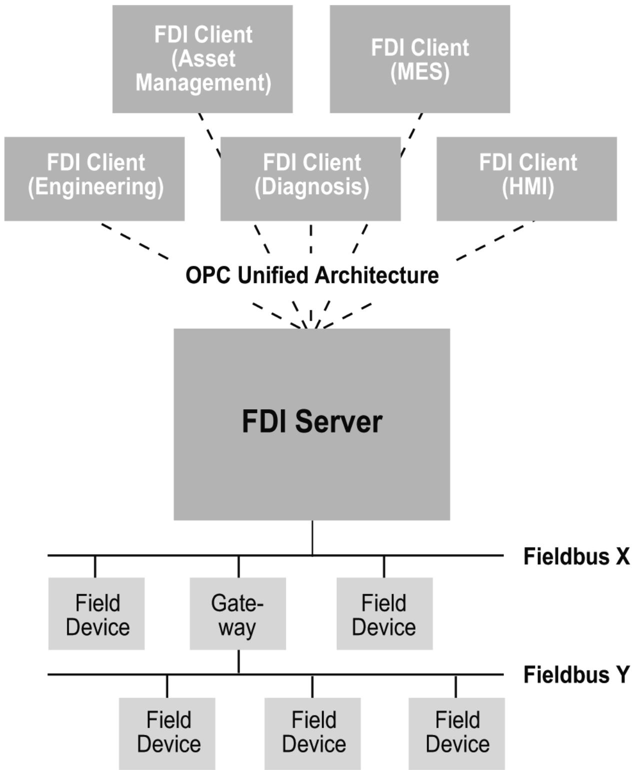

Fig. 1: The FDI Concept

Part 5 of 8:

OPC UA Companion Standards

The fourth article of the OPC UA Series (SPS-Magazin, Issue 5) outlined the OPC UA Specifications. In the fifth part, we will give an overview of collaborations between different organizations and the OPC Foundation, and take a look at the resulting OPC UA Companion Standards.

Consortiums and standardization organizations in various industry sectors recognized, very early on, the potential of OPC UA technology for a secure and reliable data communication. So why reinvent the wheel when the communication infrastructure provided by the OPC Foundation is there to use? Why not apply the standards from consortiums, for example for the programming of controllers, the parameterization of field devices or the maintenance of automation equipment, and combine the transport of information with the proven OPC UA communication standard?

From the very beginning, one of the key requirements placed on the OPC UA Specification was that OPC UA – as a universal communication platform and as an IEC Standard (IEC 62541) – can be used a basis for other standards. The OPC Foundation strategy with

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respect to aligning with the right consortiums for partnership and collaboration is to identify the consortiums that have information models that represent opportunities for information integration to be solved. The OPC Foundation today has many working groups that are dedicated to the development of OPC UA Companion Standards, including ADI, FDI, FDT, ISA-95, MES, MIMOSA, ODVA and PLCopen. This article will present some of these collaborations.

FDI Companion Standard – Device Integration with OPC UA

Two technologies have become well established in device integration in the last ten years: Field Device Tool (FDT) and Electronic Device Description Language (EDDL). The functionalities are largely similar, but they also each have specific strengths and weaknesses. In April 2007, the FDT Group and the EDDL Cooperation Team started a joint standardization activity. The cooperation aims at defining a single device integration technology, the Field Device Integration (FDI). FDI is to merge the specific advantages of FDT and EDDL in a single solution. Therefore, the FDI architecture follows the client-server architecture model: The FDI server centrally provides the data and functionality of field devices. FDI clients access the FDI server and use the field devices' data and functionality to perform their assigned tasks within the lifecycle of the automation system. As the illustration shows, an engineering client uses the server to configure a field device during the planning stage whereas a diagnostic client monitors the device state during the operational stage.

To enable different FDI clients from different vendors to access a central FDI server in order to perform their tasks, there has to be a standardized way to access the data, functionality and user interfaces of the field devices. With authentication and encryption, OPC UA provides two fundamental security properties for this purpose. They make sure that no unknown clients can make any changes to an FDI server in a plant. In addition, encryption protects against eavesdropping of confidential data.
By using platform neutral protocols such as TCP, OPC UA also ensures, for example, that an FDI server can be run on an x86 platform under Windows XP, while an FDI client runs on a Linux based MES system. In addition, OPC UA offers the possibility to define specific information models. The information model specifies both the structure and the semantics of data and functionality in the address space of an OPC UA server. This structure not only contains the representations of the field devices (data, functionality and user interfaces), but also maps the automation system and, in particular, the communication topology. In this way, FDI clients can automatically discover the topology of the automation system and the field devices it contains. OPC UA's wide variety of advantages and features thus offer the ideal basis to achieve the open client-server communication of FDI.

Analyzer Device Integration – ADI

An Analyzer is a device that performs complex analysis; they are used in industries like pharmaceuticals, food, oil and gas. They have applications in laboratory as well as process environments. Currently multiple vendors develop analyzers and each analyzer provides information in its own unique way. The information is usually provided via a proprietary interface that has been developed by the vendor of the device.
The goal of the Analyzer Device Integration (ADI) working group is to develop a common method for data exchange and an analyzer data model for process and laboratory analyzers. OPC UA's functional strengths and its widespread adoption made it especially appealing for ADI to use OPC UA as the communication platform.

