Introduction to EDDL Workshop

Stephen Mitschke

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Presenter
Stephen Mitschke

- Product Manager – Fieldbus Foundation
- Over 9 years experience with FOUNDATION™ fieldbus Technology
- Manager of Conformance and Interoperability Program
- Current Editor of Fieldbus Foundation's Device Description Language (DDL) Specification
- Fieldbus Foundation representative to EDDL Cooperation between HART, PROFIBUS, Fieldbus Foundation and OPC Foundation

Device Description Technology

What is a Device Description?

A clear and unambiguous, structured text description that precisely describes field device data to host systems.

Electronic Device Description Language

What is the Electronic Device Description Language?

The international standard for developing Electronic Device Descriptions (EDDs) according to the IEC 61804-2.

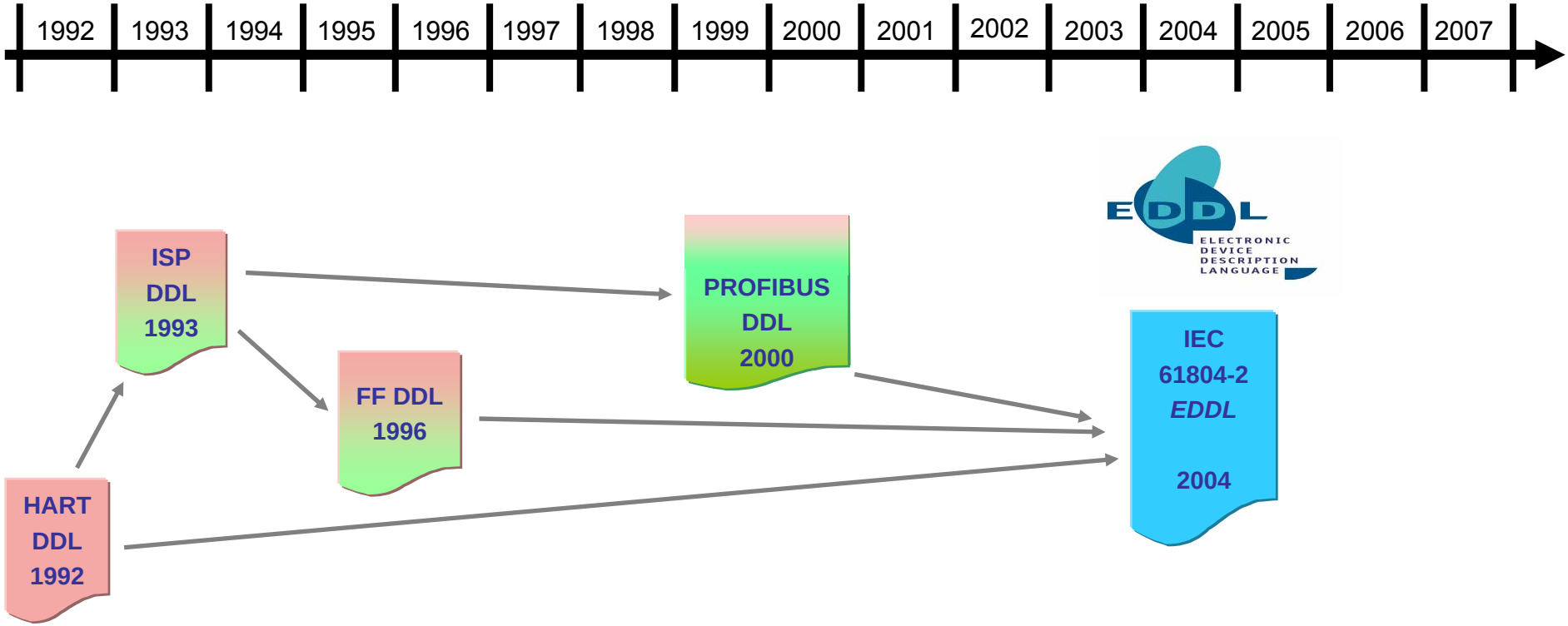
The Fieldbus Foundation FF-900 “Device Description Language Specification” is fully conformant to the IEC 61804-2 EDDL Standard.

