

OPC Day Finland 2018



OPC UA and Field Device Integration (FDI) for Industrie 4.0

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FieldComm Group Technology Director



FIELDCOMM GROUP™

*Connecting the World of
Process Automation*

The FieldComm Group is the leading source for open Digital Communication and Integration Technologies relative to measurement and automation for the benefit of the Process Industries.

> 340 Member Companies

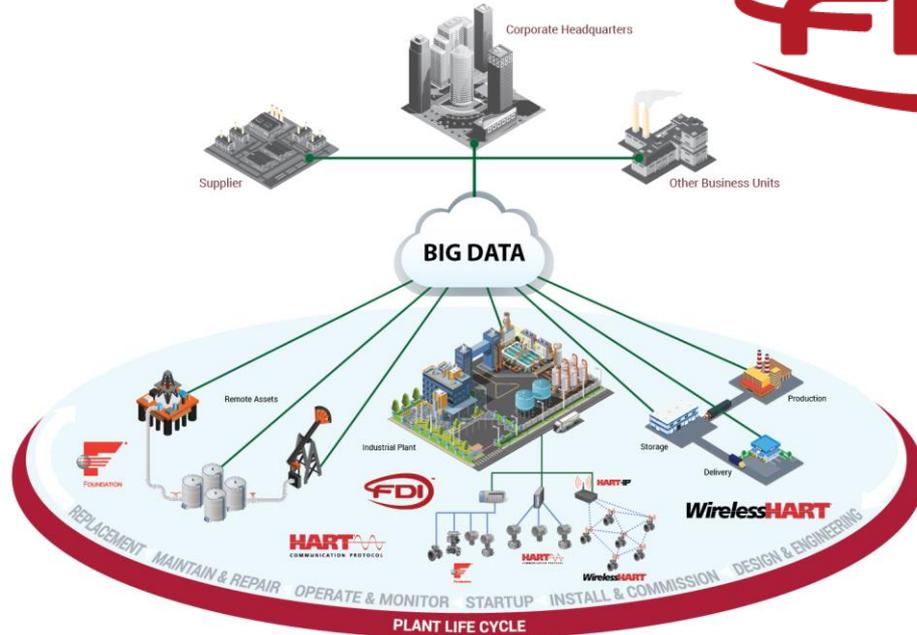
3S Co., Ltd, A3 Monitoring Ltd, A&H Enterprises Inc. (AMFLOW), ABB, ABM Sensor Technology, Inc., Agar Corporation, ALBATROS CJSC, AMETEK Drexelbrook, Amtec Solutions Group, Inc., Analog Devices, Analog Systems (SH)Co., Ltd, Analytical Technology, Inc., Anderson Instrument Co., Inc., Aplisens S.A., Apprion, Armstrong International, ASA S.r.l., Auburn Systems, LLC, Auma, Autrol by Duon System Co., Ltd., Awiatech Corporation, Azbil Corporation, Badger Meter, Baumer, BD SENSORS GmbH, Beamex Oy Ab, Beckhoff Automation, Bedrock Automation, BeiJing Capstar Automation Instrument Co., Ltd., Beijing ConST Instruments Technology Inc., Beijing Fishermeter Instrument Co.,Ltd., Beijing Huakong Technology Co., Ltd, Beijing Spake Technology Co., Ltd, Beijing Zhongdian Hua Lao Tech Co Ltd, Beijing ZhongRuiZhiCheng Technology Co., Ltd., BEKA Associates, Bela Instruments, Belcom Cables Ltd, Belden Inc., BERNARD CONTROLS, Berthold Technologies, BIFFI ITALIA SRL, Bilfinger Maintenance, Binder GmbH, Bopp & Reuther Messtechnik GmbH, Broadley-James Corporation, Brooks Instrument, BTG.COM, Burns Engineering, BusCorp Inc., Cameron Technologies, Centre for Development of Advanced Computing (C-DAC), Chengdu Action Electronics Joint-Stock Co., LTD, Chengdu Andisoan Measure Co., Ltd., CHENZHU INSTRUMENT, Chiyoda Corporation, Chongqing ChuanYi Automation Co., Ltd., Chongqing YuTong System&Software Co., Ltd., Chromalox, CiDra Corporate Services Inc., CodeWrights, CORDS CABLE INDUSTRIES LTD., Crowcon Detection Instruments Limited, Custom Control Sensors LLC, Dandong Top Electronics Instrument Group Co. Ltd, Define Instruments Limited, Dekoron Wire & Cable LLC, Det-Tronics, Die Erste Industry Co. Ltd, Dinel, s.r.o., DKK-TOA Corporation, Draeger Safety AG & Co. KGaA, Dust Networks / Linear Technology, DVG Automation SpA, Dwyer Instruments, Inc., Dynisco, E. D. Engineering, Inc., Eaton, Eldridge Products, Inc., Electro-Chemical Devices, ELECTRONSTANDART-PRIBOR, ELEMER, Elimko Electronic Production & Control Co. Ltd., ELMETRO, embeX GmbH, EMCO Controls A/S, Emerson Process Management, EMIS, Endress+Hauser Process Solutions AG, Enertork LTD., ENOTEC GmbH, ERIS, ESP Safety, Inc., Eureka Industrial Equipments Pvt. Ltd., EUROMAG INTERNATIONAL S.R.L., Exalon Delft, FESTO AG, Fieldbus Center at Lee College, Fieldbus Inc., Fieldbus International AS, FineTek Co.,, FLEXIM, Flowserve, Fluid Components International LLC, Fluidwell, Fluke Corporation, Forbes Marshall, FPI, Fraunhofer IOSB, FSUE SPA "Analitpribor", Fuji Electric Co., Ltd, G.M. International, Gasensor Technology Pte Ltd, Gastech Australia, GASTRON, GEFRAN, General Electric, Georg Fischer Signet, Georgin, Gneuss Kunststofftechnik GmbH, GP:50 Ltd., Guided Ultrasonics Ltd., H&B Sensors, HACH Company, Hamilton Bonaduz AG, Hangzhou Hollsys Automation Co. Ltd., Harold Beck & Sons, Inc., Hawk Measurement Systems Pty. Ltd., Hebei Zhufeng Instrument Equipment Co., Ltd, Heilongjiang Tongbao Sensor Company, Heinrichs Messtechnik, Henan Hanwei Electronics Co., Ltd., HIMA Paul Hildebrandt GmbH, Hitachi High-Tech Solutions, Hitachi, Ltd., HITROL