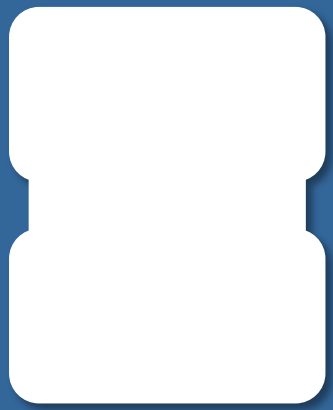
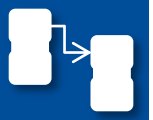


Introduction to IEC 61499

Valeriy Vyatkin, University of Auckland

Plan

- Was ist die IEC 61499?
- Blockdiagramm-Denkweise
- Ein kurzes Einführungsbeispiel
- Ereignisgesteuertes Komponenten-Modell
- Schlüsselvorteile: Systemlevel-Design-Offenheit, Übertragbarkeit, Kompatibilität
- Tools und Plattformen
- Unterschiede zur 61131-3
  - Wiederverwendung, Flexibilität, Verteilung, Systemlevel-Design



IEC 61499 International Standard

International Electrotechnical Commission IEC TC 65B/ WG7/ MT15

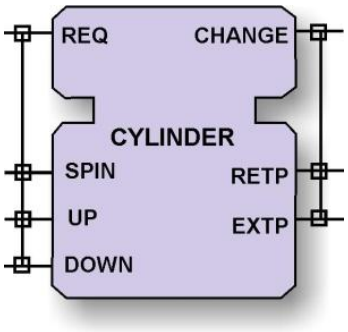
Eine **komponentenbasierte**, **offene Referenzarchitektur** für
verteilte Industrielle Prozessmessungs- und Kontrollsysteme (IPMCS)
Welche die Voraussetzung für sowohl gegenwärtige als auch zukünftige Anforderungen erfüllen für intelligente Automatisierung

1996 – project started

2005 – first edition

2011 – second edition

Basiert auf und erweitert die Standards

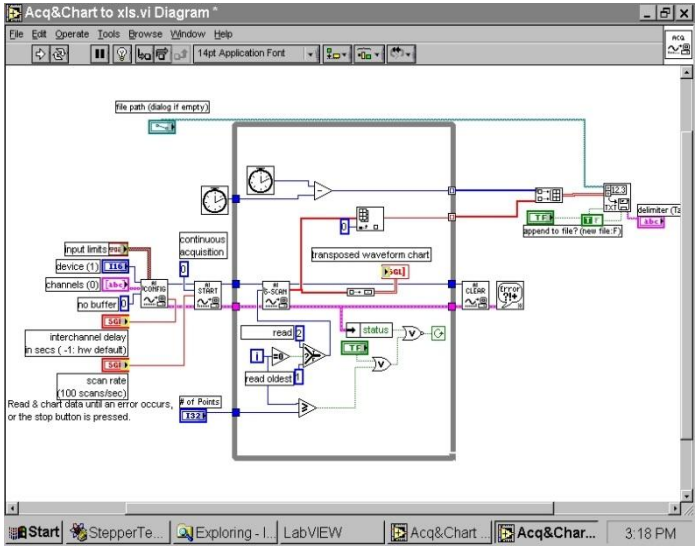


PLC Function Blocks (IEC 61131-3)

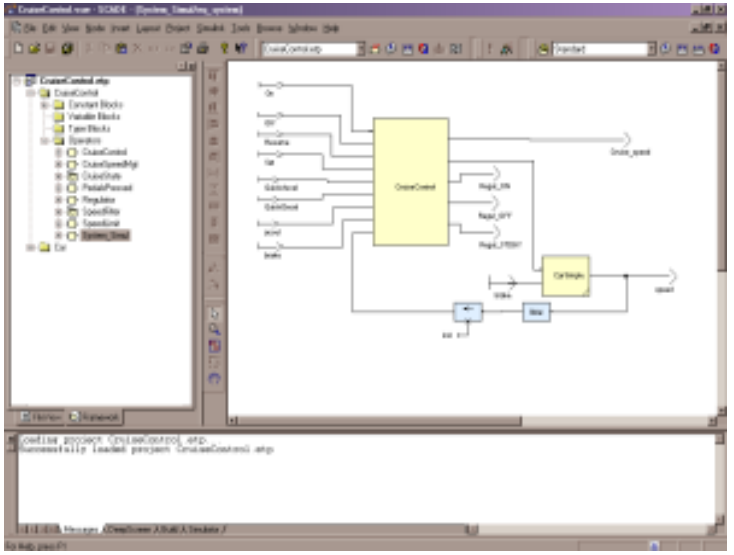
DCS Function Blocks (IEC 61804 project)

Blockdiagramm-basierte Programmierung

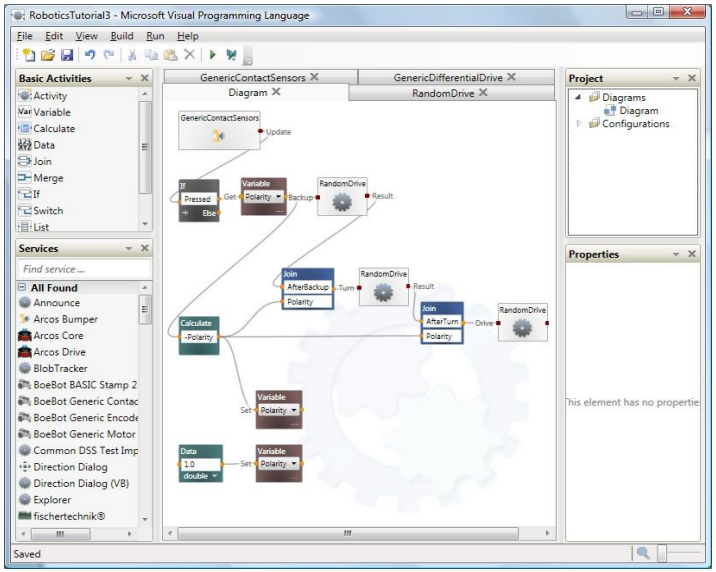
LabView



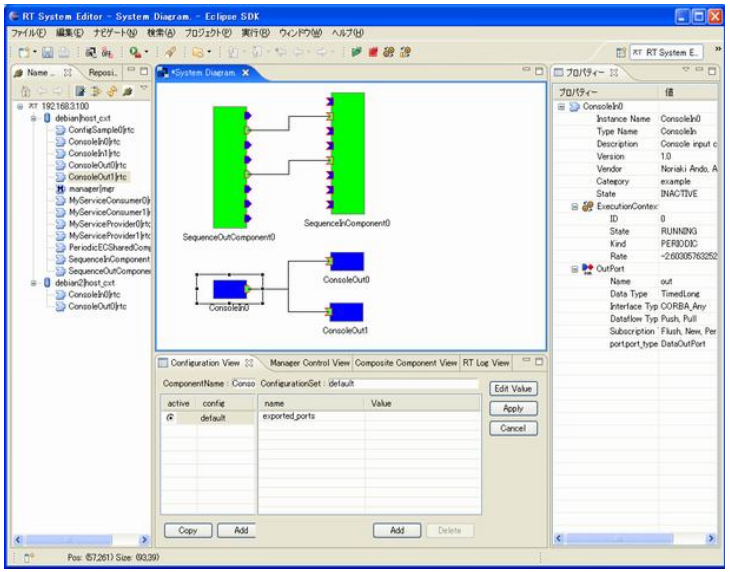
SCADE



MS VPL



Open RTM



Frühe Papiere mit IEC 61499-Ideen

Pergamon

Control Eng. Practice, Vol. 4, No. 6, pp. 855-861, 1996

0967-0661/96 $15.00 + 0.00

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ASYNCHRONOUS AND SYNCHRONOUS APPROACHES FOR PROGRAMMING DISTRIBUTED CONTROL SYSTEMS BASED ON STANDARDS

R. Schoop* and A. Strelzoff**

**AEG Schneider Automation, Steinheimer Strasse 117, 63500 Seligenstadt, Germany (schoop@modicon.de)*
***AEG Schneider Automation, One High Street, North Andover, MA 08145-2699, USA*

Abstract: Based on a general design model for distributed control systems, and using standardised languages of IEC 1131-3 for control, three approaches to programming are investigated. The first is based on IEC programs with extensions, the second is a decomposition of programs with SFC notations and the third approach uses function blocks corresponding to the IEC TC65 Function Block Standard. The approaches are specified and compared, and conclusions for their use and for further work are drawn. The intention of the contribution is to discuss possibilities for open programming models, rather than to present final results.

Keywords: Distributed control, distributed models, functional blocks, open control systems, programming approaches, sequential control, standards

