

IEC 61499 - a Multi-Agent Based, Open Control Standard

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Agenda

- What's Agent Software?
- Why do I want Agent Software?
- What is IEC61499?
- Where did IEC61499 come from?
- How can I use IEC61499?
- Where can I find IEC61499?



What's Agent Software?

- Autonomous - proactive
- learning
- cooperation
- mobile
- reactive/deliberative
- graceful degradation
- Most Famous Agent?



Types of Agent Software

- Collaborative agents
- Interface agents
- Mobile agents
- Information/Internet agents
- Reactive agents
- Hybrid agents
- Smart Agents



Why do I want Agent Software?

- Easier to distribute
- More robust
- Configuration options
- Complex control
- Flexible
- Agile
- Graceful Degradation



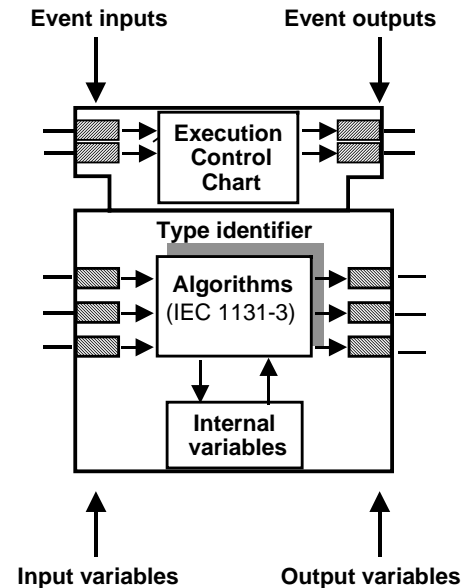
What is IEC 61499?

- Standard issued by International Electrotechnical Commission
- Distributed Function Block Architecture for Industrial Measurement and Control Systems
- An international, collaborative effort

Characteristics

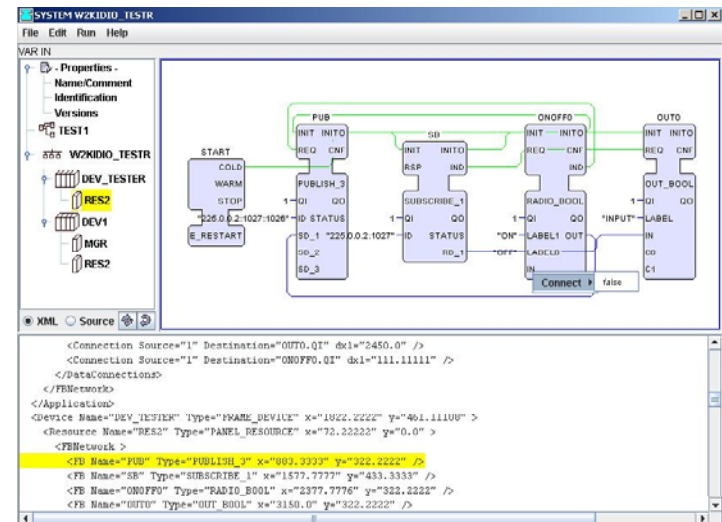
■ Features:

- IEC61499 Function Block Programming
- Built on IEC1131 Function Block Standard
- Adds “Top-Hat” mechanism for event triggering



Characteristics

- Graphical Programming:
 - Select from over 400 Function Blocks
 - Graphically interconnect data flow
 - Graphically interconnect event triggers
 - Distribute over multiple controllers
 - Download and Run