CO., LTD., Höntzsch GmbH, Hoerbiger Automatisierungstechnik Holding GmbH, Hoffer Flow Controls Inc., Honeywell International, HORIBA Advanced Techno. Co., Ltd., Huaxin Instrument (Beijing) Co., Ltd., Huizhong Instrumentation Co., Ltd., HYDAC Electronic GmbH, IDX Academy, ifak system GmbH, III, IMI Precision Engineering, IMTEX Controls, Inor Process AB, Institute of Software, Chinese Academy of Sciences, Isoil Industria S.p.a., ITEI, ITRI, Taiwan, JUMO GmbH & Co. KG, K-Patents Oy, Kaneko Sangyo Co., Ltd., Katronic, KEI INDUSTRIES LIMITED, KEM Kueppers Elektromechanik GmbH, Klay Instruments, KMITL, Knick GmbH & Co. KG, Kobold Messring GmbH, Kongsberg Maritime AS, KONICS, Koso Engineering Co. 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Ltd., Northwire, Inc., NOVUS AUTOMATION, Nuhus Oman LLC, Nuoan, Okonite, ONICON, Inc., OOO NPO Vakuummash, optek-Danulat GmbH, Opto 22, Orange Instruments, Otis Instruments, OVAL Corporation, Pentair Valves & Controls, Pepperl+Fuchs, Permasense Ltd, Petrobras, Phase Dynamics, Inc., Phoenix Contact, PMC Engineering LLC, Point, LLC, Rotex, Power-Genex Ltd., PR electronics A/S, Precision Digital Corporation, Presys, Procentec B.V., Process Level Technology, Ltd, ProComSol, Ltd., Prysmian Group, Pulsar Process Measurement, Pyromation Inc., R. Stahl GmbH, Relcom, Research and Production Complex "VIP", CJSC (ZAO "NPK VIP"), Rexa, Inc., Rhosonics, Riken Keiki Co., Ltd., Rittmeyer AG, Rivertrace Engineering, Rockwell Automation, Rohrback Cosasco Systems, Ronan Engineering, ROSEN, Rotork Controls, Sage Metering, Inc., SAIT Polytechnic, SAMHUI INDUSTRIAL CO., LTD., SAMSON AG, Satron Instruments Inc., ScanSense AS, Schneider Electric, Scott Safety, Seojin Instech Co., Ltd, Shanghai Automation Instrumentation Co., LTD., Shanghai Puguang Instrument Factory, Shanghai Sinoto Instrument Co., Ltd., Shanghai Xinhua Control Technology Co., Ltd, Shanghai Yinuo Instrument Co., LTD, Shanghai Welltech Automation, Shell, Shenzhen ExSaf Electronics Co., Ltd., Shenzhen Nuoan Environmental&Safety Inc., Shenzhen Xhorse Electronics Co., Ltd, SICK Engineering GmbH, Siemens AG, Sierra Instruments, Inc., Sierra Monitor, SIPAI, SKF USA Inc., SMAR, Smart Embedded Systems, Inc., SMC Corporation, SoftDEL Systems Private Limited, Softing AG, Soldo srl., SOR Inc., Southern Alberta Institute of Technology Polytechnic, Sparring Instruments, LLC, Spectrum Controls, Spirax Sarco Ltd, Spriano, Springfield Research Corp., S-Products, Status Instruments Ltd., STC B.V., STF BACS, STI Srl, SWAN Analytical Instruments, SWISA Instrument Inc., Teclfluid S.A., Tekab Co. Ltd., Teplokontrol, Thermal Instrument Co., Thermo Fisher Scientific, Tianjin Future Instrumentation Technologies Ltd., Tismo Technology Solutions, TLV, TOKYO KEIKI INC., TOKYO KEISO, TOSHIBA, Tracerco, Triangle Micro Solutions, Inc., Trine University, Turck, UFRGS, Unifire, United Electric Controls, Universal Flow Monitors, University of Shanghai for Science & Technology, Utthunga Technologies Pvt. Ltd., V.Automat & Instruments (P) Ltd., Val Controls A/S, Valcom S.r.l., Valmet, Valtek Sulamericana, VEGA Grieshaber KG, Vivace Process Instruments, Walsn, Waseda University, Westcontrol AS, Westlock Controls, WIKA Alexander Wiegand SE & Co. KG, Wilcoxon Research, WISE Sensing Inc., WITECK, Wuxi GLT Safety Equipment Co., Ltd, Wuxi KST Safety Equipment, Xian ANCN Intelligent Instrument Co., Ltd., Xi'an Dongfeng Machinery & Electronic Co., Ltd, Yokogawa Electric Corporation, Young Tech Co., Ltd., Yuyao Jinyee Instrument Co., Ltd., Zhejiang SUPCON Technology Co., Ltd.,