Komponentenmodell

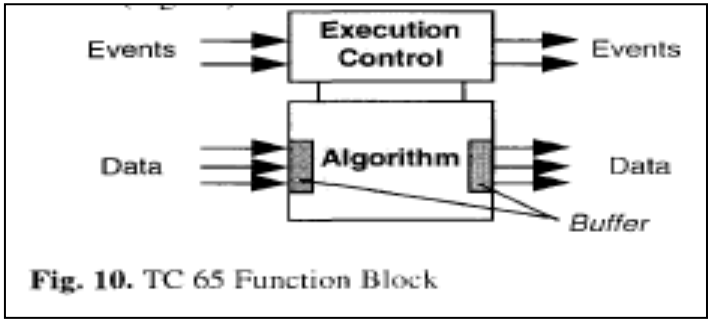
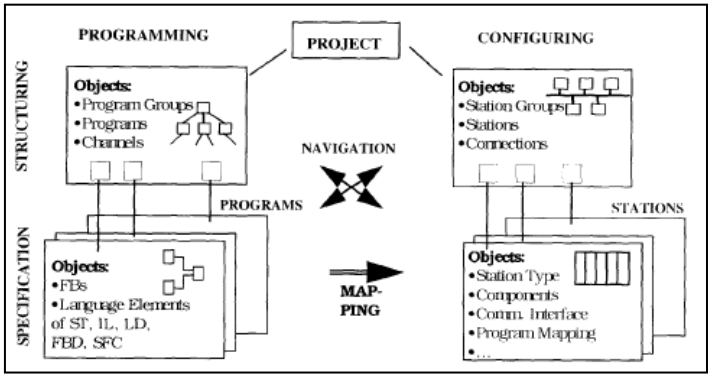
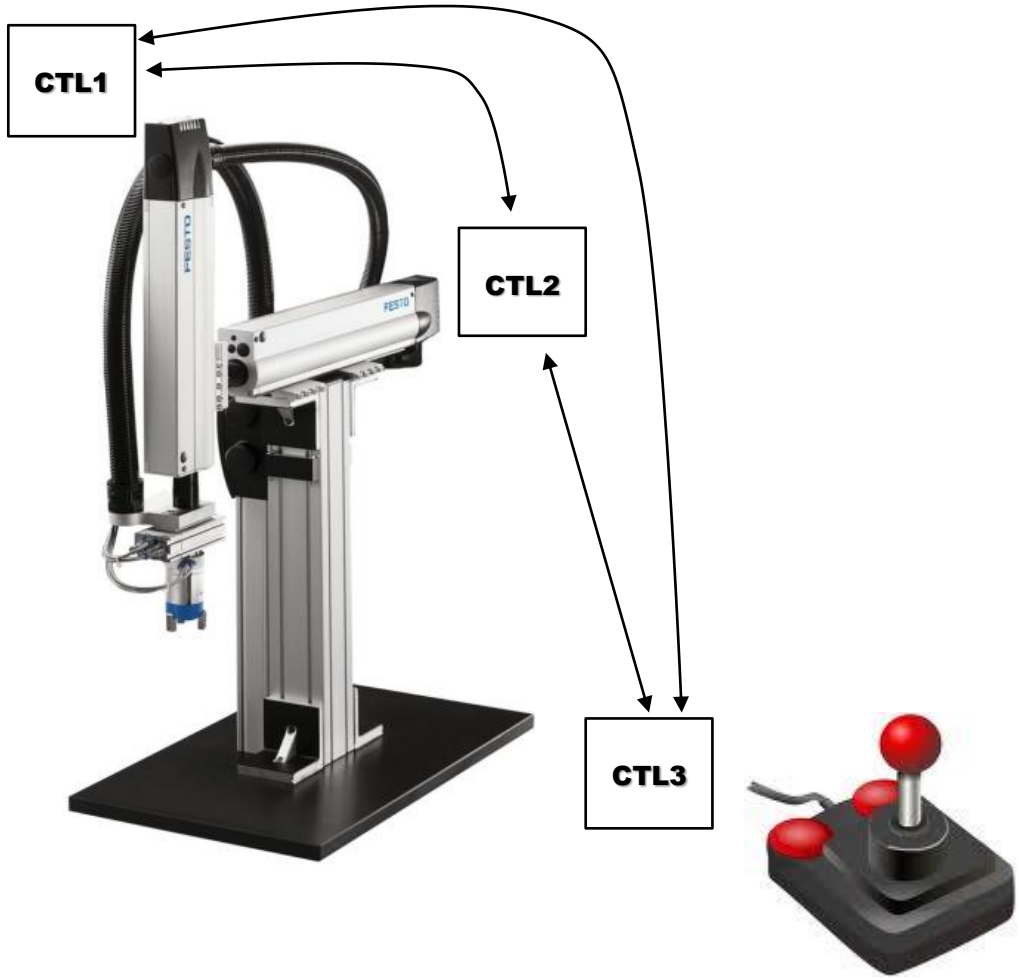