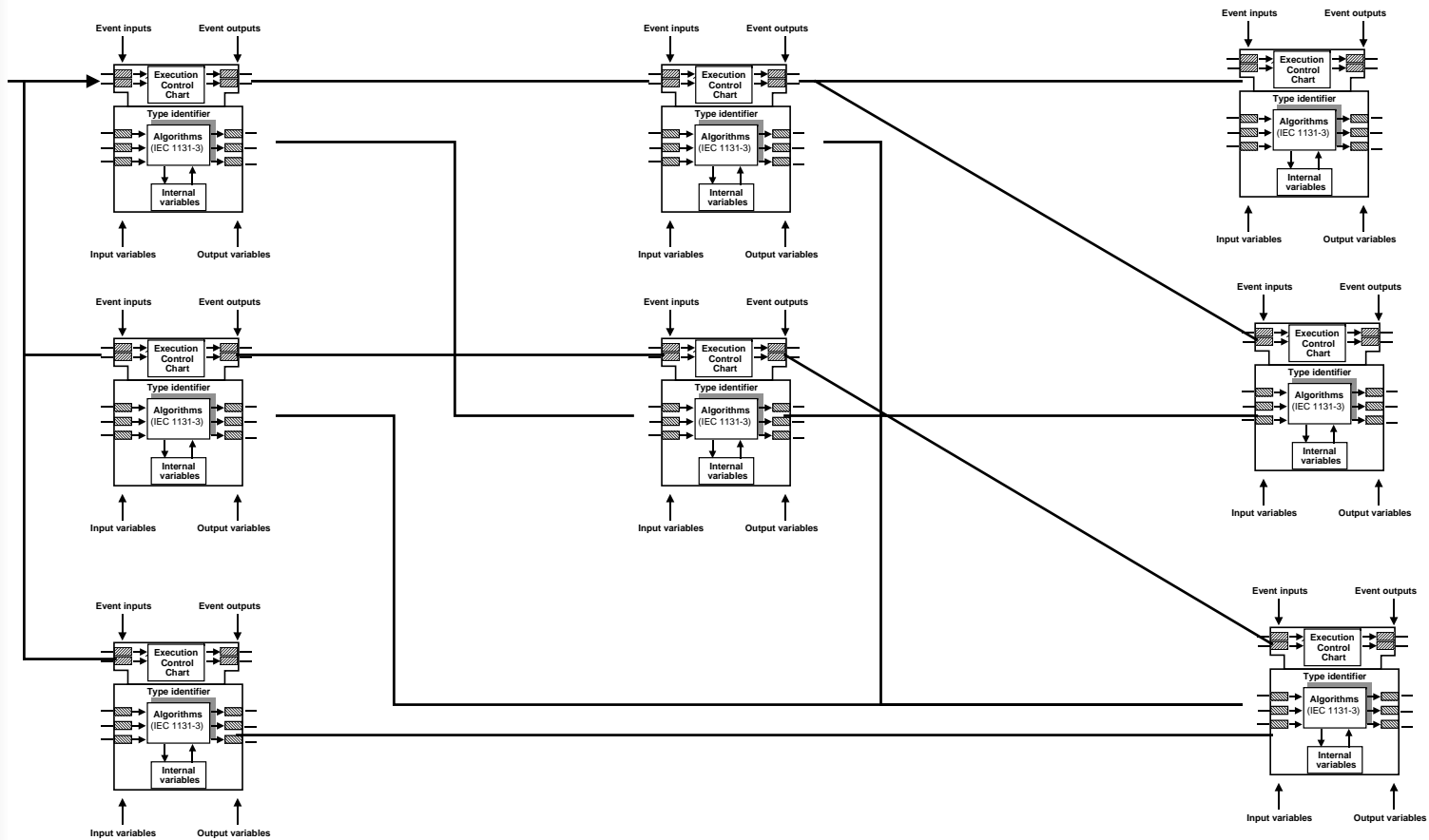
Characteristics

■ Features:

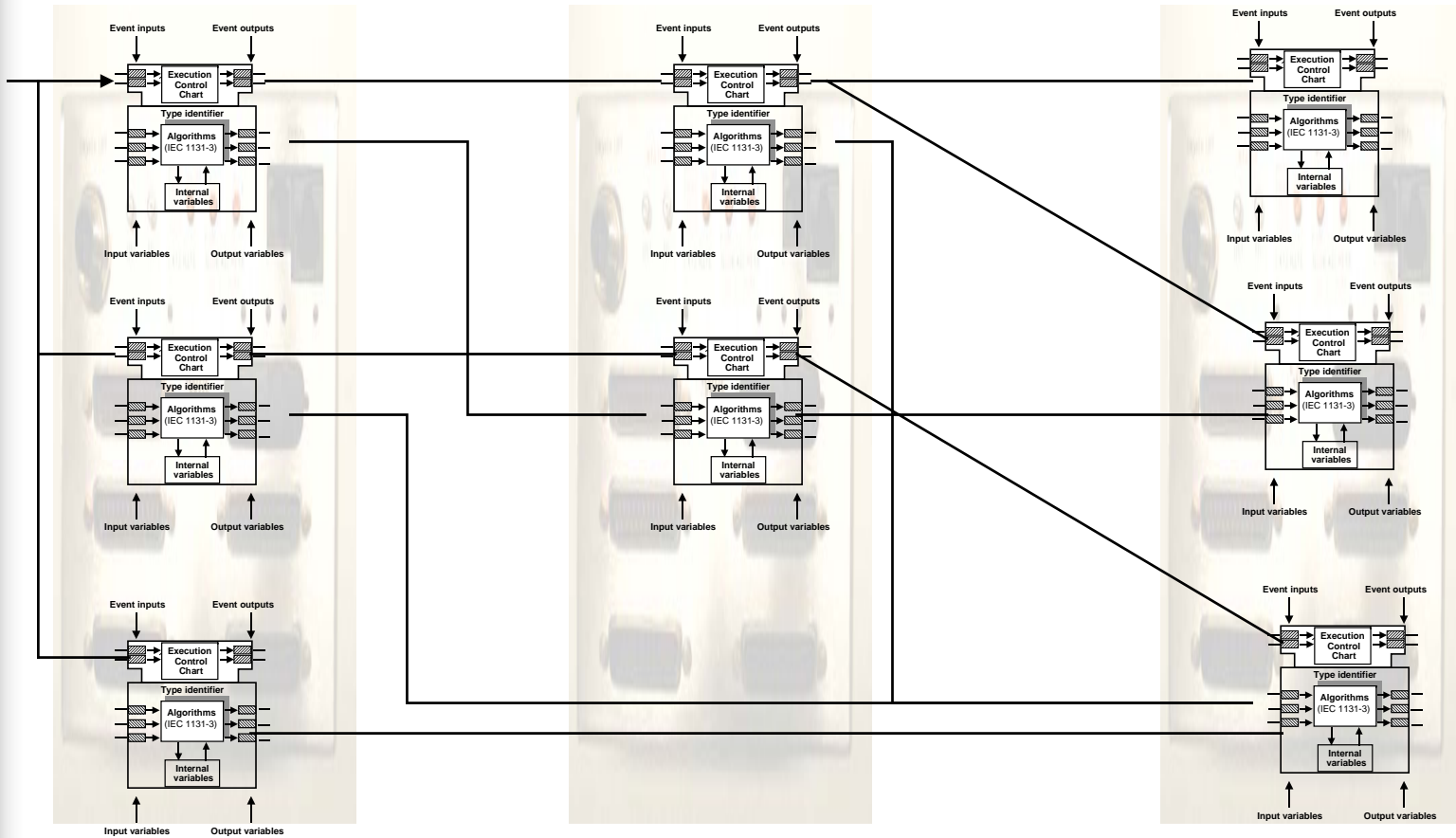
- Select from open communication standards
 - Ethernet TCP/IP, UDP, and FTP
 - CAN
 - Optional DeviceNet / CanOpen
 - user-defined scratch pad memory blocks can be used for internally generated calculations, events, and data
 - Additional, optional, networks are planned



Distributed Control



Distributed over Controllers



Where did IEC61499 come from?

IEC 61499

Holonic Manufacturing Systems (HMS)

Parent organization: IEC

Working group:
TC65/WG6

Goal: Standard model
(function blocks) for
control encapsulation &
distribution

Parent organization: IMS
(\$250M in R&D funding)

Working group:

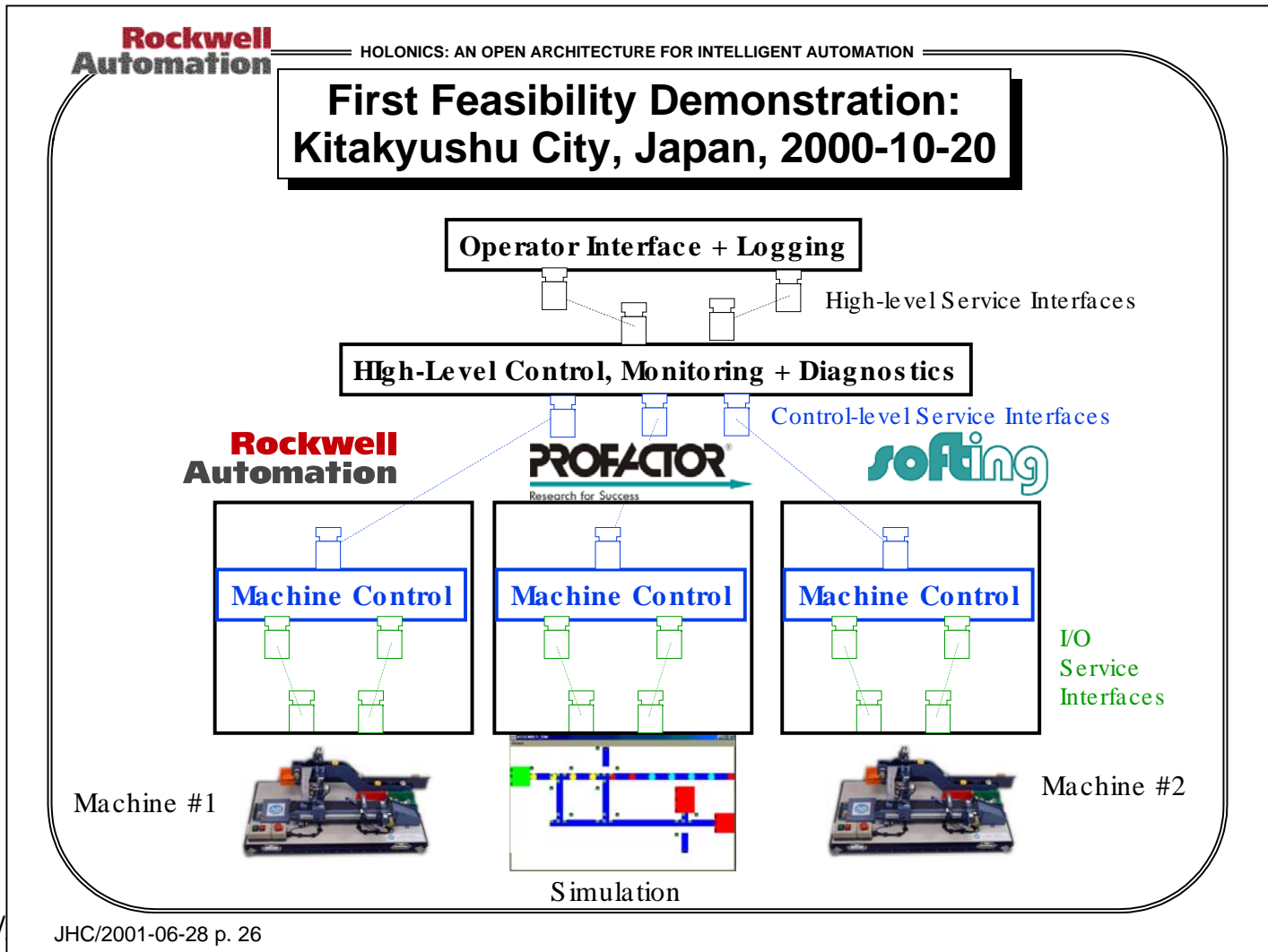
HMS Consortium

Goal: Intelligent manu-
facturing through holonic
(autonomous, cooperative)
modules

requirements
Controls architecture

Agile systems architecture

HOLONICS





How can I use IEC61499?

- **Distributed Control**
 - pipeline management
 - power grid management
 - high-speed manufacturing
- **High-Reliability Applications**
- **Applications requiring local intelligence**
- **High-speed applications**

Underlying Hardware



- W2 Holocon™ Controller is the first IEC61499-compliant controller in the marketplace.
- W2 is built on Rockwell Automation's Function Block Runtime and Development Kit Software with WRC unique extensions.
- Rockwell has not yet introduced this technology

OPPORTUNITY

■ W2 Holocon Controller:

- **MOOSE (Multitasking, Multi-Object, Operating System)**
- **Extensive Memory (2M Flash, 8M DRAM)**
- **Battery-Backed Real-Time Clock**
- **Embedded JAVA Engine**
- **Ethernet**
- **Web Server**
- **CAN**
- **RS232/422/485**





Where can I find IEC61499?

- Western Reserve Controls - Holocon™
- Tait Controls
- Holobloc
- Softing
- Rockwell
- Profactor
- ICS Triplex ISaGRAF



Useful URLs

■ General Information:

- <http://www.holobloc.com>
- <http://www.holobloc.com/fbdk/README.htm>
- <http://www.wrcakron.com/61499.html>

■ IEC 61499 and 61131-3 related:

<http://www.holobloc.com/stds/iec/sc65bwg7tf3/html/news.htm>

■ HMS Consortium:

- <http://hms.ifw.uni-hannover.de/>

■ FIPA: <http://www.fipa.org>

- HCD proposal: <http://www.holobloc.com/stds/fipa/hcd/>

■ OOONEIDA CCI

- <http://www.oooneida.info/>



Wrap-Up

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