



The Standard  
of Device  
Integration

# EDDL and Future of device integration



## EDDL Cooperation

Members: PNO, FF, HCF, OPCF

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  - Using description technology EDDL for type information



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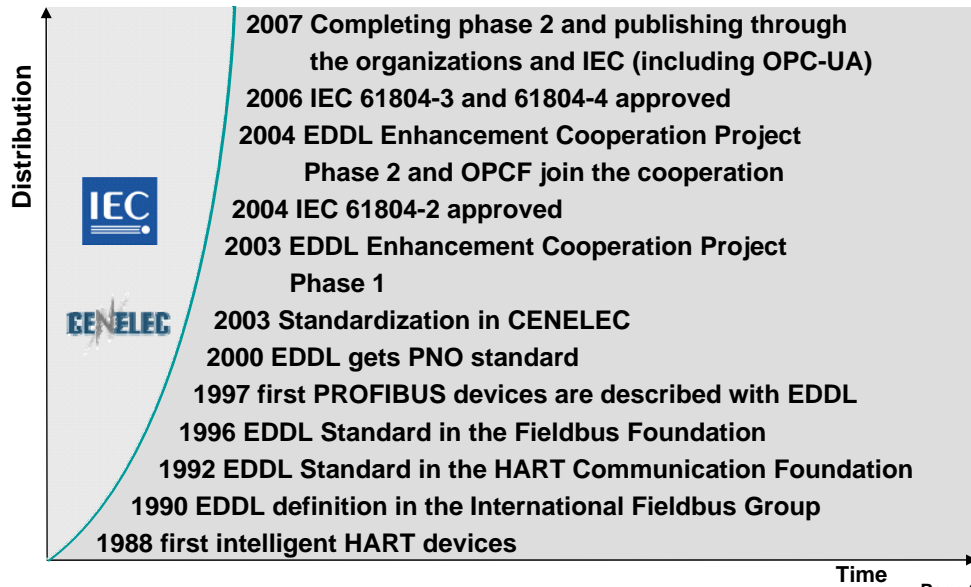
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## EDDL Roadmap

### Matured and a long term oriented

About 1800 devices of more than 100 manufactures are described with EDDL. In plants are about 16.000.000 devices in use.

Because of **operating system independence**, EDDs from 1992 are still used without changes.



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## EDDL Cooperation Team (ECT)

### • ECT Members

- PROFIBUS Nutzerorganisation (Representatives: Siemens, ABB, E+H)
- HART Communication Foundation (Representatives: Smar, Honeywell, HCF)
- Fieldbus Foundation (Representatives: Emerson, Yokogawa, FF)
- OPC Foundation (Representatives: ABB, Invensys, Emerson)

### • EDDL Enhancements Phase 1 (2002 - 2004)

- Graphical enhancements like charts , graphs, images, etc.
- Data archives
- **EDDL specification and EDD guideline approved 2006**
- **Products since 07 / 2005 available**

### • EDDL Enhancements Phase 2 (2004 - planned 2007)

- EDDL OPC-UA information model, usage of EDDL in OPC-UA, client / server semantic and usage of OPC-UA services
- Modular Devices support including configuration rules
- Guideline for Diagnostic
- Guidelines for On-/Offline Configuration, Up-/Download
- **Specification work almost done, Prototyping and Validation started**



## Identification and Version Information

- MANUFACTURER, DEVICE\_TYPE
- DEVICE\_REVISION and EDD\_REVISION

## Data Description

- VARIABLES
  - LABEL
  - HELP
  - TYPE
  - CLASS
  - DEFAULT\_VALUE
  - MIN/MAX\_VALUE
  - UNIT
  - ACTIONS (METHODs)
- ARRAY, ITEM\_ARRAY
- BLOCK, RECORD
- COLLECTION
- LIST
- FILE
- ...

## User Interface Description

- MENU
- WINDOW, DIALOG
- PAGE, GROUP
- TABLE, GRID
- IMAGE
- CHART
  - hor. and ver. BAR
  - GAUGE
  - SCOPE, STRIP, SWEEP
- GRAPH YT, XY
- ACTIONS (METHODs)
- ...

## Communication Description

- COMMAND
  - Data ordering
  - Bit-masks and -positioning
- Upload and Download of offline and online configurations
- Ordering of COMMANDs
- Control of time conditions
- Error handling and Error messages
- Relative and absolute addressing...