FieldComm Group is the Home of HART, FOUNDATION Fieldbus and FDI Technologies



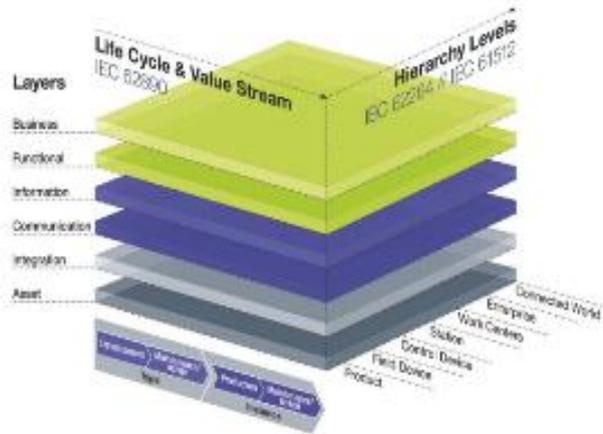
FDI is the enabler for I4.0

FDI enables access to device information (OT level) for plant and enterprise wide monitoring and optimization (IT level), across various communication protocols



Reference Architecture for Industrie 4.0

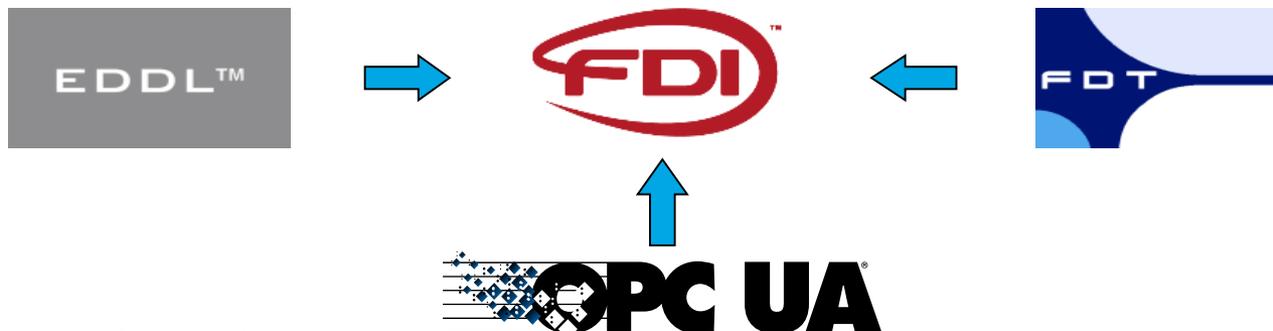
German industry Associations BITKOM, VDMA and ZVEI recommend a Reference Architecture Model for Industrie 4.0 (RAMI)



- Functional layer: FDI
- Information layer: FDI
- Communication layer: OPCUA

FDI integrates seamlessly into the Reference Architecture Model for Industrie 4.0

What is the motivation behind FDI?



