



Functional Demands

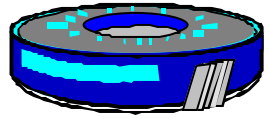
- Remote (slow) control
- Procedures
  - setup
  - state transitions
  - system tuning
- Measurement supervisory tasks
  (dedicated high speed measurement systems)

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

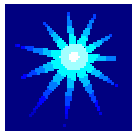
Controls Warehouse

- 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

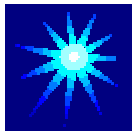
- Well-defined **interfaces and protocols** on all levels are needed for successful integration of different systems
- **Scalability** is important as systems always tend to grow
- **Interconnectivity**: polymorphic modules allow implementation of a specific function in different ways and places



What is EPICS?

BESSY

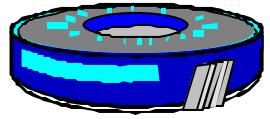
- **Collaboration** of ~120 institutes
- Control system **Toolbox** containing a large collection of client applications
- Network protocol based on publish/subscribe mechanism: **Channel Access**
- Real-time function **Database**



What made EPICS successful?

BESSY

- 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)