- EDDL is **operating and automation system independent**
- EDDL sources are stored in **ASCII file** that may contain UTF8 string constants
- EDDL is mainly a descriptive language, but allows also **conditions** and **c-like methods**

# Data Description

Parameter can be described with there label, help text, data type, min and max values, read/write handling, etc. The data definitions can be used in structures like BLOCK, RECORD, COLLECTION, ARRAY, LIST, FILE, etc. Any **device model** and **data archives** can be described with EDDL.

References to **text dictionaries** allows to use common wording and translations.

**Conditional expression** allows to define e.g. value ranges, read/write handling dependent of any other parameters

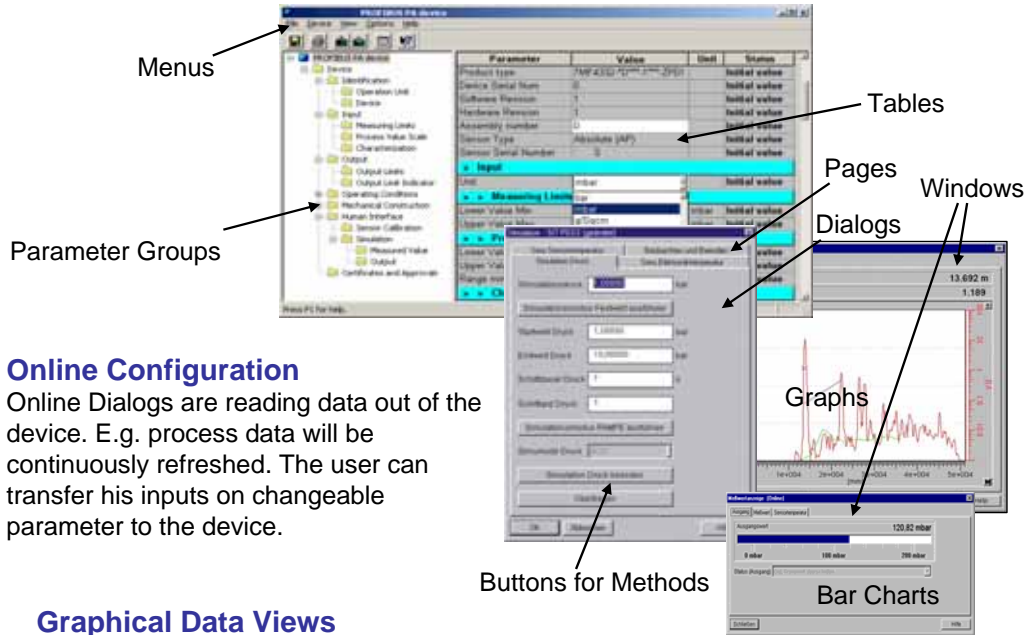
```
#define LINEAR 0
VARIABLE trans1_temperature_unit
{
  LABEL [digital_units];
  HELP [temperature_unit_help];
  CLASS CONTAINED;
  HANDLING READ & WRITE;
  TYPE ENUMERATED (2)
  {
    DEFAULT_VALUE 32;
    { 32, [degC], [degC_help] },
    { 33, [degF], [degF_help] },
    { 34, [degR], [degR_help] },
    { 35, [Kelvin], [Kelvin_help] }
  }
  IF (trans1_sensor_type == LINEAR)
  {
    { 36, [mV], [mV_help] },
    { 37, [Ohm], [Ohm_help] },
    { 39, [mA], [mA_help] },
  }
}
}
```



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# EDD User Interface Description

Very simply hierarchies of menus, dialogs, windows, table views with parameter groups, images, graphs, charts, etc. can be created.



## Online Configuration

Online Dialogs are reading data out of the device. E.g. process data will be continuously refreshed. The user can transfer his inputs on changeable parameter to the device.

## Graphical Data Views

It very easy to define graphs or charts with different styles. Therefore in the EDD the ranges, unit, the data or datalist and optional some additional information have to be defined.