EDDL International Standard

IEC 61804

- Function Blocks (FB) for Process Control
  - **Part 1: Overview of system aspects**
  - **Part 2: Specification of FB concept and Electronic Device Description Language (EDDL)**
- Covers DDL used in the FOUNDATION™ fieldbus, HART® and Profibus communication protocol
- International Standard in March 2004

History of EDDL Technology



Electronic Device Description Technology

An EDD contains the following information about the parameters of a device:

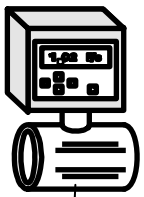
- Attributes like coding, name, engineering unit, write protection, how to display etc.
- The arrangement of the parameters in a menu structure, names of menus and submenus.
- Information about the relation of parameters to others.
- Information about help texts and help procedures.
- Information about necessary operating interactions (e.g. calibration), also called methods.
- Information about visualization tools (i.e.: charts and graphs)

EDDL is Declarative

```
RECORD      __pv
{
    LABEL           "|en|PV" ;
    MEMBERS
    {
        STATUS,  __status_contained_r ;
        VALUE,   __float_contained_r ;
    }
}
```

```
VARIABLE    __status_contained_r
{
    LABEL           "|en|Status" ;
    HELP            [status_contained_help] ;
    CLASS           CONTAINED & DYNAMIC ;
    TYPE            ENUMERATED (1)
    {
        __FF_STATUS_VALUES
    }
    CONSTANT_UNIT   [blank] ;
    HANDLING        READ;
/*  RESPONSE_CODES  xxx ; */
}

VARIABLE    __float_contained_r
{
    LABEL           "|en|Value" ;
    HELP            [float_contained_help] ;
    CLASS           CONTAINED & DYNAMIC ;
    TYPE            FLOAT ;
    HANDLING        READ ;
    CONSTANT_UNIT   "deg C";
}
```



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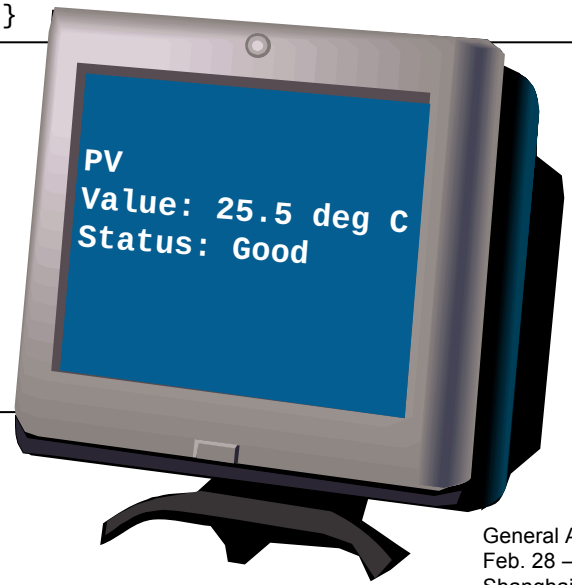


EDDL Methods

Permits Device/User Procedures

Interpreted **ANSI "C" (limited) executed by host application – Not compiled Code.**

Secure access to User Interface and Device handled through pre-defined functions call "built-ins"

```
METHOD calibrate
{
            CLASS OUTPUT;
            LABEL "|en|Calibration Method";
            DEFINITION
            {
                        long status, ids, indices;

                        status = get_acknowledgement(
                        "|en| Apply Pressure", ids, indices, 0);
                        /* ... */
            }
}
```

EDDL Benefits

- Established – millions of devices worldwide
- System Independent (including OS)
- A single EDD for all hosts
- Robust Revision Control
- Testing and Registration
- International Standard
- Uniformity
- Supported by major suppliers
- Backward compatible
- Preserves investment
- Easy to implement

EDDL Cooperation Project

Joint Fieldbus Foundation, PROFIBUS and HART Communication Foundation project to specify visualization and data storage management extensions

Why extend EDDL?