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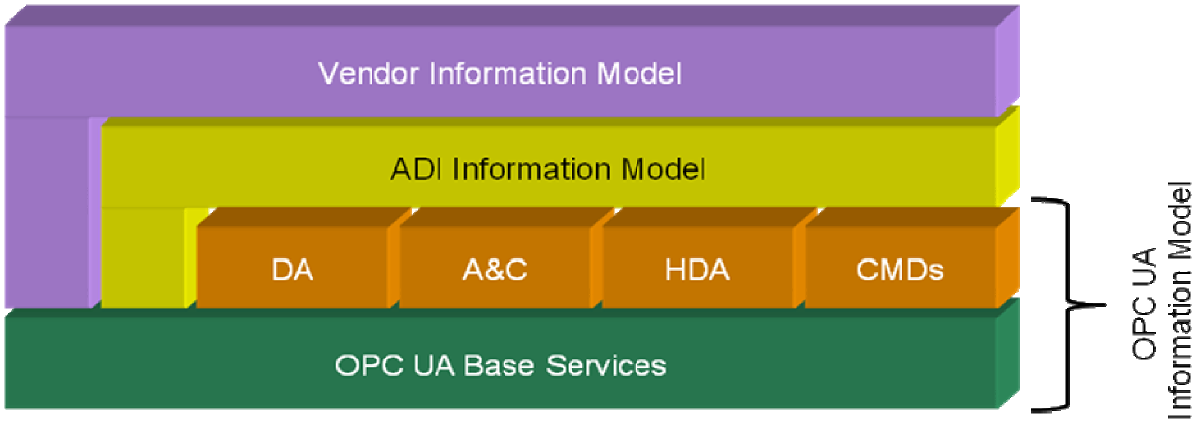

Fig. 2: – ADI Extends *OPC UA Information Model*

The relationship between ADI and OPC UA Information Model is illustrated in Figure 2. ADI extends the standard OPC UA Information Model (outlined in the fourth part of this series of articles) by reusing constructs like object types, variables, data types, references and event types. It introduces a set of its own constructs but it always does it by deriving from the existing ones.
The ADI Companion Specification defines the information model associated with analytical devices (analyzers). The model described in the specification is intended to provide a unified view of analyzers irrespective of their underlying device protocols.

PLCopen: Definition of a OPC UA Information Model

The PLCopen is an organization for the definition and implementation of standards in industrial automation technology. It focuses on the development and distribution of the IEC6-1131-3 standard to become the global standard for industrial controller programming. De facto, IEC6-1131-3 is already considered today to be the standard for the implementation of PLC programs for modern industrial controllers. On the basis of this standard, users can structure their software modularly and thus easily maintain and reuse it.
The PLCopen and the OPC Foundation have united to form a joint working group. The resulting companion specification describes the IEC6-1131-3 information model for OPC UA: If an IEC6-1131-3 PLC project is loaded to different control platforms, then it is represented outwardly in a standardized manner via the OPC UA Server of the controller and made available for communication.

The cooperation of the two groups represents a fundamental basis for future solutions in the automation world. In addition to visualizations and MES/ERP systems, further areas of application will be opened up. PLC users from the most diverse branches of industry can now easily take advantage of a standardized UA presentation and UA access to IEC6-1131-3 controllers. In a second stage, the working group is currently defining standardized PLC function blocks for communication via OPC UA. This will enable a controller to initiate OPC UA communication independently and to request or send PLC data.

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Cross-Membership between MES D.A.CH Verband and OPC Europe

In October 2011 the MES D.A.CH Verband e.V. became a member of OPC Europe, and OPC Europe a member of the MES D.A.CH Verband. By joining forces, the two organizations aim at improving the connectivity between the PLC level and the MES level. The cross-membership is to provide the basis for intensifying the collaboration between the two organizations so that MES solutions can access information from the field and PLC levels even faster and easier in order to perform their tasks. In a production company, a large part of the production data and measurement values used for calculating MES data comes directly from the automation level. To transport the data, the two standards OPC Data Access (OPC DA) and, increasingly, OPC Unified Architecture (OPC UA) are used.

If, as OPC Foundation President Thomas Burke puts it, “the success of a standard is clearly measured by the level of adoption of the respective technology”, it is fair to say that OPC UA is on the right way.

In Part 6 of the OPC UA Series, we will take a closer look at the OPC Compliance Test.

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Series of Articles in SPS-MAGAZIN

Issue	Date of Publication	Topic
3	24.02.2012	OPC UA Status
4	16.03.2012	OPC UA: Origin, Development and Objectives
HMI Special	13.04.2012	Ten Reasons for OPC UA
5	10.05.2012	OPC UA Specifications
6	01.06.2012	OPC UA Companion Standards
7	30.06.2012	OPC UA Compliance Test
8	27.07.2012	OPC UA Toolkits
9	31.08.2012	OPC UA Outlook

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