1. Reduce life cycle costs

A single technology that leverages the best of both existing technologies.

“ONE Device – ONE Package – ALL Tools”

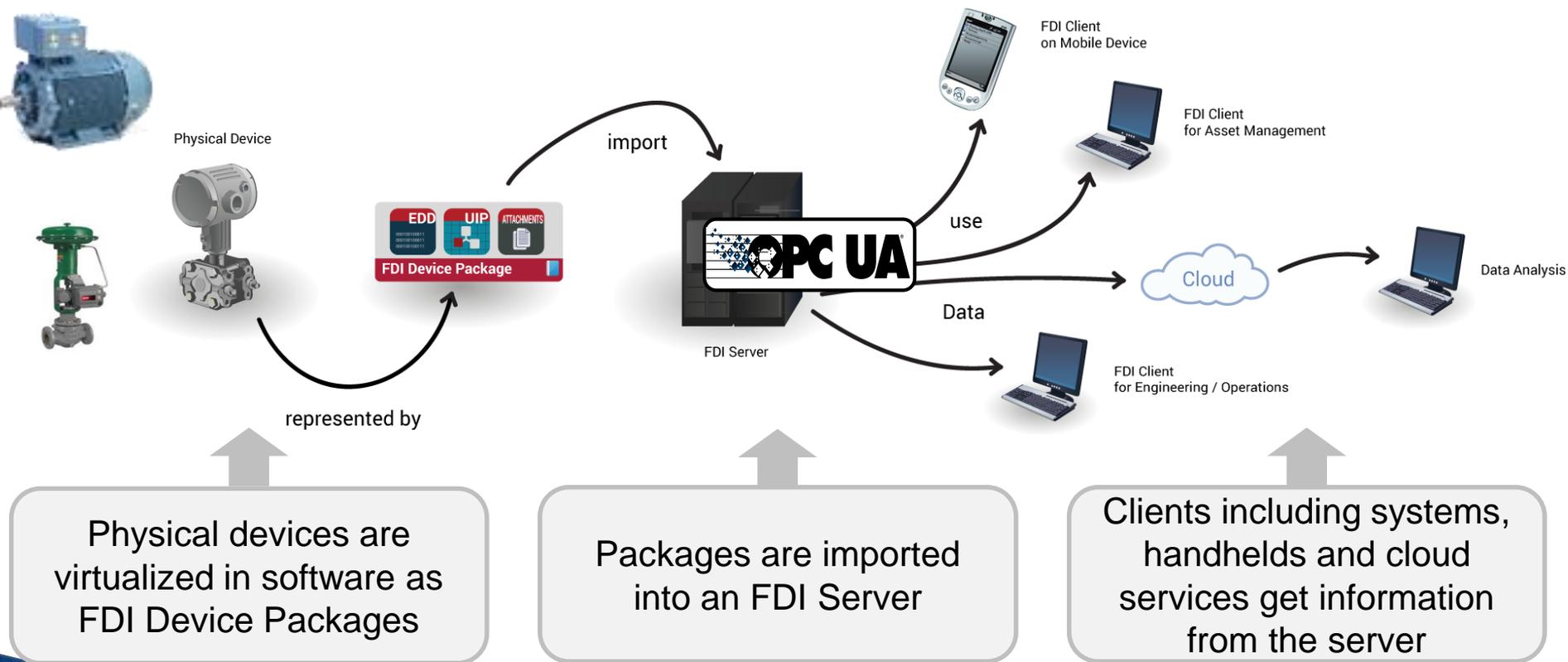
2. Enable open architectures (e.g. NOA, I4.0)

Standardized access to device information through OPCUA

3. Up to date cyber security features

Signing, Sandboxing

FDI – The Big Picture



FDI saves costs for vendors and users

200+
downloadable
files available for a
common flowmeter

Before FDI

FDI brings standardization to the packaging and distribution of all the software and tools

An objective of FDI is to dramatically simplify software



Today's field devices often include over 200 files that are needed for a successful integration with a host