Complex devices use advanced visualization and data storage management

- valve signatures
- sensor calibration curves
- persistent data storage
- trends

Huge worldwide investment in EDD devices

- development tools
- testing tools
- PC, handheld hosts

Proven technology: EDD has been in use for over 10 years

Easy to use: Developers and end users like it

Open and interoperable

EDDL Visualization Extensions

Improved User Interface (UI) – DD Developer can describe screen layout

- Enhanced `MENU` construct with screen layout attributes (e.g. dialog boxes)
- New `IMAGE` construct to support images
- New `GRID` construct for easy table entry

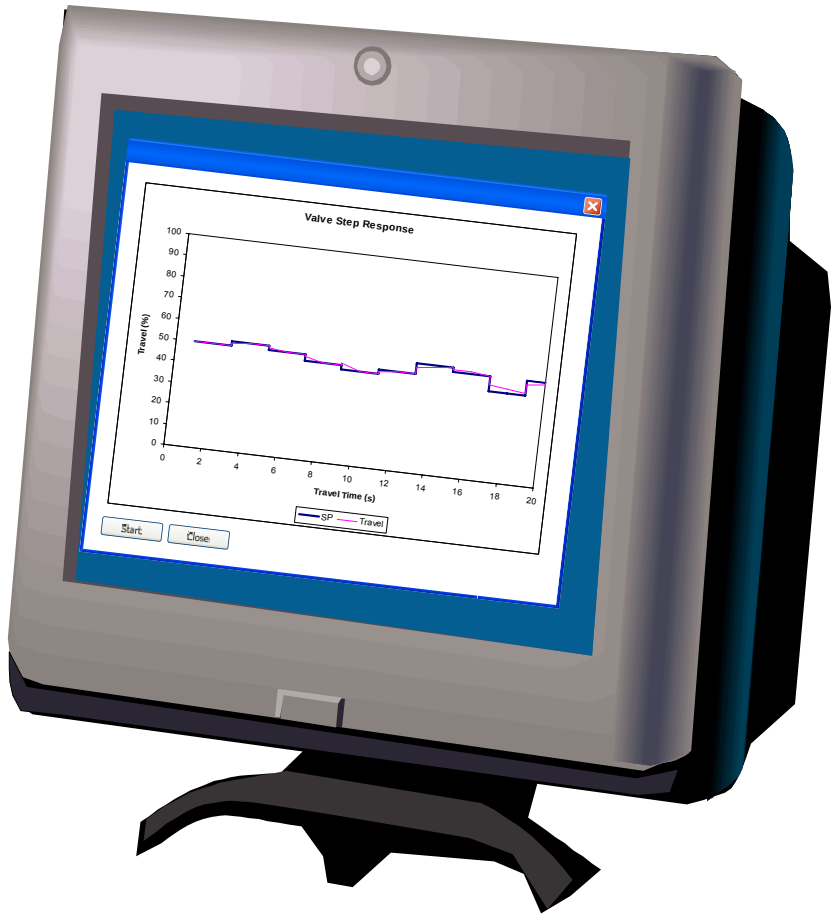
Visualization Built-ins

- `MenuDisplay` for enabling “Wizard-like” interface using enhanced Menus

EDDL Visualization Extensions

Charts and Graphs – Enables graphical display of static and real-time (continuous) data

- New CHART construct to define display characteristics
- New SOURCE construct enables multiples curves on a CHART
- New GRAPH construct to define display characteristics
- New WAVEFORM construct enables multiple curves on a GRAPH.
- New AXIS construct



Charting Sample Code

```
CHART strip_chart
{
        LABEL    "Strip Chart";
        MEMBERS
        {
                 PV_SRC, pv_src;
        }
        TYPE              STRIP;
        CYCLE_TIME        5000;
        LENGTH            60000;
}

SOURCE pv_src
{
        LABEL    “PV Source";
        MEMBERS
        {
                 PV_SRC, __pv;
        }
        Y_AXIS   pv_y_axis;
}
```

```
AXIS pv_y_axis
{
        LABEL           “Value";
        MIN_VALUE       0;
        MAX_VALUE       100;
        CONSTANT_UNIT “deg C”;
}
```

Simple code give EDD Developers powerful visualization tools.