Fig. 10. TC 65 Function Block

Verteilungsmodell

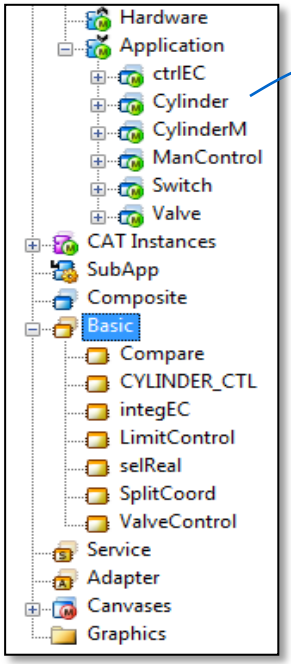


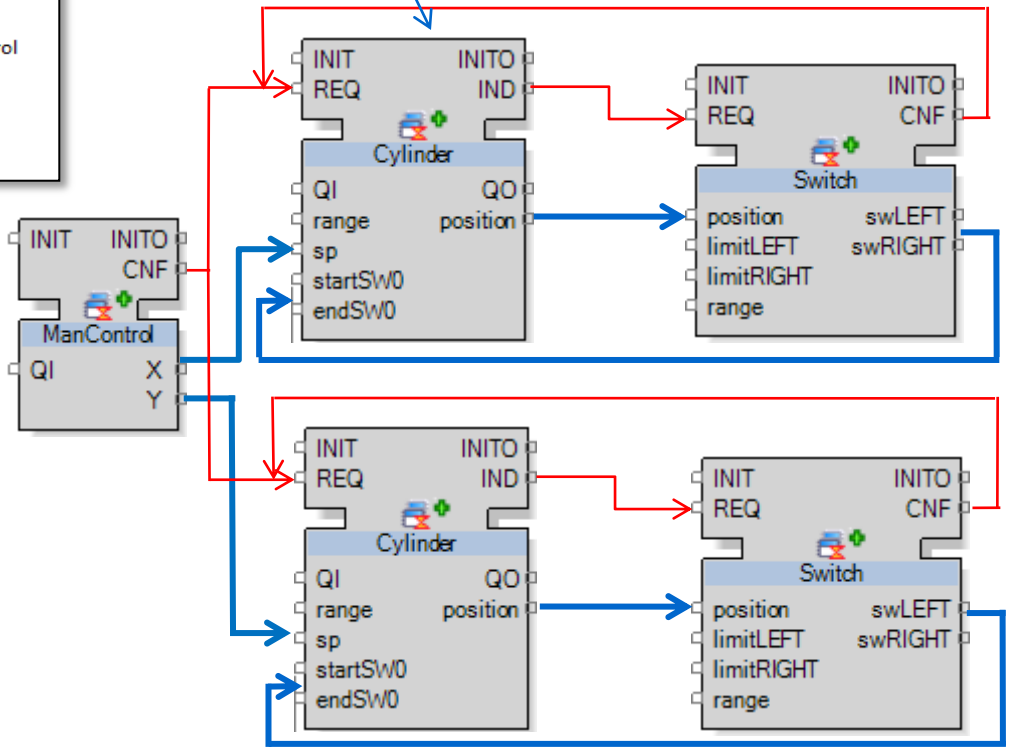
Kurze Einführung in Funktionsbausteine

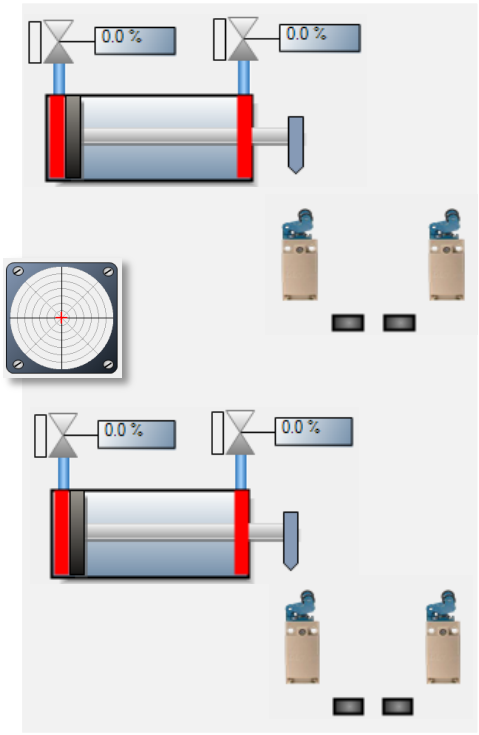


Modulare Software für Modulare Maschinen

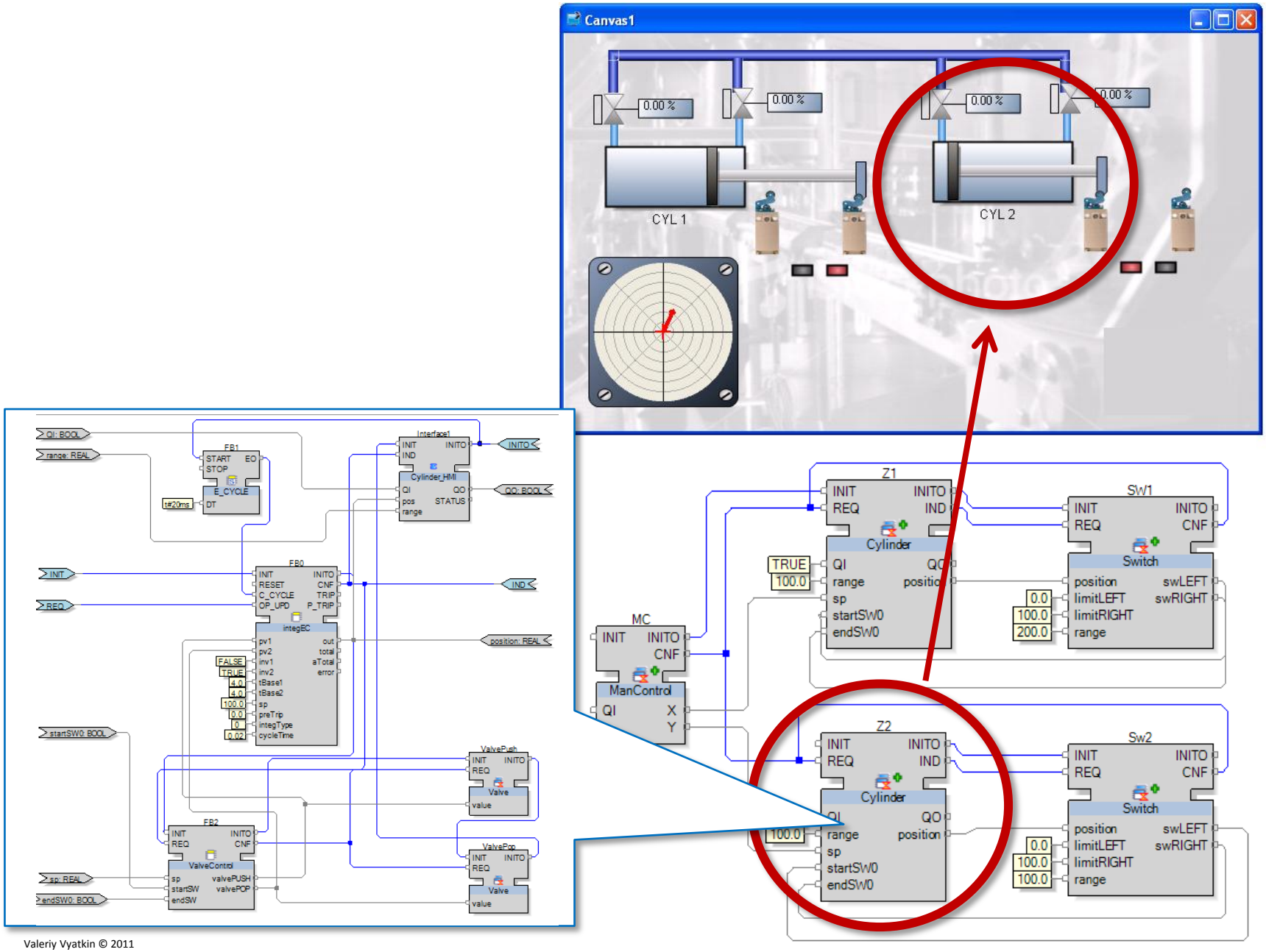
Repository



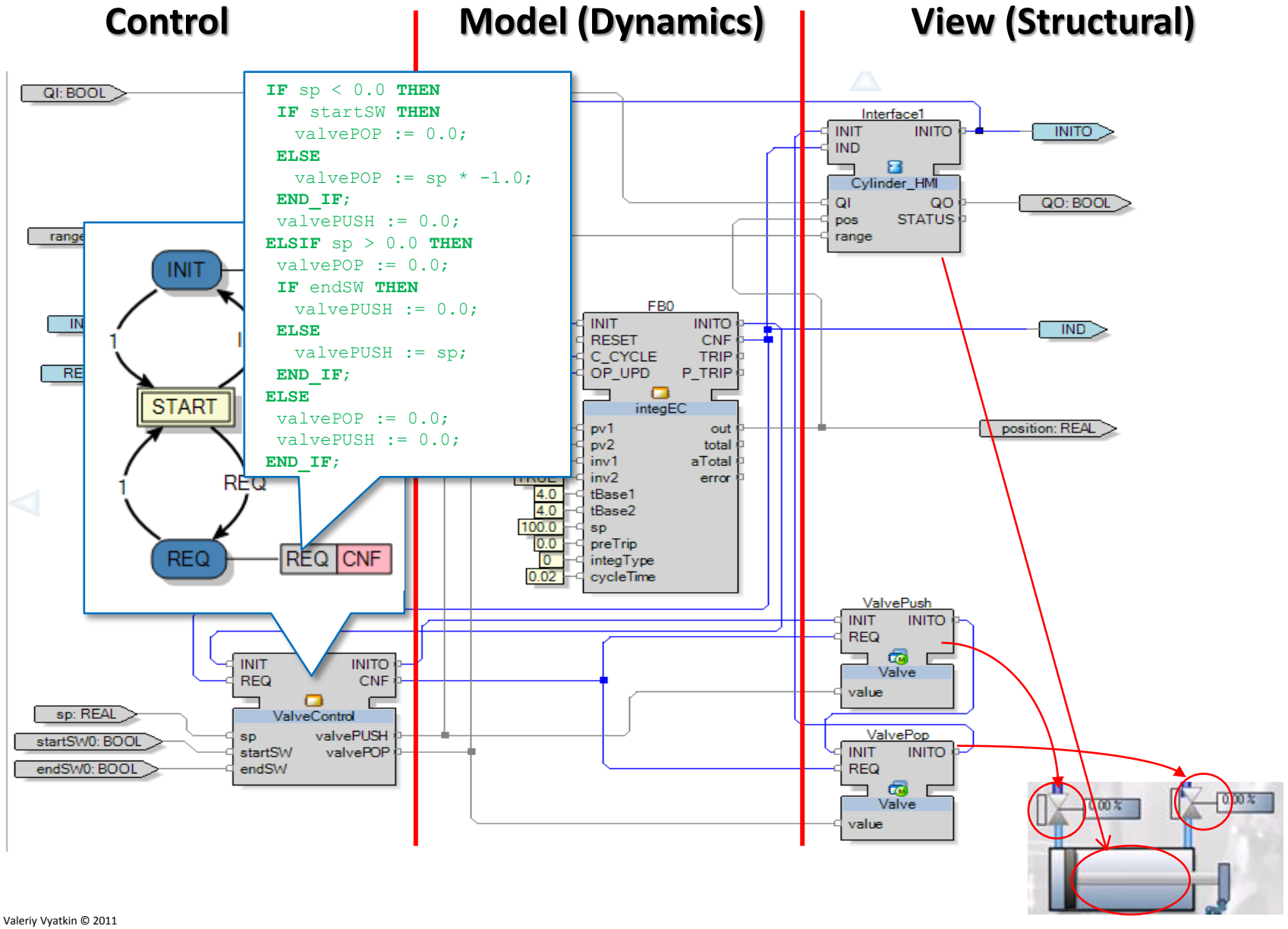