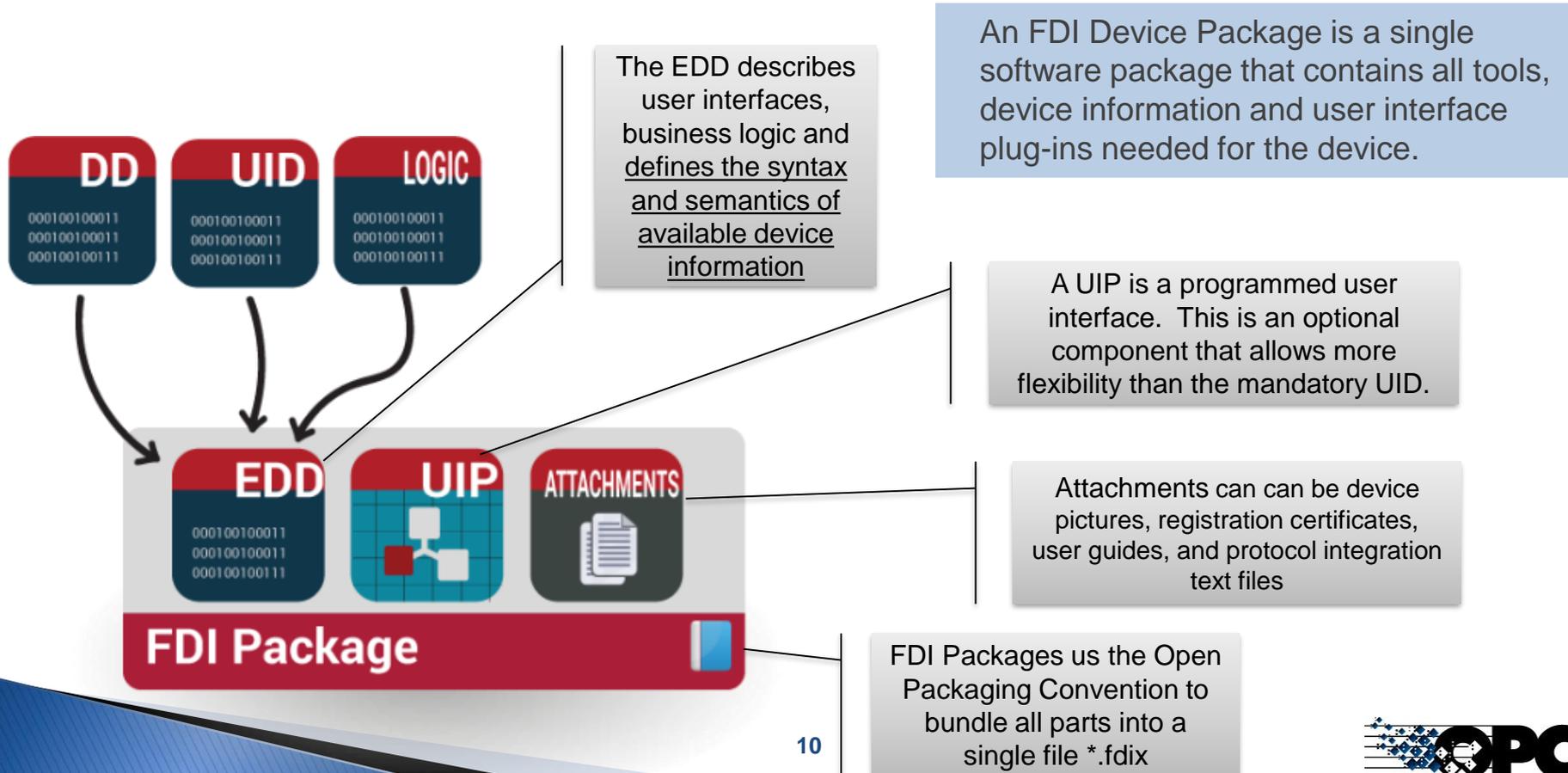
management

Id instruments and host systems



Only one FDI Device Package is needed for a successful integration with a host

FDI Device Packages – The Core of FDI



Human readable access to device information



&



UID

- EDDL based
- Parameterization, diagnosis

UIP