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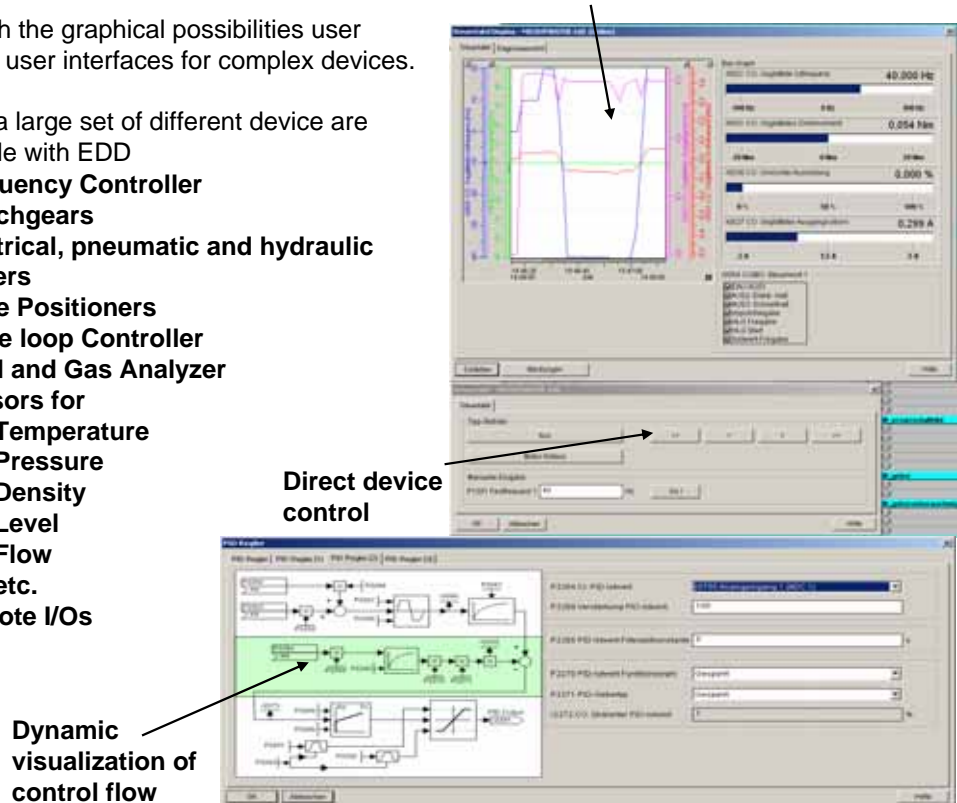
# Graphical Examples

Through the graphical possibilities user friendly user interfaces for complex devices.

Today a large set of different device are available with EDD

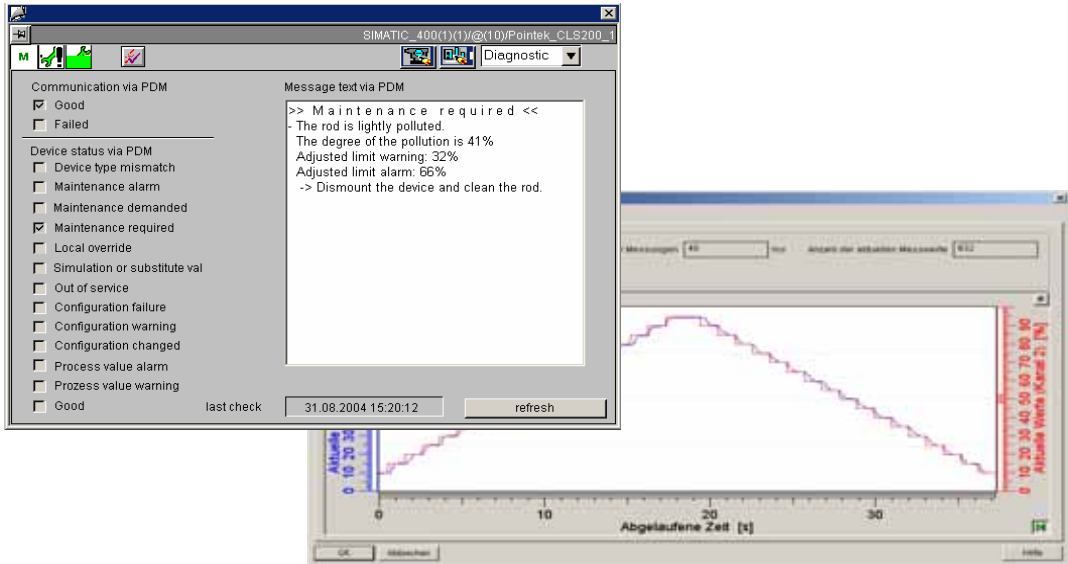
- Frequency Controller
- Switchgears
- Electrical, pneumatic and hydraulic Drivers
- Valve Positioners
- Close loop Controller
- Fluid and Gas Analyzer
- Sensors for
  - Temperature
  - Pressure
  - Density
  - Level
  - Flow
  - etc.
- Remote I/Os
- etc.