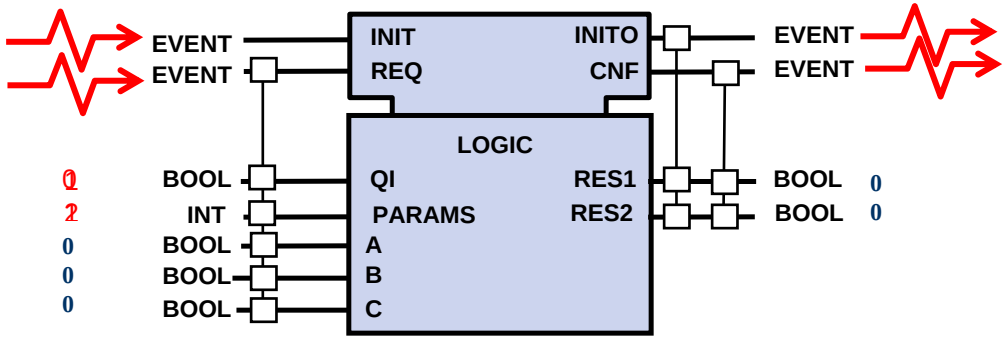
MVC Design Pattern

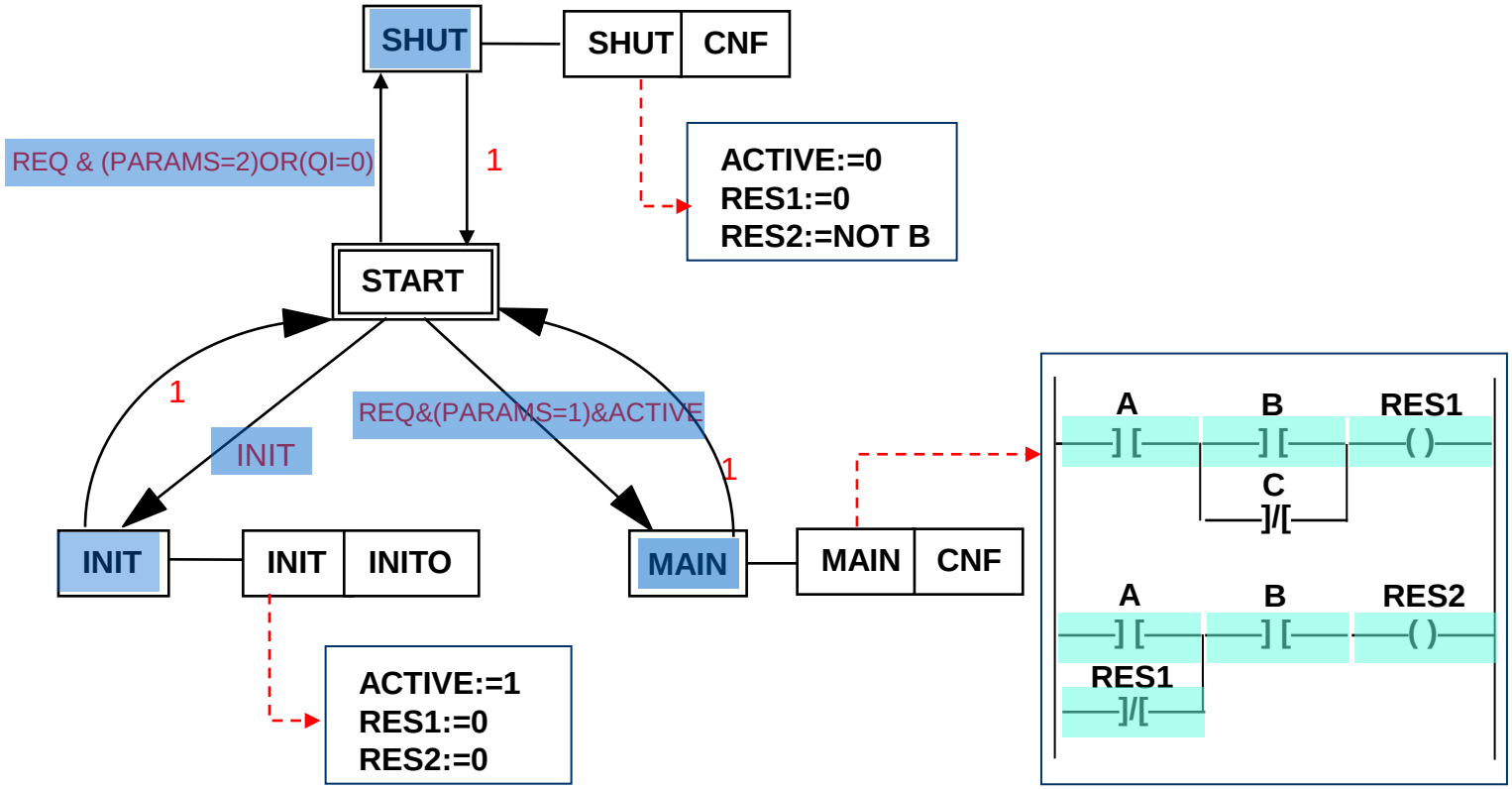


Zylinder: MVC Design

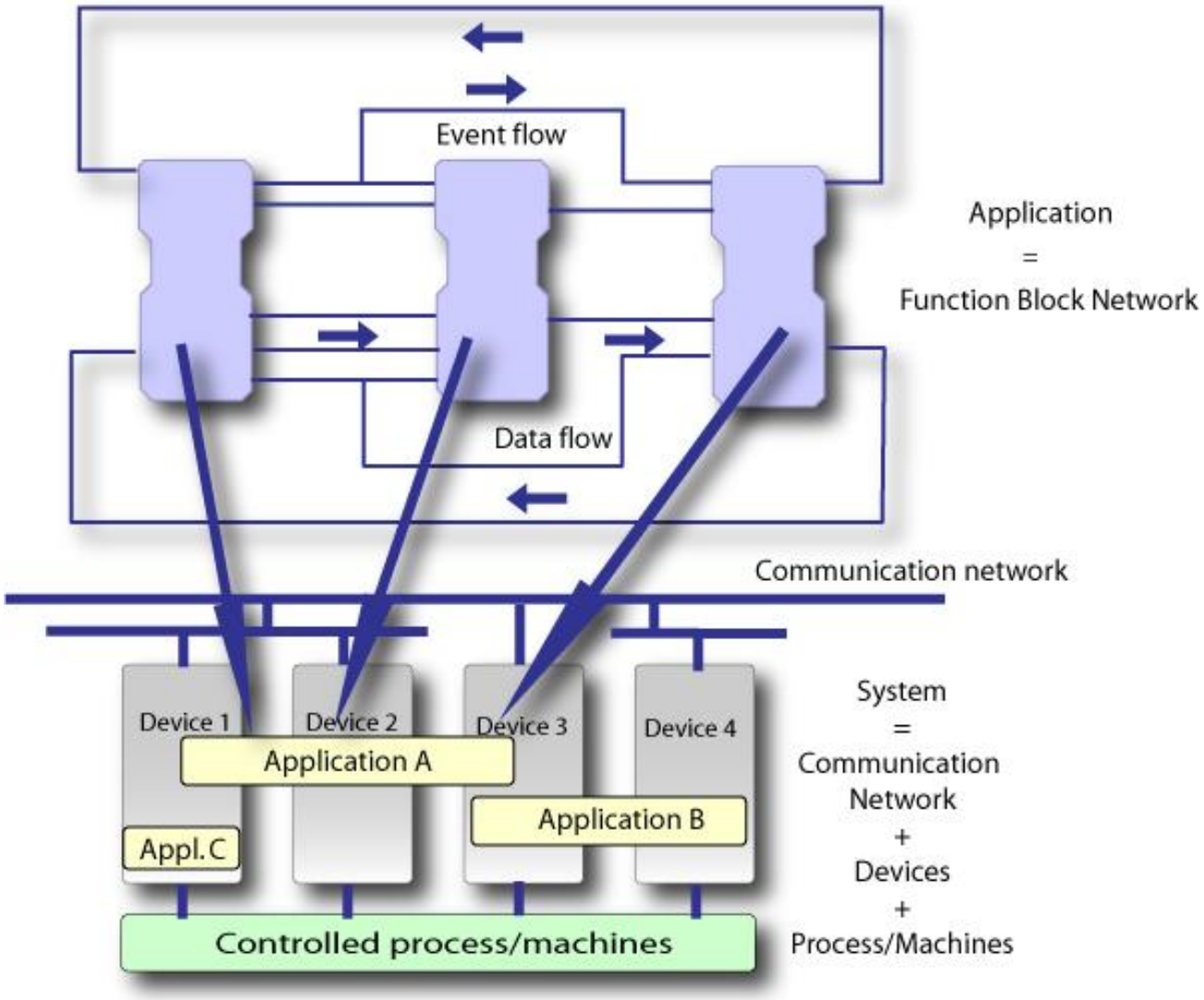


Ausführungsmodell– ereignisgesteuert

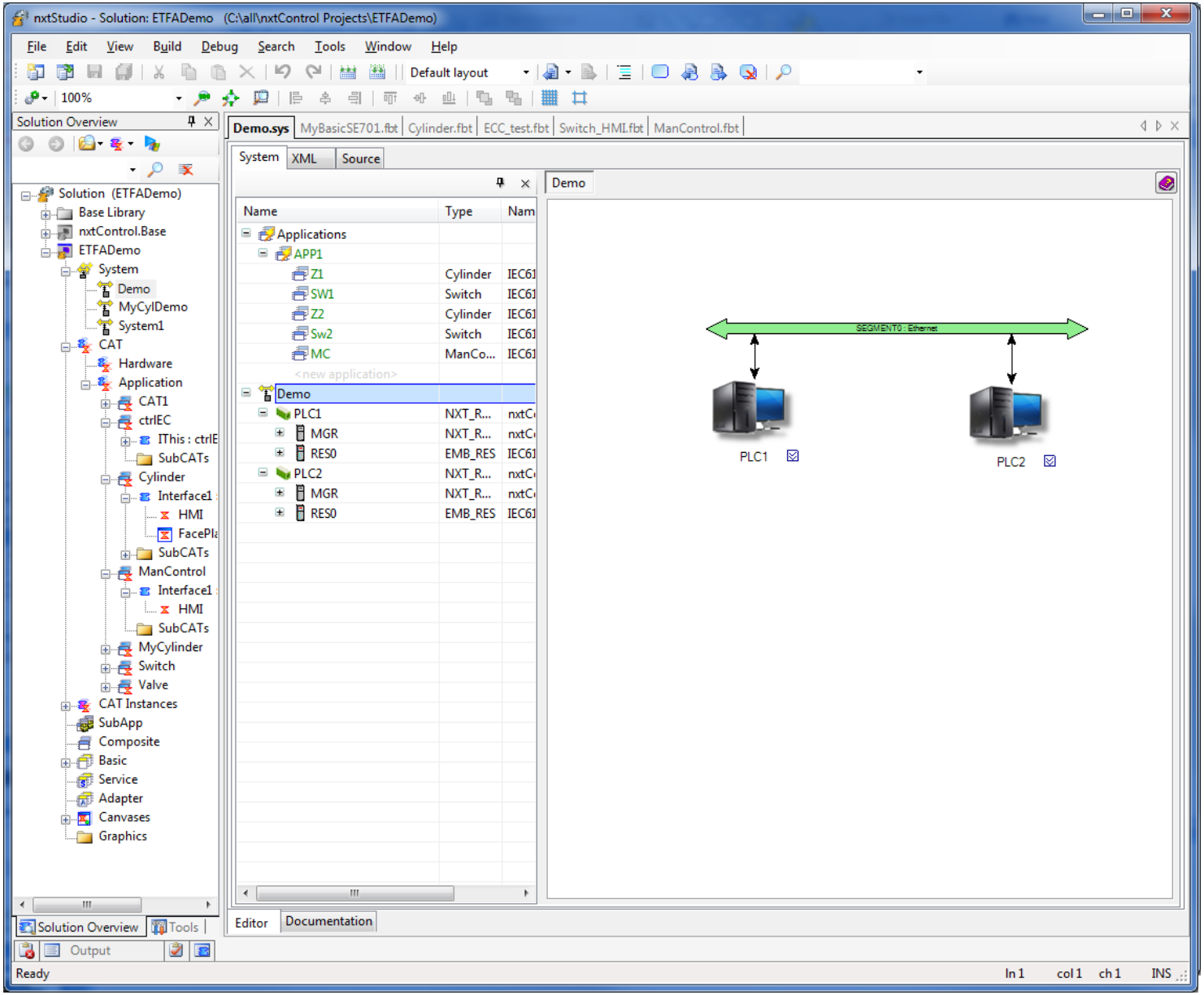




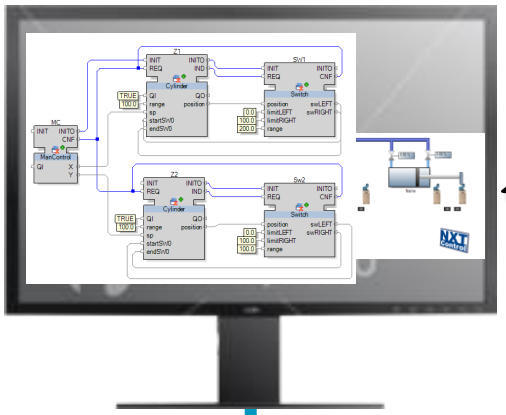
System-level Model

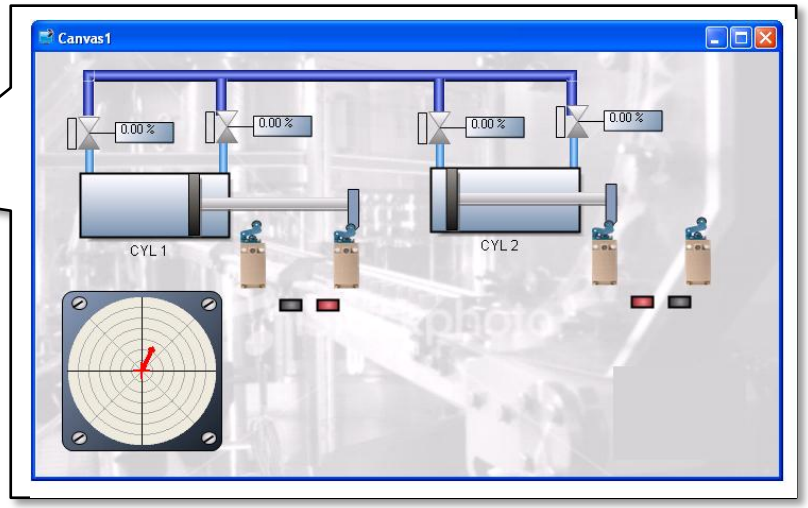


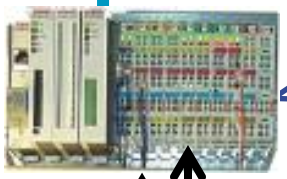