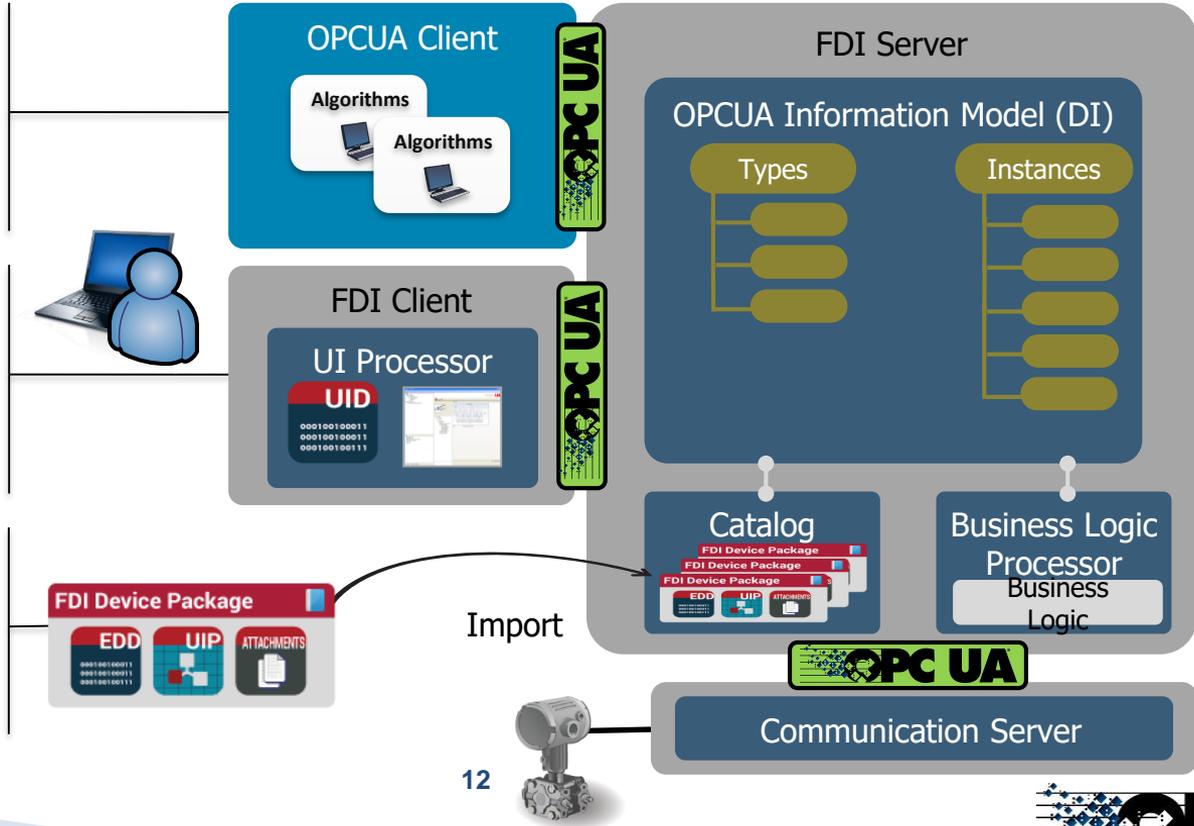
- .NET or HTML5 based
- Advanced UIs and graphics

OPCUA Device Information Model (DI) for machine readable information

The OPCUA Device Information Model provides machine readable information

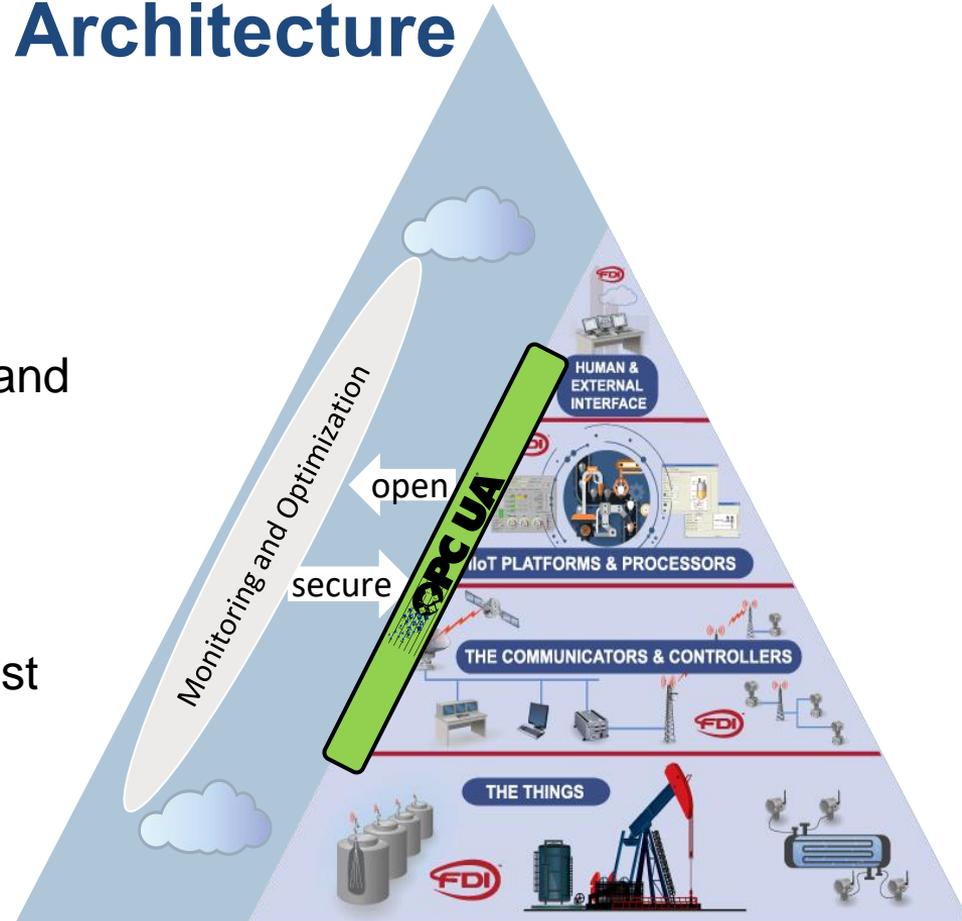
FDI client provides human-readable information for device parameterization