## Example: Control Panel of an frequency controller

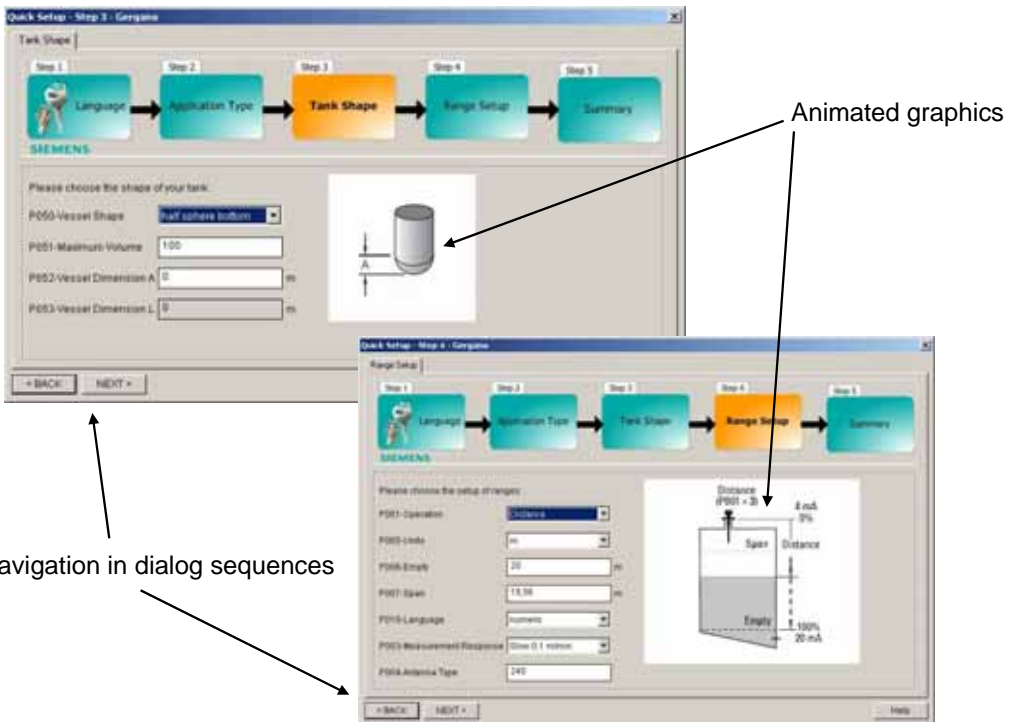


## Diagnostic Support

EDDL supports the definition of archives through persistent stored dynamic lists. Complex diagnostic analytics can be define that compares archived data with current data to get diagnostic information with a problem description, prognoses and hints to solve the problem.



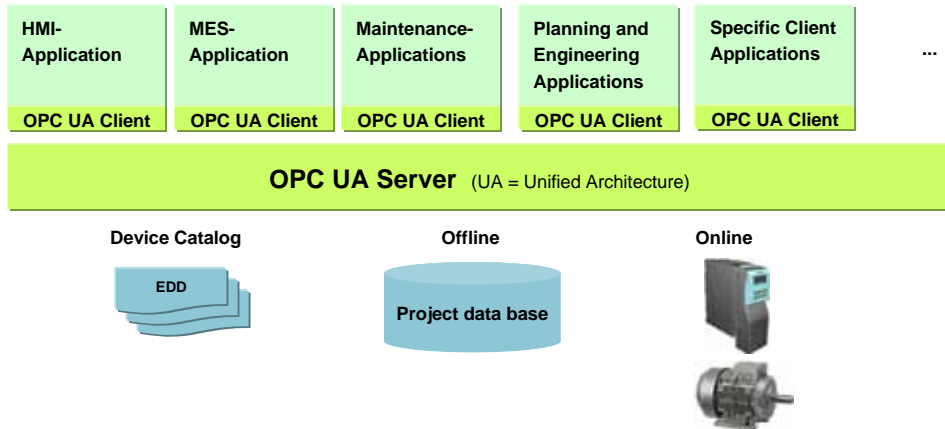
## Graphical Assistancess Based on Enhancements Phase 1