Systemmodel beinhaltet vernetzte Geräte

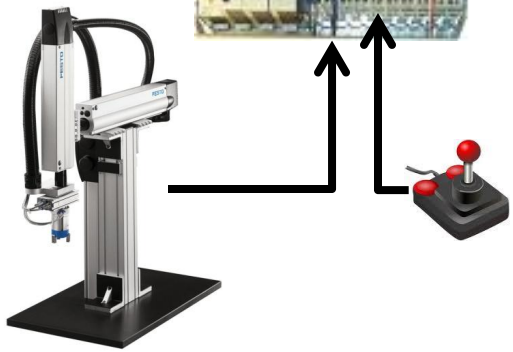


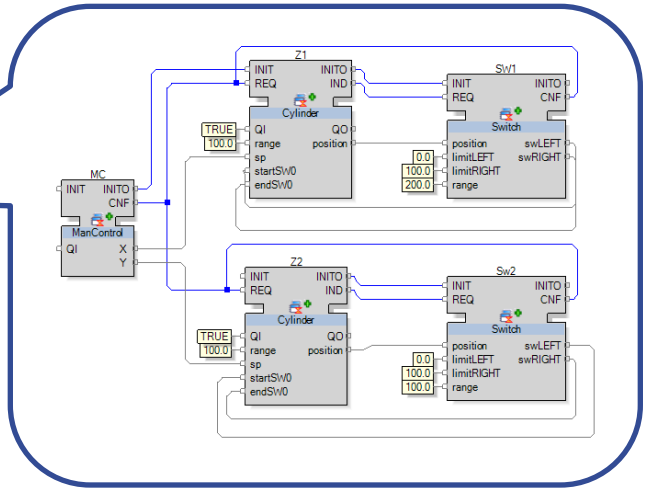
Zentralisierte Ausführung



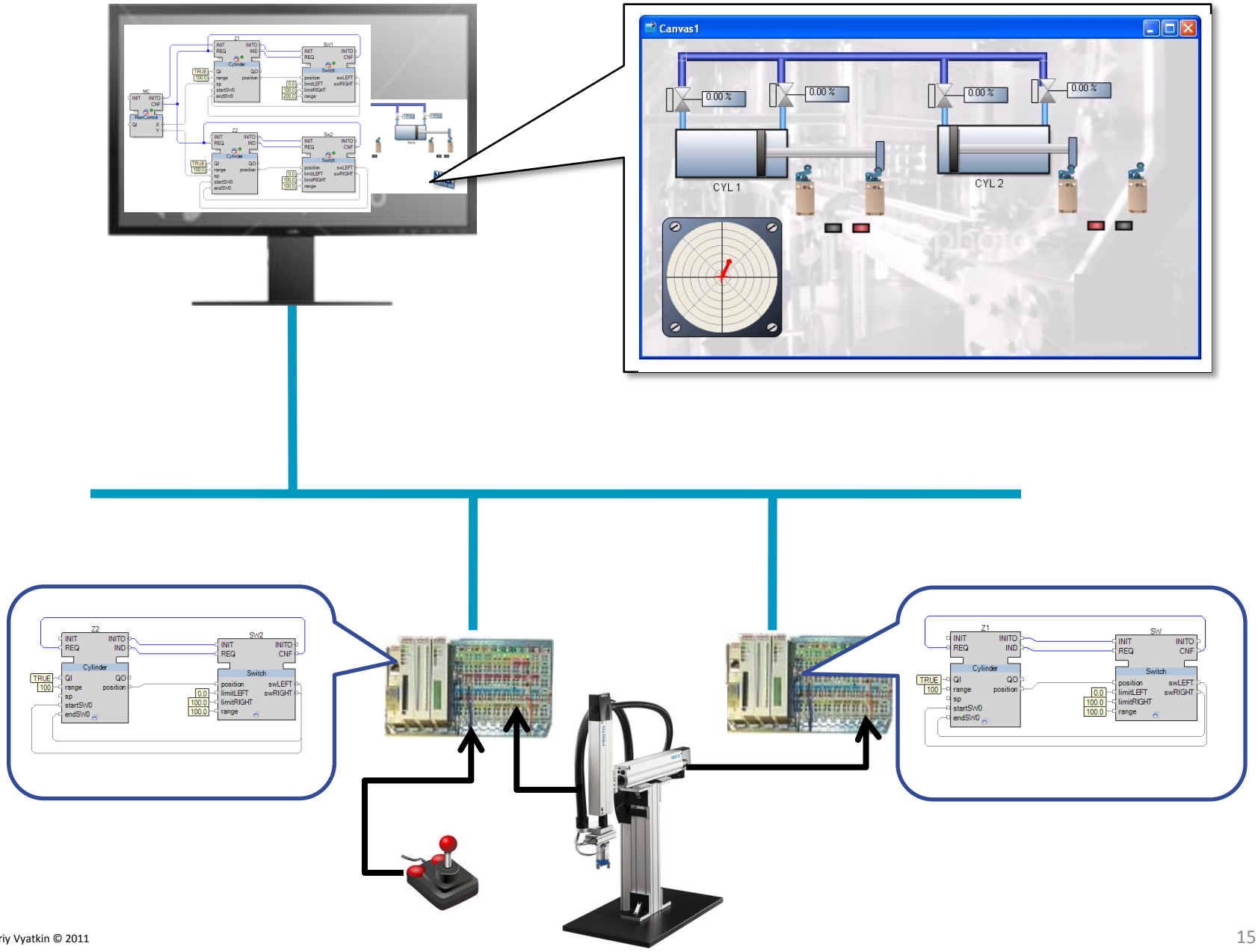




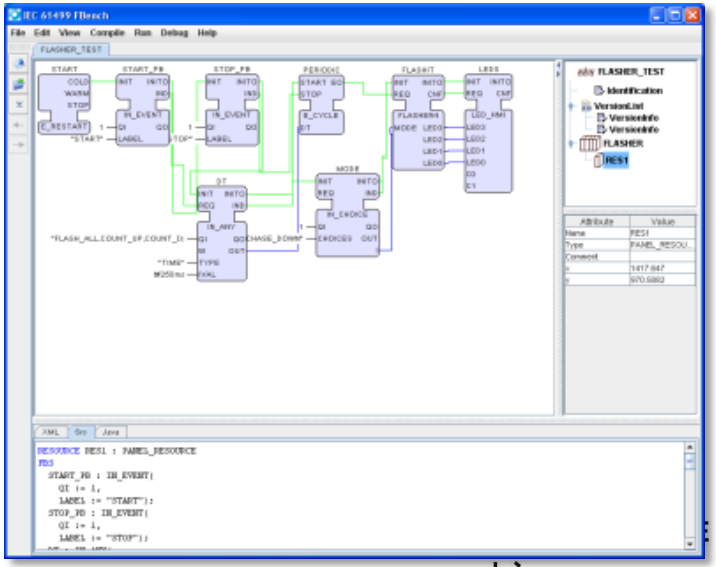




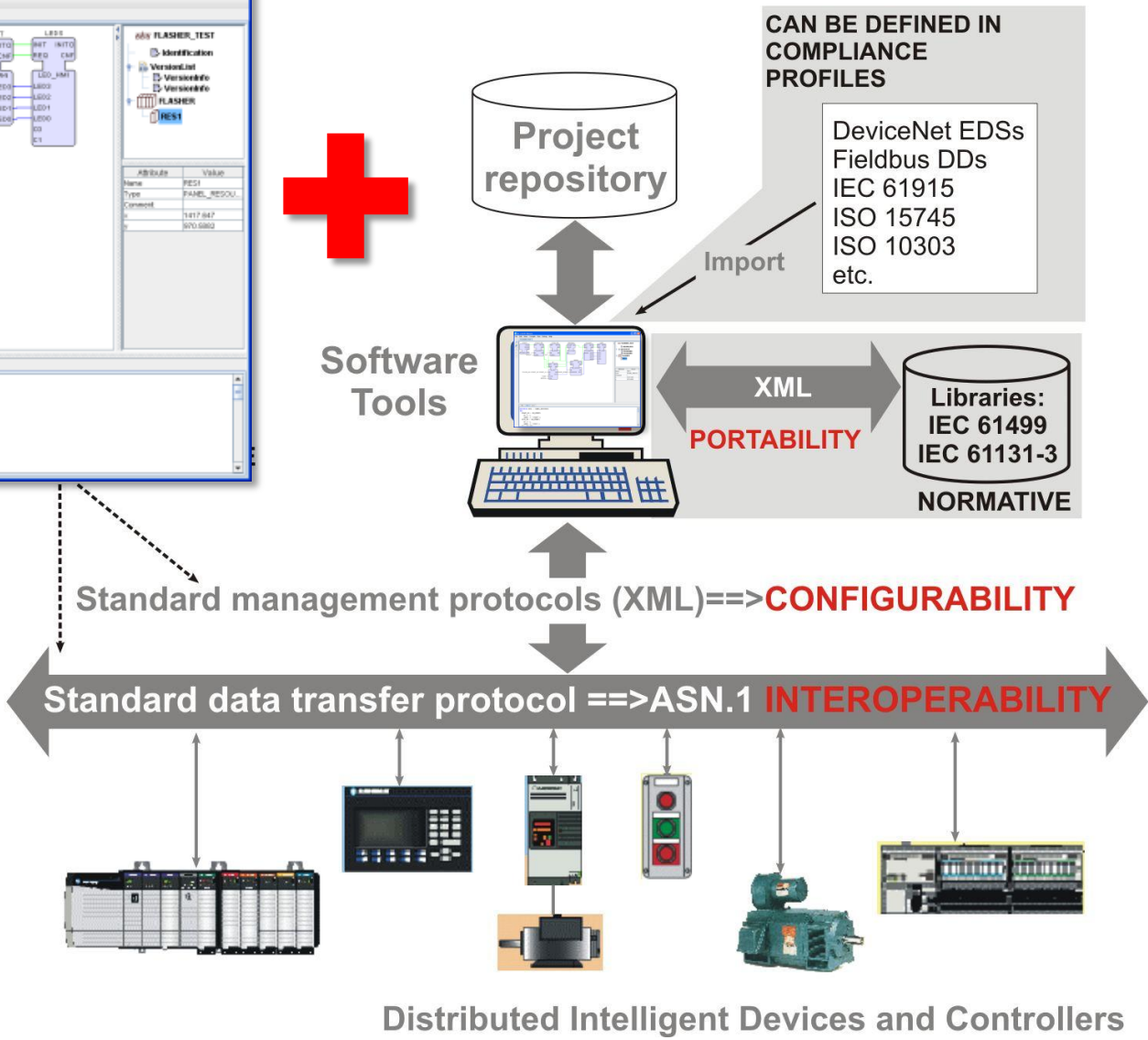
Verteilte Ausführung



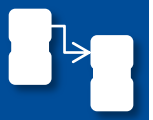