The FDI Device Package represents a device type



Use Case: NAMUR Open Architecture

- Based on available FDI and OPCUA technology
- Open for new approaches within IIoT and I4.0 concepts
- No risk on availability and safety for installed base
- Enables significant improvement of cost per sensor



Machine readable information

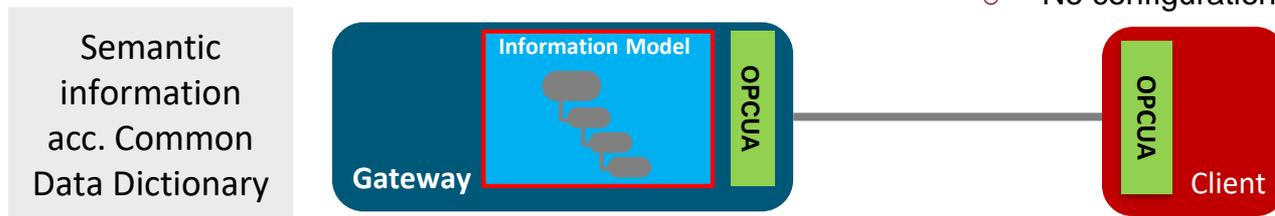
- FDI, EDDL and OPCUA specifications are being enhanced to manage semantic IDs, to allow for exposing machine readable information

- Gateway

- Exposes device information through information model
- Provides semantic ID according to Common Data Dictionary (IEC 61360, 61987)

- Client

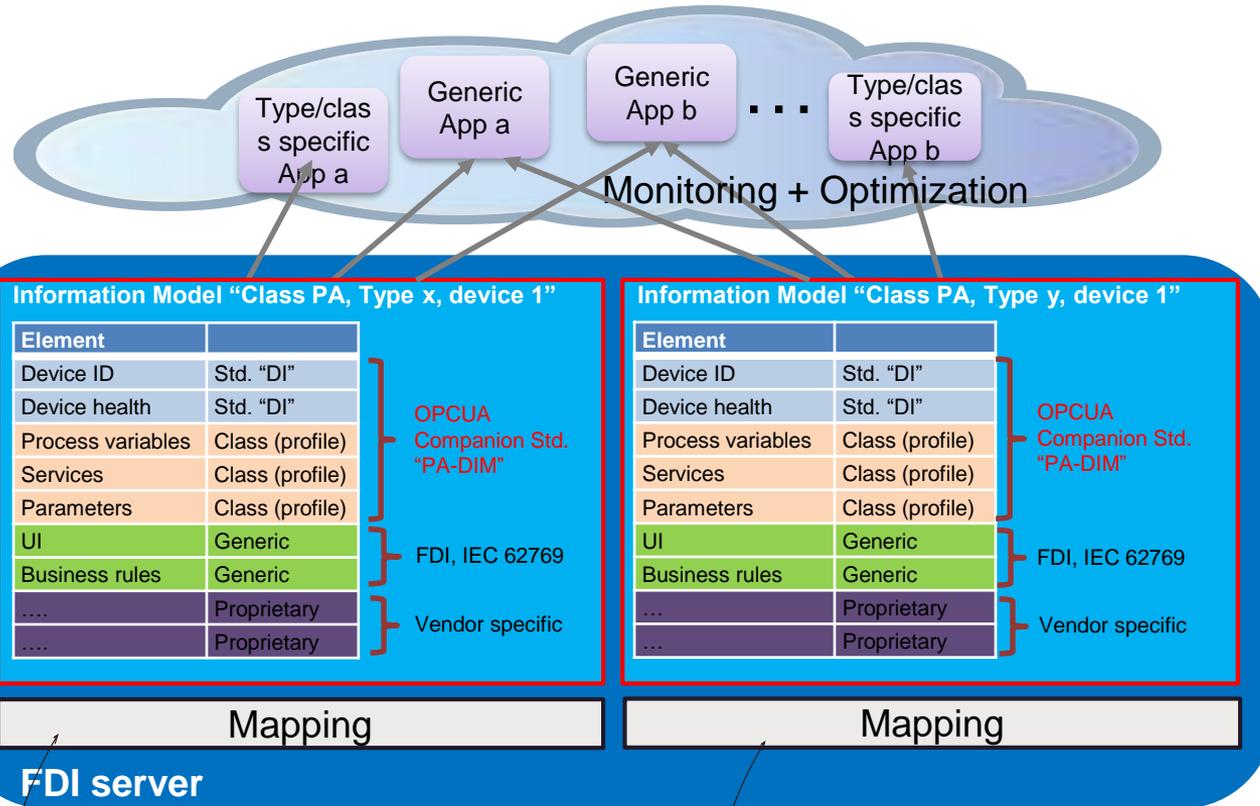
- Has all semantic information for device data according to Common Data Dictionary
- No configuration required