# Enterprise Application

Client applications using OPC UA server to have access to device information e.g. process data, product data and diagnostic information

Possible Client Applications

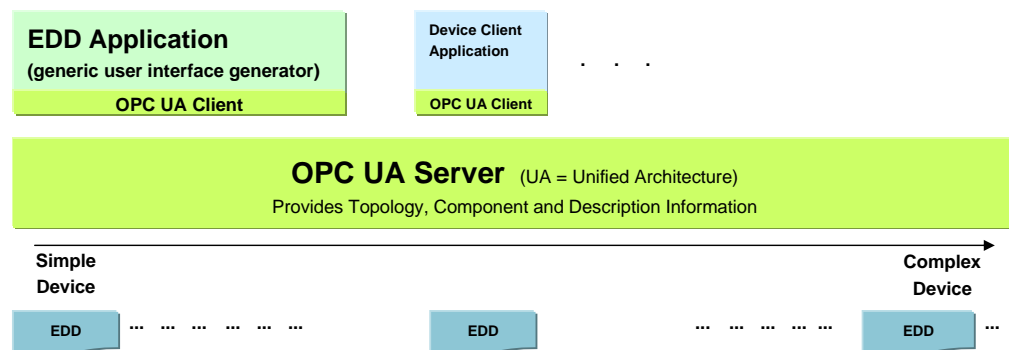


# Device Application

Device integration shall consist of EDDs and optional OPC UA Device Applications

- EDDs are mandatory and shall fulfill all required EDD features
- Optional OPC UA Device Applications are programs written by device vendors to supplement their EDDs
  - shall only use OPC UA server to access device and host system data
  - shall not duplicate EDDL features
  - shall be independent of operating system and platform of host system

Customers requires a long term stability for 20 and more years

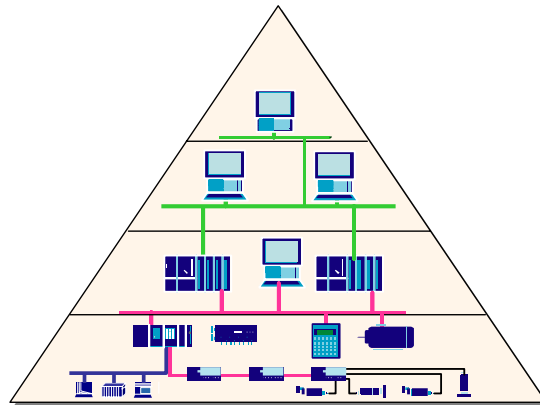




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## Content of OPC-UA Information Model

- Network and component topology
- EDD type information
  - Common unique identifiers for data
  - Labels and help information
  - Data types, ranges, etc.
  - User interface information
- Different kinds of data
  - Product data e.g. identification, I/O description, certifications
  - Parameter e.g. unit, upper/lower limits
  - Diagnostic data e.g. classification, description, spare parts, tools for maintenance
  - Process data e.g. measurement data, set point