IEC 61499: Summary of Benefits



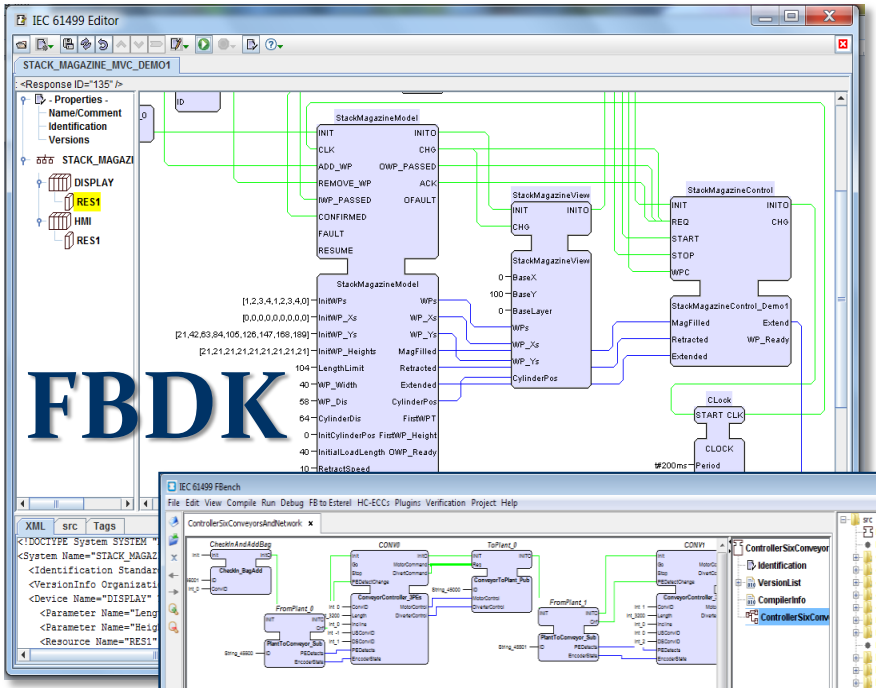
Visual System Level Language for Distributed Systems

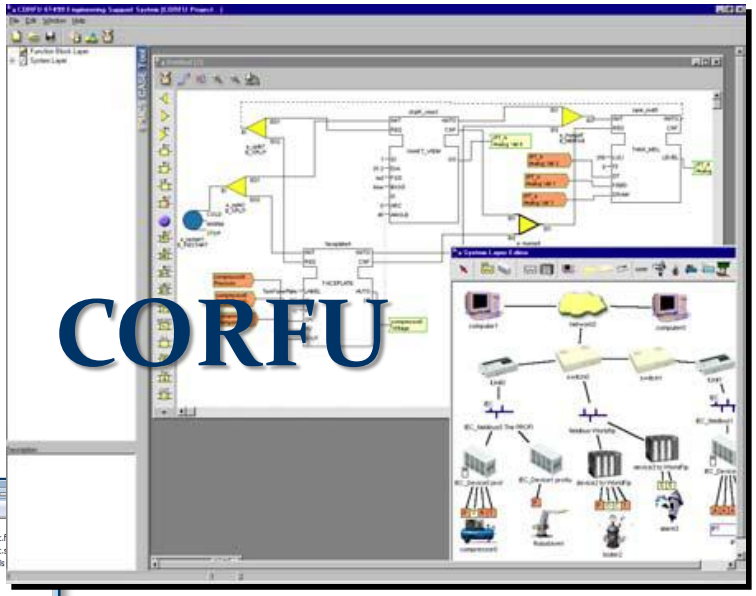


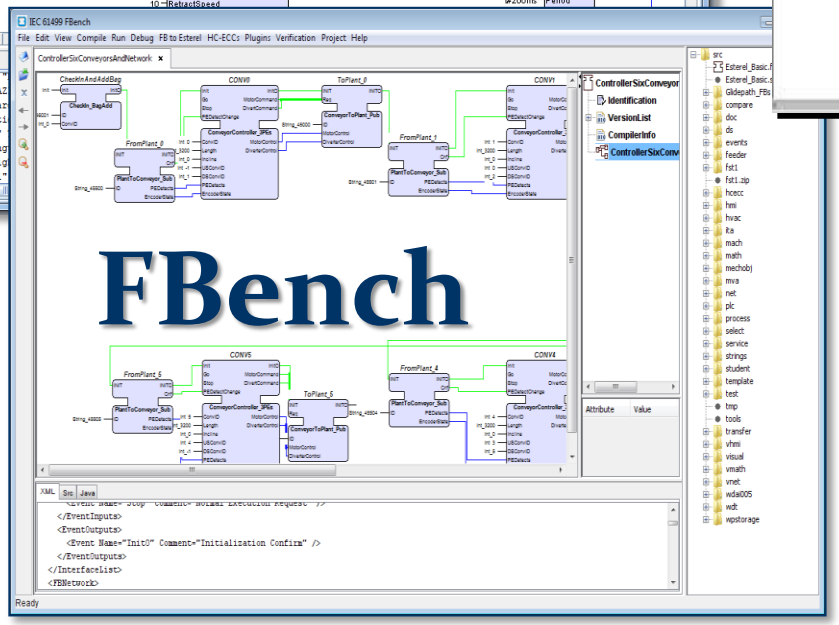
TOOLS und PLATTFORMEN



Experimental Tools

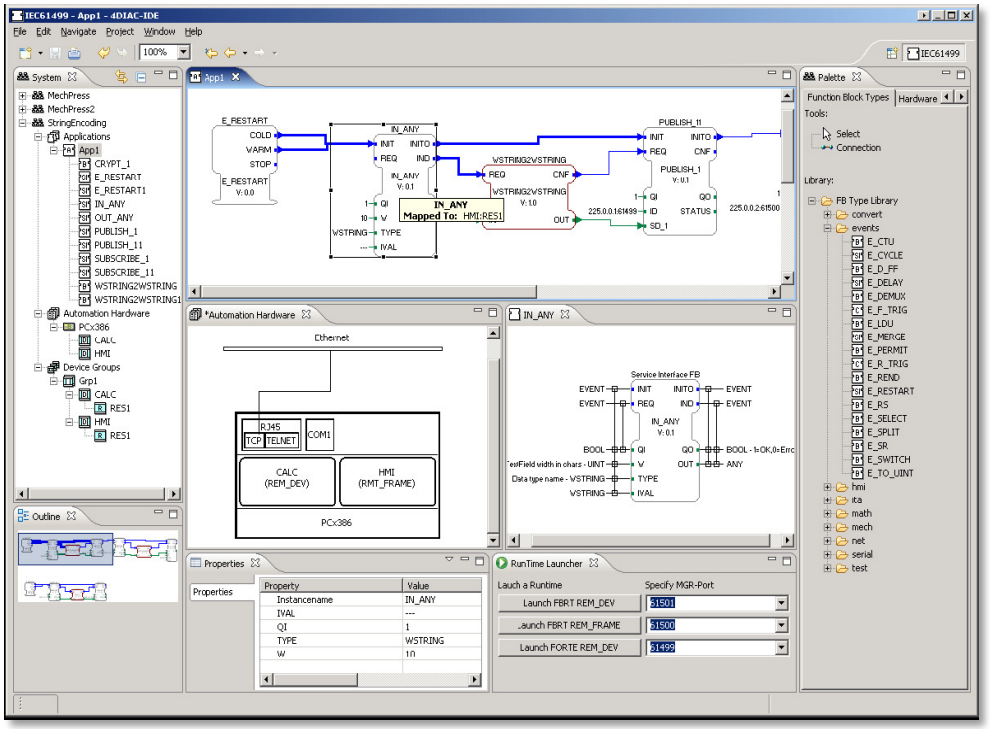


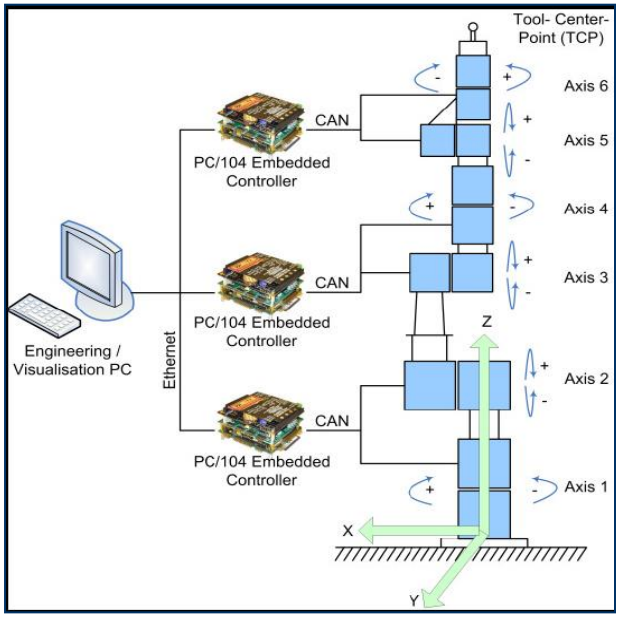




4DIAC IDE und RTE (forte)