Many other attributes available to fully customize the display.

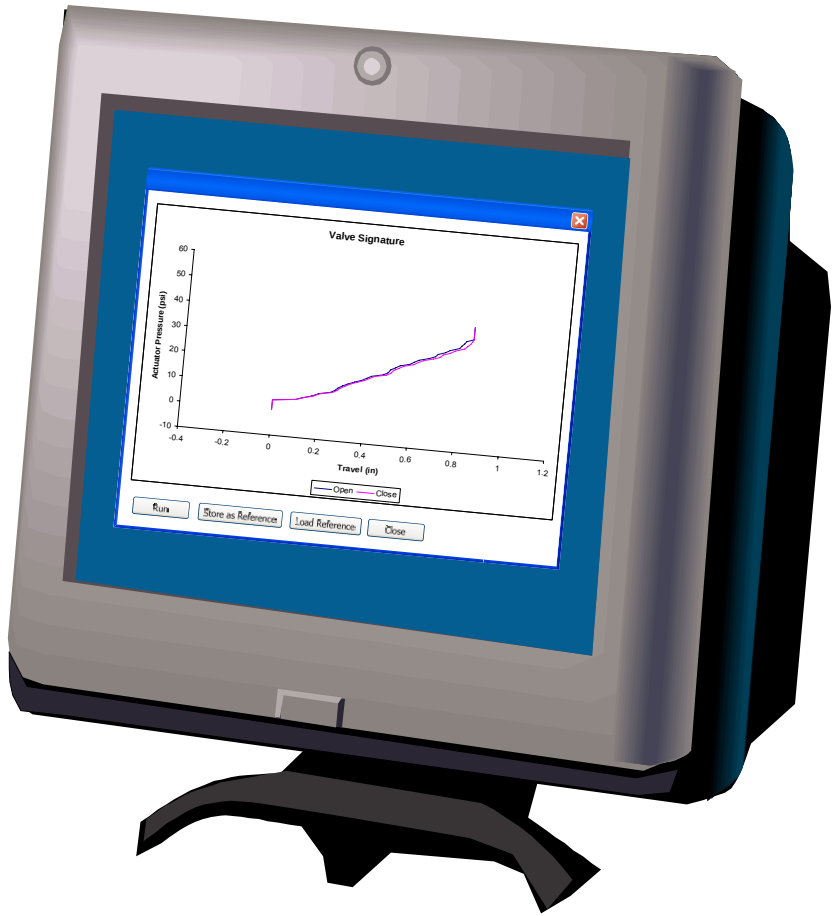
Persistent Data Storage

Improved Data Storage- Enables DD Developer to securely store data on the host

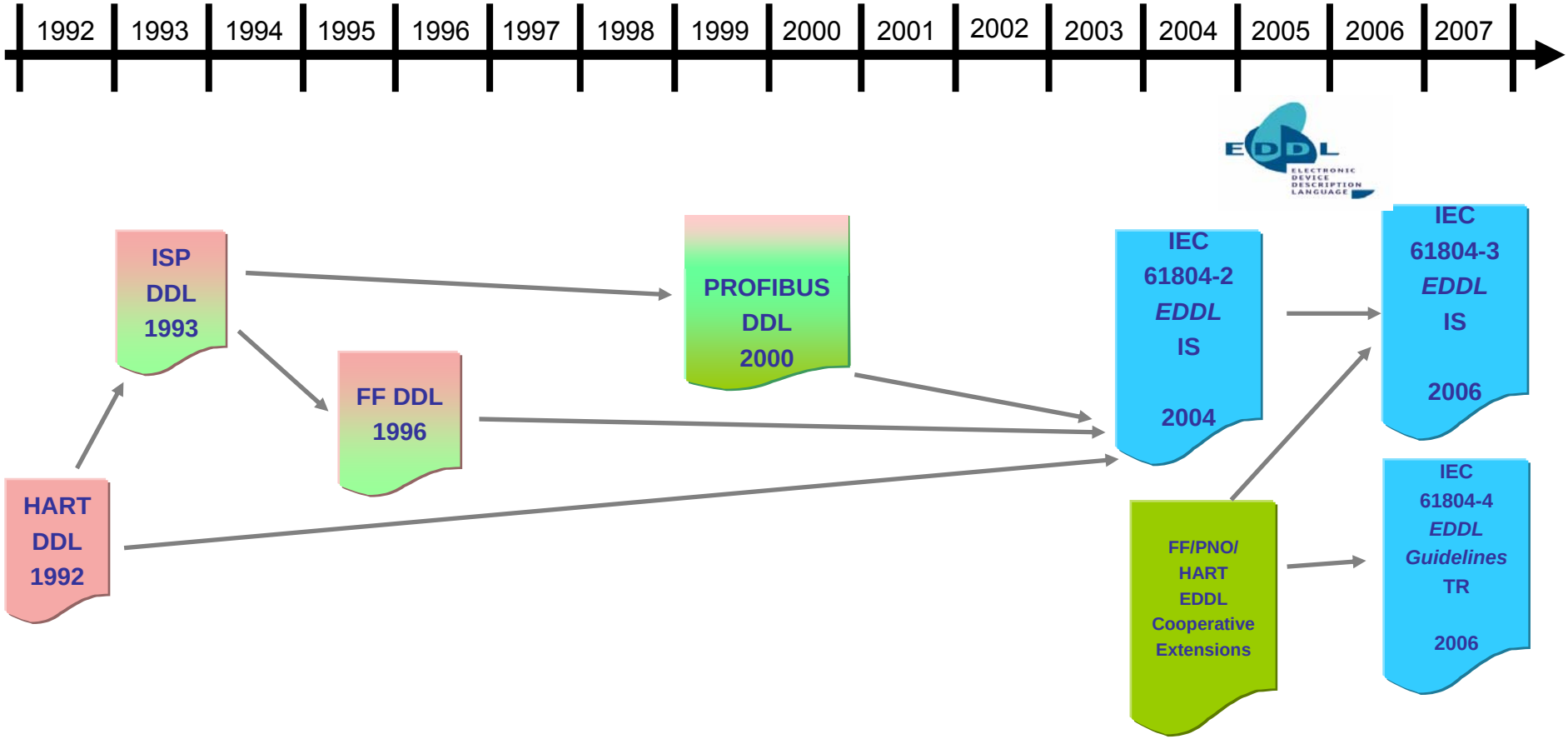
- New `FILE` construct describes parameters that will be stored
- New `LIST` construct is used with FILE to access specific parameters

List Builtins (persistent storage)

- `ListInsert` inserts an element into a list
- `ListDeleteElementAt` deletes an element from a list



Common EDDL Enhancement included in next IEC 61804 Maintenance Cycle



Note: IEC 61804-2 (Ed.1) contains Function Block Model and EDDL. The next maintenance cycles breaks out EDDL into a new part – IEC 61804-3 (Ed. 1)

EDDL Cooperation Project, Phase II

OPC Foundation Joins Cooperative Project

OPC Foundation joins the Consortium

- OPC provides data exchange across independent interfaces
- EDDL provides rich type definitions for device integration
- Together, OPC UA+EDDL solution provides open standards to extend interoperability from device to enterprise applications