ERP - Level

MES - Level

HMI - Level

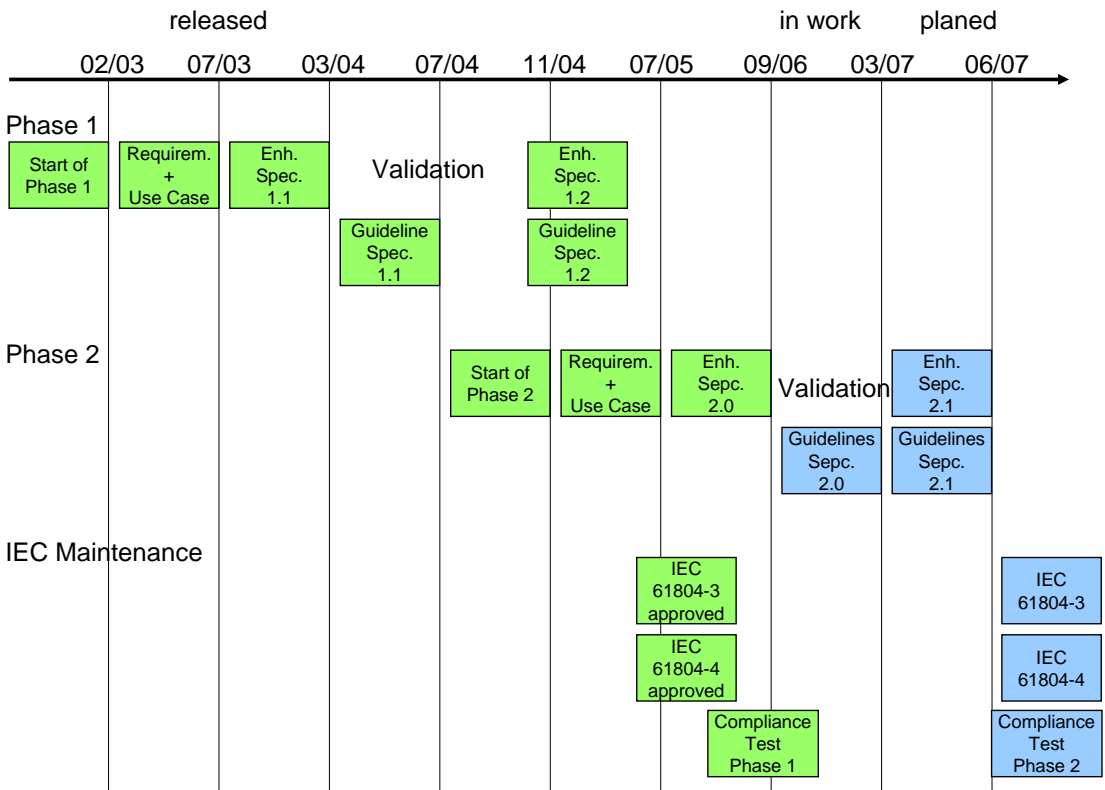
Control - Level

Field - Level



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## EDDL Enhancement Cooperation Roadmap





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## Benefits of EDDL Based OPC UA

Customer benefits:

- Reduced effort to customize HMI, MES etc. systems
- Device information available up to the HMI and MES level
- The unified device representation allows to interpret device information without device specific knowledge
- Data type security, because of available EDD description
- Server-Objects can describes with EDDL it's self;
  - that allows clients to use OPC server specific information



Software manufacturer benefits:

- Client applications can use EDD information of OPC UA EDDL servers to create generic user interfaces (HMI)
- EDDL technology available for additional use cases and applications than EDDL is used today



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### Questions?

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## EDDL Communication description

It's possible to describe

- Communication orders (using COMMANDs)
- sorting of parameters
- Bit positioning and bit length of parameters
- Sorting of communication orders
- Read and write timeouts
- Error handling including user messages

Example of a communication order

```

COMMAND read_fb_ai_
{
  BLOCK function_block;
  INDEX 11;
  OPERATION READ;
  TRANSACTION
  {
    REQUEST
    {
    }
    REPLY
    {
      fb_ai_pv_upper_range_value,
      fb_ai_pv_lower_range_value,
      pres_primary_val_unit,
      pres_decimal_point
    }
  }
}

```

- EDDL is open to support different communications protocols



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## EDDL Cooperation Team (ECT) Principles

1. Existing EDDs in FF/HCF/OPCF/PNO shall continue to operate without requiring any modifications. All EDDL enhancements shall be backward compatible with existing EDDs
2. The technical basis of EDDL enhancements shall be IEC 61804-3 and 4, plus the current work of the ECT
3. All EDDL enhancements shall be operating system and platform independent.
4. All EDD shall be operating and platform independent. It must be possible to develop and test the EDD once for a given device and device revision
5. All enhancements shall be traceable to requirements derived from the use cases



# EDD Entry Points

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```

MENU device_root_menu
{
  LABEL "Device";
  HELP [HelpMenuDevice];
  STYLE MENU;
  ITEMS
  {
    simulation,
    calibration,
    reset,
    ...
  }
}

```

```

MENU diagnostic_root_menu
{
  LABEL "Diagnostic";
  HELP [HelpMenuDiagnostic];
  STYLE MENU;
  ITEMS
  {
    diagnostic_overview,
    ...
  }
}

```

```

MENU process_variables_root_menu
{
  LABEL "Process Values";
  HELP [HelpMenuDevice];
  STYLE MENU;
  ITEMS
  {
    pressure_out,
    temperature_out
  }
}

```

```

MENU offline_root_menu
{
  LABEL "Device";
  HELP [Help_Table_Main_Specialist];
  STYLE TABLE;
  ITEMS
  {
    s_ident,
    s_input,
    s_output,
    s_opconds,
    s_const,
    s_interface,
    s_certificates
  }
}

```