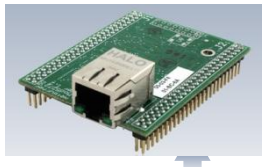
4DIAC-IDE





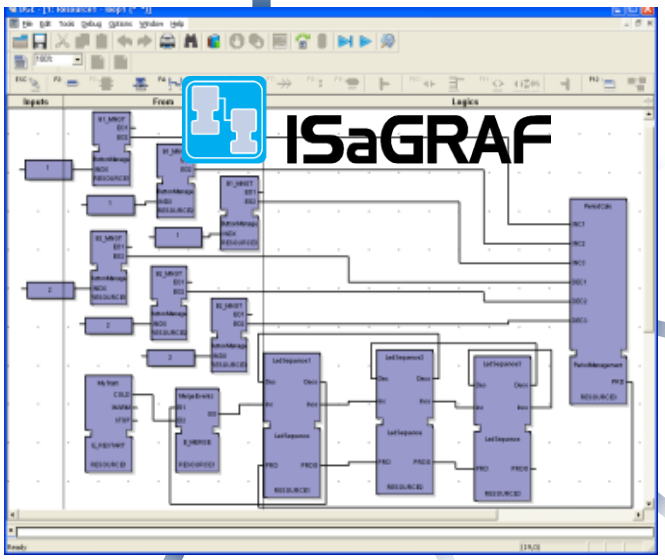
ISaGRAF
A Rockwell Automation Company

RTUs/PLCs/PACs

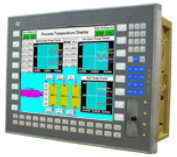


and much more…

Industrial PCs



Small Controllers



Panel PCs

Tiny Controllers

PC 104

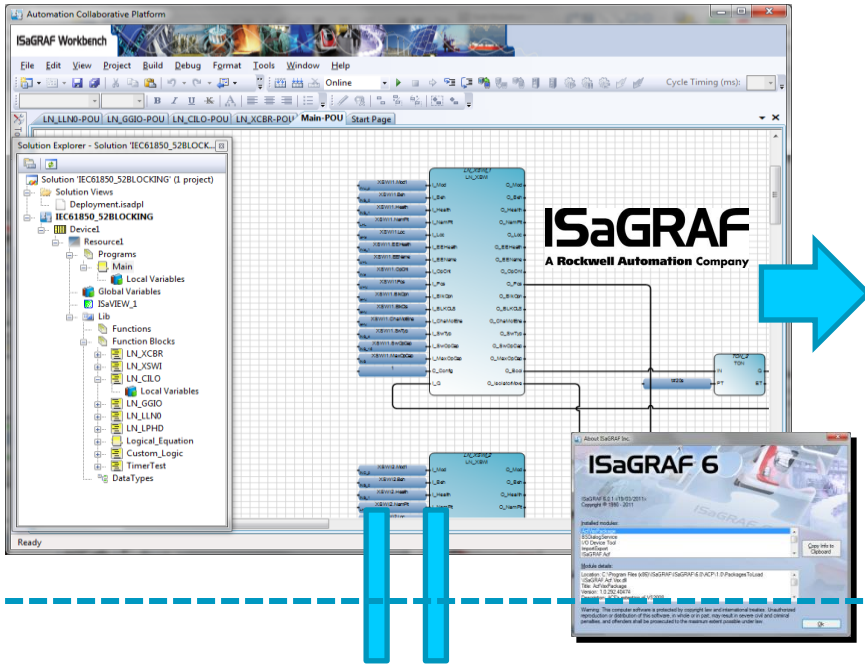
Intelligent Boards

VME Boards And Racks

ABB
AREVA
ALSTOM
SNCF
THALES
eca
BOMBARDIER
WAGO
INNOVATIVE CONNECTIONS
Schneider Electric

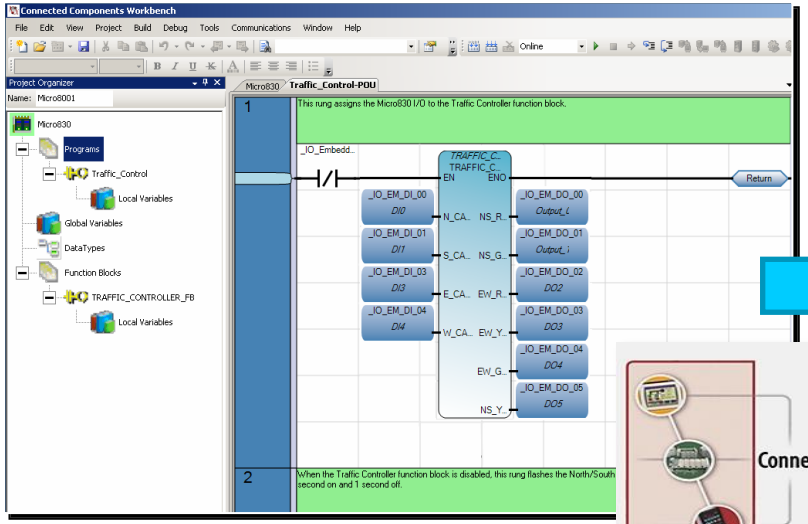
and much more…

ISaGRAF v.6.0



ISaGRAF v.5 supports IEC 61499 since 2005. The next generation ISaGRAF v.6 released in 2010.

And, since 2008 ISaGRAF is Rockwell Automation company.

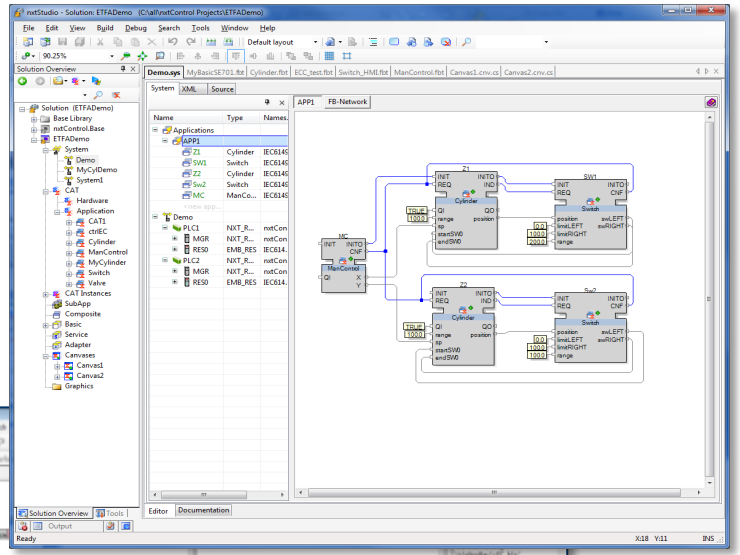


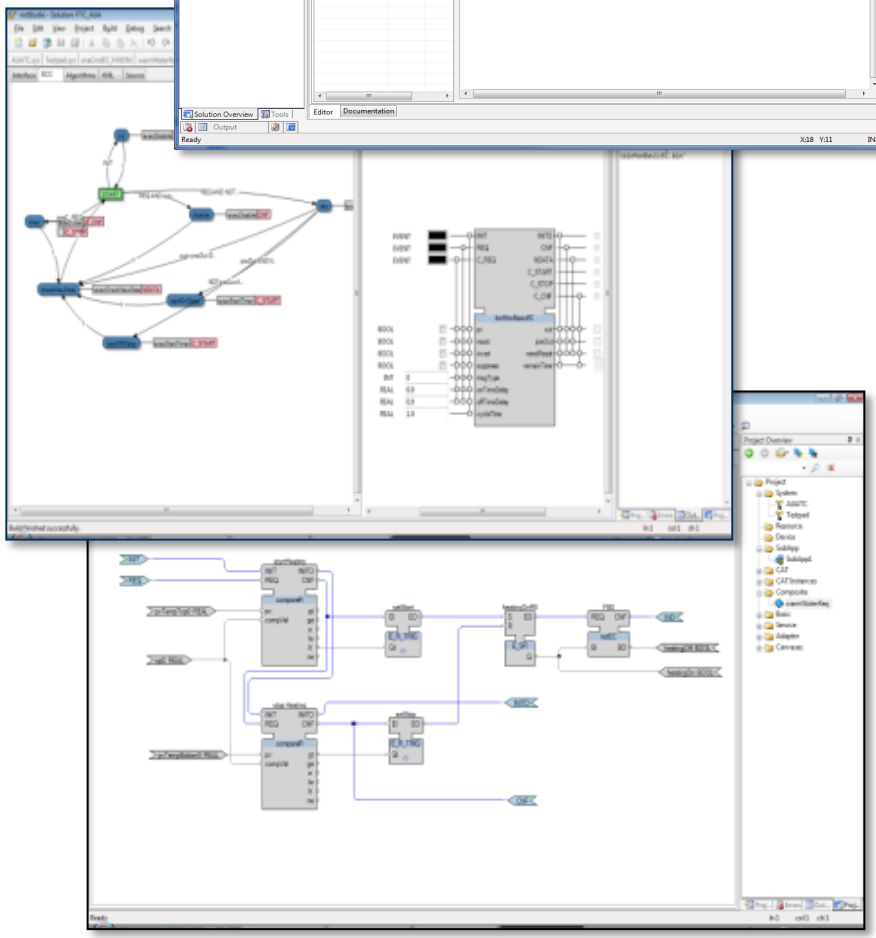
Allen-Bradley Micro800™ Family of PLCs

Featuring Allen-Bradley Connected Components Workbench™ Programming and Configuration Software

NXT Control

Austria





ADVANTECH

BECKHOFF

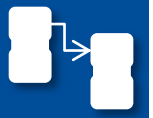
SIEMENS

WAGO®

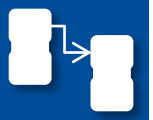
INNOVATIVE CONNECTIONS

Vorteile?

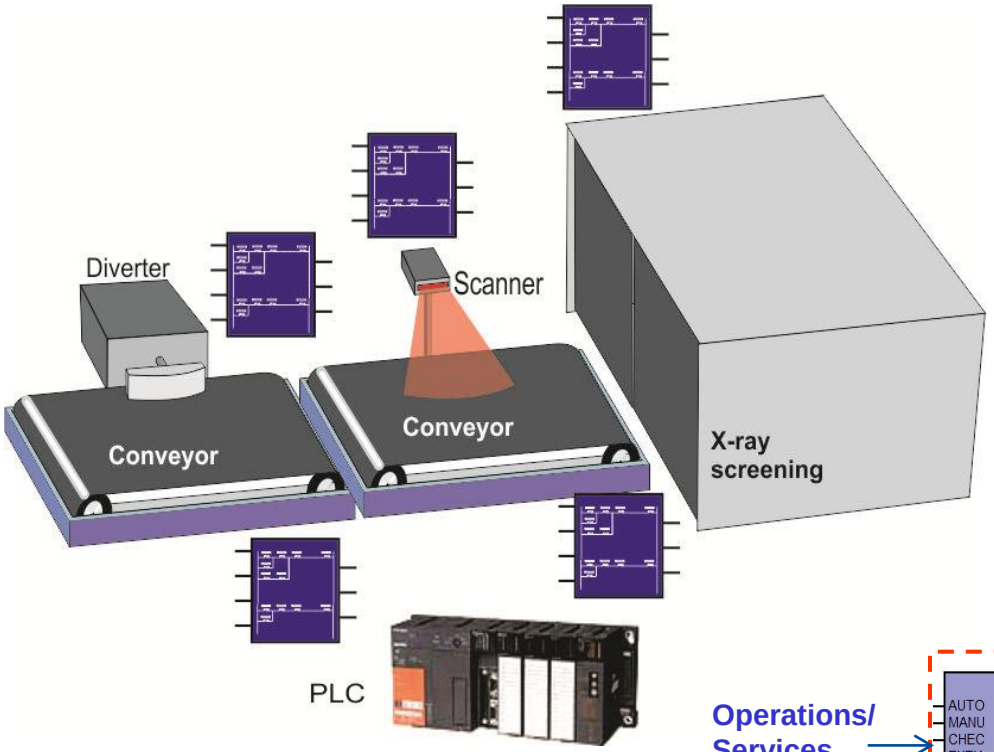
- Entwurfseffizienz
- Simulation verteilter Software auf System-Ebene
- Automatische Codeverteilung



