IEC 61499 Current Status and Near Future Developments

SPS/IPC/DRIVES
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What is IEC 61499?

- An **IEC Standard** for the use of **function blocks** in **distributed** industrial-process measurement and control systems (IPMCSs)
- Maintained by SC65B/WG15
- Adopted in 2005:
  - **Part 1, Architecture**
  - **Part 2, Software Tool Requirements**
  - **Part 4, Rules for Compliance Profiles**
- Currently in 5-year scheduled maintenance cycle
- Part 3, Tutorial Information
  - Withdrawn (obsolete), 2007

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IEC 61499 Maintenance Status

2nd Edition Status				
Part	CDV	RV	FDIS	PUB
1	65B/799/CDV, 2011-06-17	2011-11-18	2012-02	2012-10
2	65B/800/CDV, 2011-07-08	2011-12-09	2012-03	2012-10
4	65B/805/CDV, 2011-08-12	2012-01	2012-04	2012-11

- CDV=Committee Draft for Voting, RV=Report of Voting + Comments, FDIS=Final Draft (projected), PUB=Publication date (projected)
- IEC/TR 61499-3, Tutorial information
  - Withdrawn 2007
  - New Work Proposal (NWP) for 2nd Edition under consideration
- IEC/TS 61499-5: Proposed Extensions
  - DC (Draft for Comments) - 2012Q2(?)

IEC 61499-1 Progress

- General changes and corrections
- Improvements in ECC behavior description
- Local (temporary) variables in algorithms
- Network/Segment Types
- Interaction with Programmable Controllers
- Simplified READ/WRITE

IEC 61499-1: General Changes and Corrections

- Correction of wrong references, formatting, etc.
- Added missing management command: RESET
- Allow non started FBs to be deleted
- Allow service sequence declarations for all FB types (as anticipated in IEC 61499-2)
- Clean up of adapter usage syntax for Basic FBs
- Clean up of the mapping syntax

IEC 61499-1: ECC Behavior

- Improve description to remove ambiguities
- UML-style transition condition
  - event_input_name [guard_condition]
- The **resource shall ensure** that **no more than one input event** occurs at any given instant in time.
- Definitions for input sampling
- Clear definition of the validity of input events

IEC 61499-1: Algorithm Temporary Variables

- The declaration of an algorithm may include the declaration of temporary variables that:
  - Are only visible in the body of the algorithm;
  - Are initialized upon each invocation of the algorithm;
  - May be used and modified during execution of the algorithm; and
  - Do not have values that persist between executions of the algorithm.
- Application example: counter in for loops

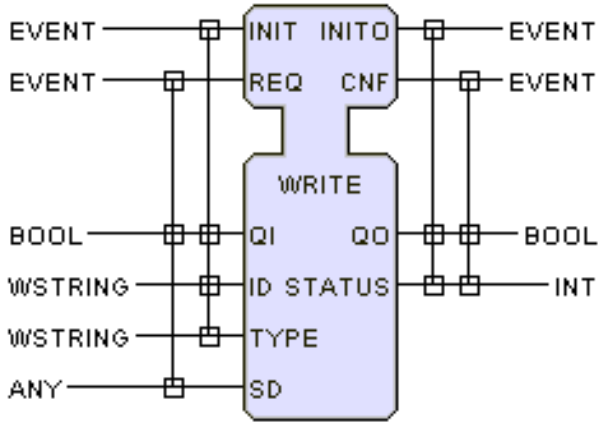
IEC 61499-1: (Network) Segment Types

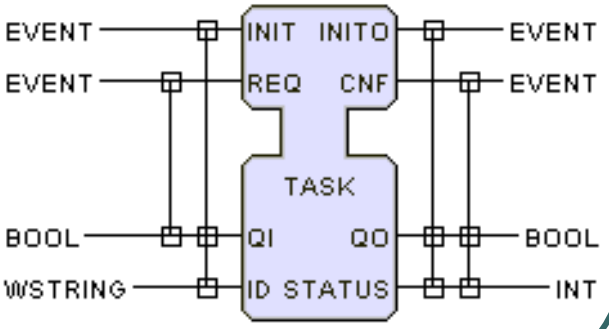
- Similar to Device Types

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE SegmentType SYSTEM "http://www.holobloc.com/xml/
   LibraryElement.dtd" >
<SegmentType Name="CAN" Comment="CAN Segment" >
  <Identification Standard="61499 ITA" Description="CAN ..." />
  <VersionInfo Organization="4DIAC-Consortium" Version="0.0"
   Author="4DIAC-IDE" Date="2008-07-10" />
  <VarDeclaration Name="Param" Type="WSTRING" Comment="Param" />
</SegmentType>
```

IEC 61499-1: Interaction with PLCs (Programmable Controllers)

- Improve the interaction with IEC 6113-3 PLCs
- Communication FBs
  - READ
  - UREAD
  - WRITE
- Remote Action Triggering
  - TASK





IEC 61499-1: Simplified READ/WRITE

- READ/WRITE now only applies to *parameters* of resources, devices, and top-level FB instances.
- No READ/WRITE of FB internals.
- Rationale:
  Enforce good software design and enhance system performance, reliability, maintainability and safety.

IEC 61499-2: Progress

- Informative examples of software tool capabilities added.
- DTDs updated to conform with 61499-1 revision.

IEC/TS 61499-5: Proposed Extensions (1)

- Time durations in service sequences
  - Specify more strictly not only the functional behavior of FBs (Basic Composite, SIFBs, SubApps, and Adapters), e.g., event sequence
  - But also the requested timing behavior
- Universal function block
  - A FB type that combines basic and composite
  - Similar to UML models
- Adapter-related extensions
  - Merging of Adapter Connections
  - Hierarchical Adapters
  - Adapter connection over the network
- Namespaces
  - Allow a unique identification of library elements from different vendors

IEC/TS 61499-5: Proposed Extensions (2)

- XML encoding of management commands
  - Standarization of the configuratability provision
  - Efficient ways of representing XML for devices (e.g., binary XML representations)
- Use of IEC 61131-3 programming language elements
  - Reuse of existing libraries within basic FBs
  - Rules for allowed and reasonable IEC 61131-3 syntax elements
- Internationalization
  - International portability of IEC 61499 library elements, textual elements such as identifiers, comments, and string literals
- Device/Resource Capabilities
  - Means for expressing hardware capabilities to be used by tools during the mapping and verification prozess

IEC/TS 61499-5: Proposed Extensions (3)

- Application-Specific Subapplications
  - Improve semantics and syntax of subapplications to support all application use-cases
- FB behaviours during start-up and shutdown
  - Define the behaviour in regard to cold and worm start as well as on shut down
- Hybrid IEC 61499/61131-3 platforms
  - How to better integrate the best of both sides show migration and integration paths
- Smaller Extensions
  - Specification of FB instance-specific initial values
  - Updating of DTDs to XML Schemas
  - Multi-segment connections

Summary

- Maintenance of IEC 61499 Part 1, 2, & 4 nearly completed
- Improvements towards increased usability and reduced ambiguities
- Future activities
  - IEC/TR 61499-3: Tutorial information
  - Proposed IEC/TR 61499-5: Proposed Extensions
- Comments and topics for Part 3 and 5 are welcome

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