Fully Integrated Architecture

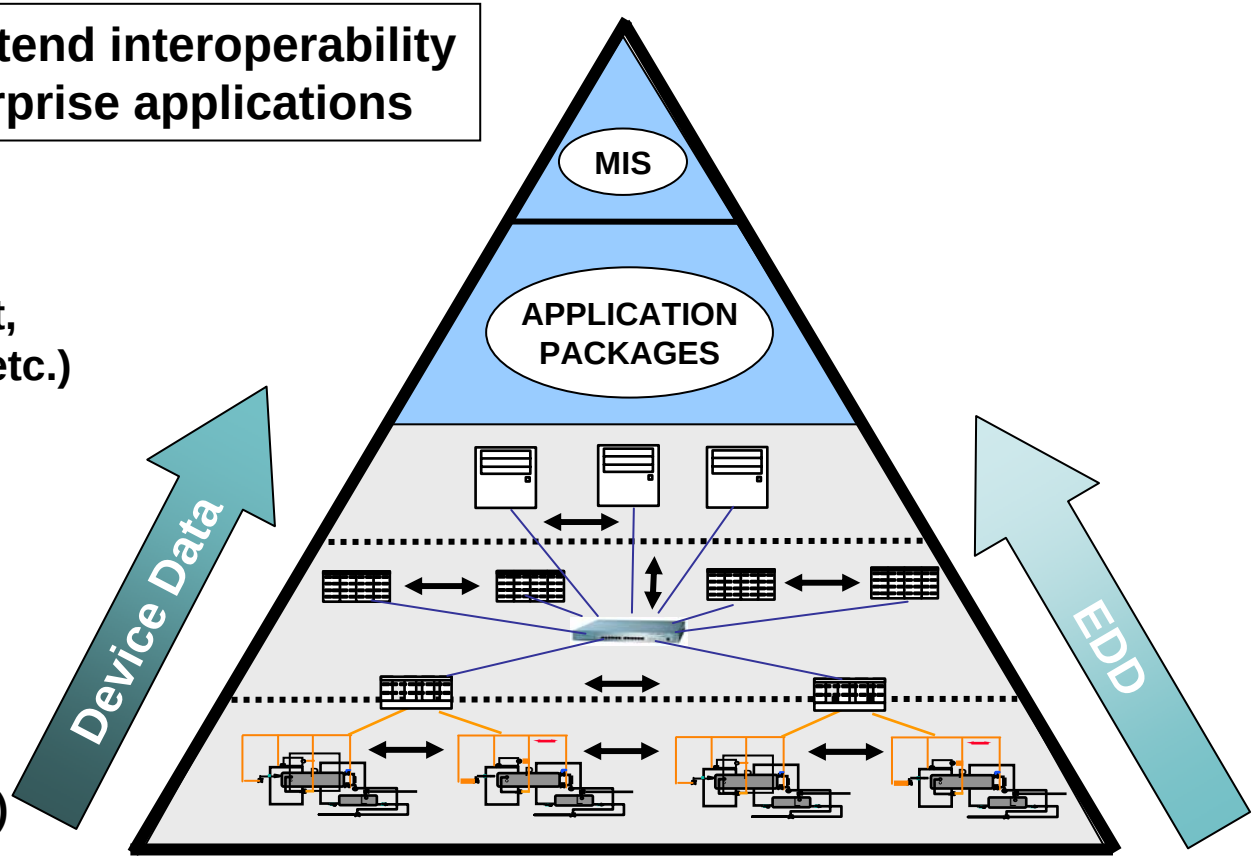
Open standards to extend interoperability from device to enterprise applications

Application Packages (ERP, Asset Management, Advanced Diagnostics, etc.)

Server Integration (OPC UA)

Subsystem Integration (HSE)

Device Integration (FF, Profibus, HART, etc)



OPC UA and EDDL Benefits

Enhanced device integration

- OPC Clients have access to complex device data
- Automated integration

System independent complex diagnostic packages

- Single application across multiple systems
- No custom software applications

Cost effective

- Reduce development costs

Open and Interoperable

EDD Validation

EDD Validation (Device)

- DD Tokenizer Software
- DD “Super” Viewer
- Interoperability Test Kit 5.0

EDD Application Validation (Host)

- New EDD Validation Test (HIST)

Status of Enhanced EDDL Technology

- √ Feb 2005 - Cooperative Team Completes Specification
- √ Oct 2005 - Fieldbus Foundation Completes DD Tokenizer and DD Services 5.0
- √ Dec 2005 - Fieldbus Foundation completes Interoperability Test Kit 5.0 supporting enhancements
- ■ EDD Application Test Development in Progress

First Tested And Registered devices expected 1Q-2Q 2006 !

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