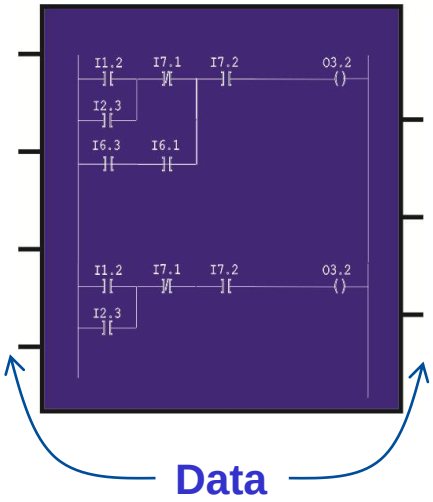
HAUPTUNTERSCHIEDE zur IEC 61131-3



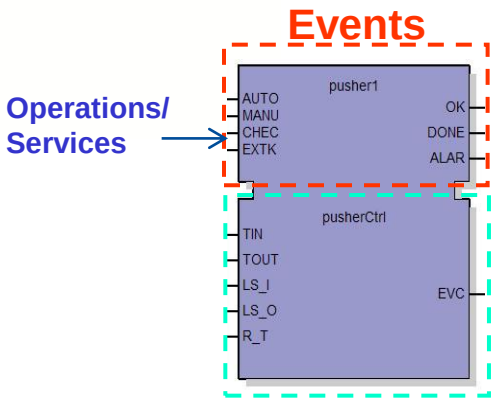
Encapsulate in Function Blocks

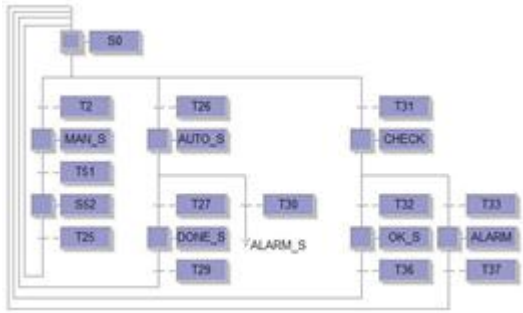


Function Block in PLC

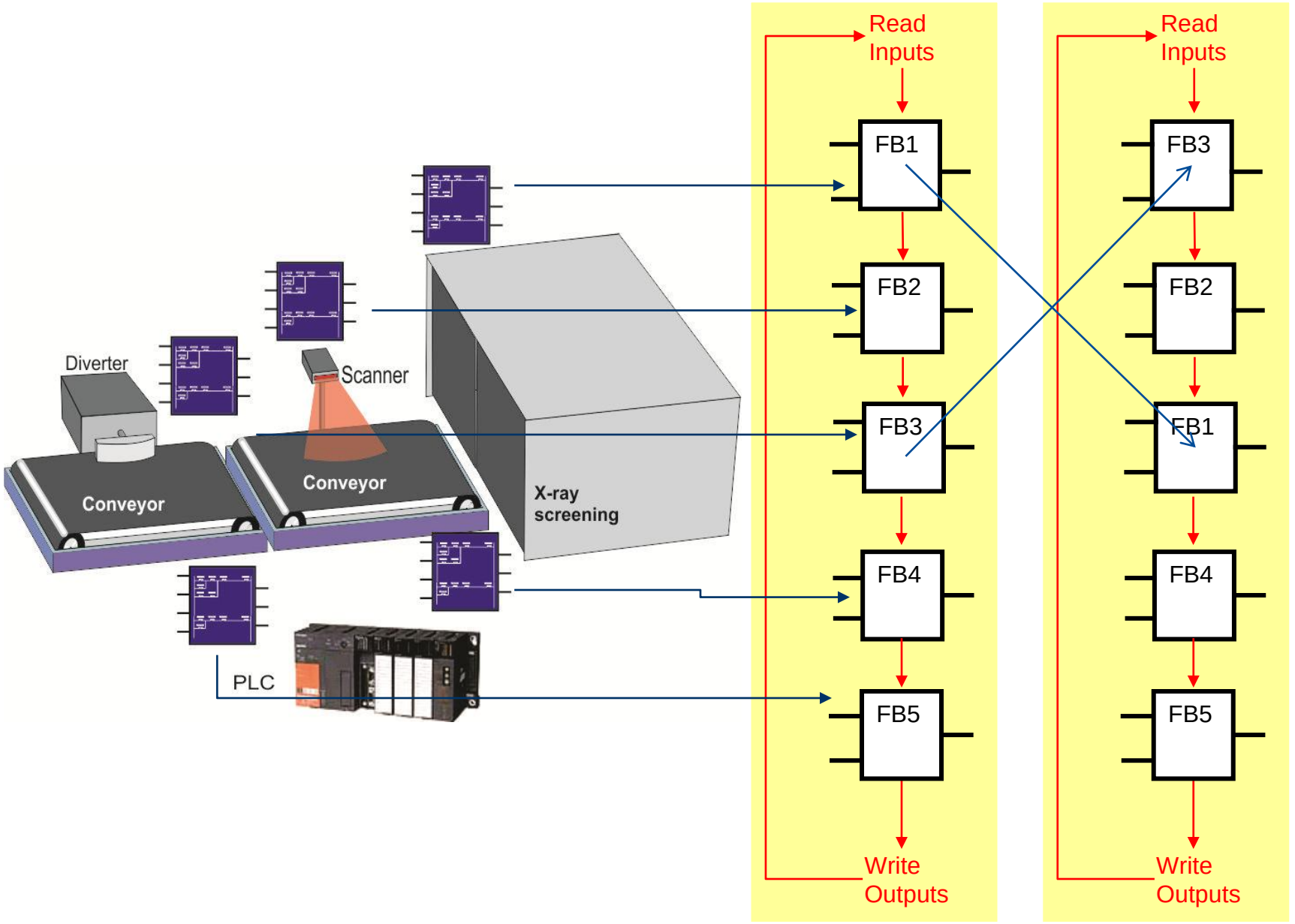


Function Block in IEC 61499

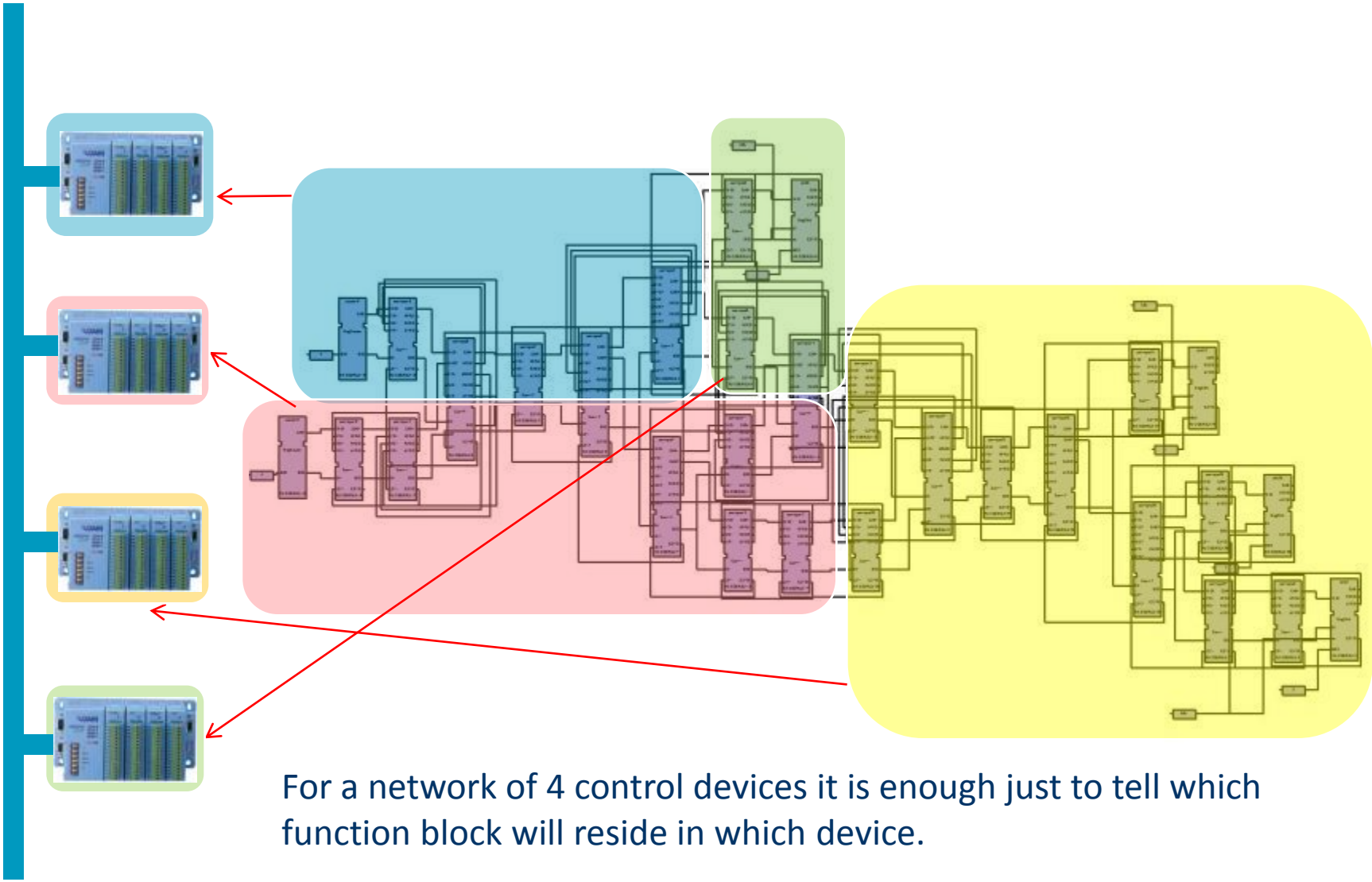




FB Re-use in the Traditional PLC Architecture



In IEC 61499 Code Distribution is Easy



For a network of 4 control devices it is enough just to tell which function block will reside in which device.

Conclusion

Function block architecture of IEC 61499 combines all essential features of a mature model-based software engineering framework with:

- System-level design of distributed systems
- Distribution on networked targets
- Open standard
- Determinism and efficiency of execution