HART, FF,
PROFIBUS, PROFINET, other

Example: Tag - 0112/2///61987#ABB271#002
Unit - 0112/2///61987#ABA968#001
Temperature - 0112/2///61987#ABA927#002

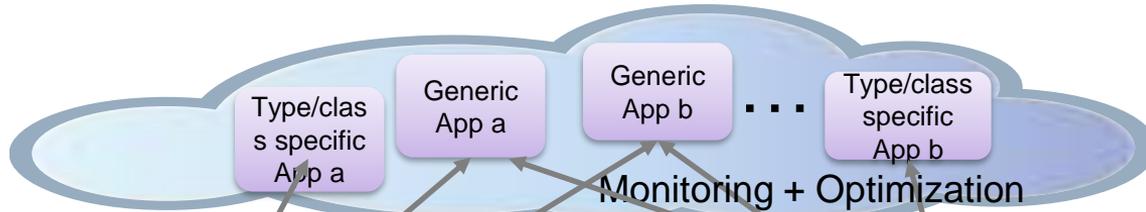
Process Automation Device Information Model (PA DIM)



- ▶ Information model is created from FDI package (EDD), i.e. all parameters are described by EDDs
- ▶ Technology basis
 - OPCUA
 - FDI 1.2
 - EDDL 1.0
- ▶ Can be applied to the installed base of field devices



Process Automation Device Information Model (PA DIM 1.x)



Information Model "Class PA, Type x, device 1"

Element	
Device ID	Std. "DI"
Device health	Std. "DI"
Process variables	Class (profile)
Services	Class (profile)
Parameters	Class (profile)
UI	Generic
Business rules	Generic
....	Proprietary
....	Proprietary

OPCUA
Companion Std.
"PA-DIM"

FDI, IEC 62769

Vendor specific

Information Model "Class PA, Type y, device 1"

Element	
Device ID	Std. "DI"
Device health	Std. "DI"
Process variables	Class (profile)
Services	Class (profile)
Parameters	Class (profile)
UI	Generic
Business rules	Generic
...	Proprietary
...	Proprietary

OPCUA
Companion Std.
"PA-DIM"

FDI, IEC 62769

Vendor specific

FDI server with aggregated information model



Embedded information model



Element	
Device ID	Std.
Device health	Std. "DI"
Process variables	Class (profile)
Services	Class (profile)
Parameters	Class (profile)
....	Proprietary
....	Proprietary



Embedded information model



Element	
Device ID	Std.
Device health	Std. "DI"
Process variables	Class (profile)
Services	Class (profile)
Parameters	Class (profile)
....	Proprietary
....	Proprietary



- Information model will be embedded in OPCUA device
- Device information models will be aggregated
- Technology basis
 - OPCUA
 - FDI 1.x
 - EDDL 1.x

FDI + OPCUA – Protocol Independent Access to Device Information

IIoT Services

Can be available on premise or in the cloud

OPC UA Clients

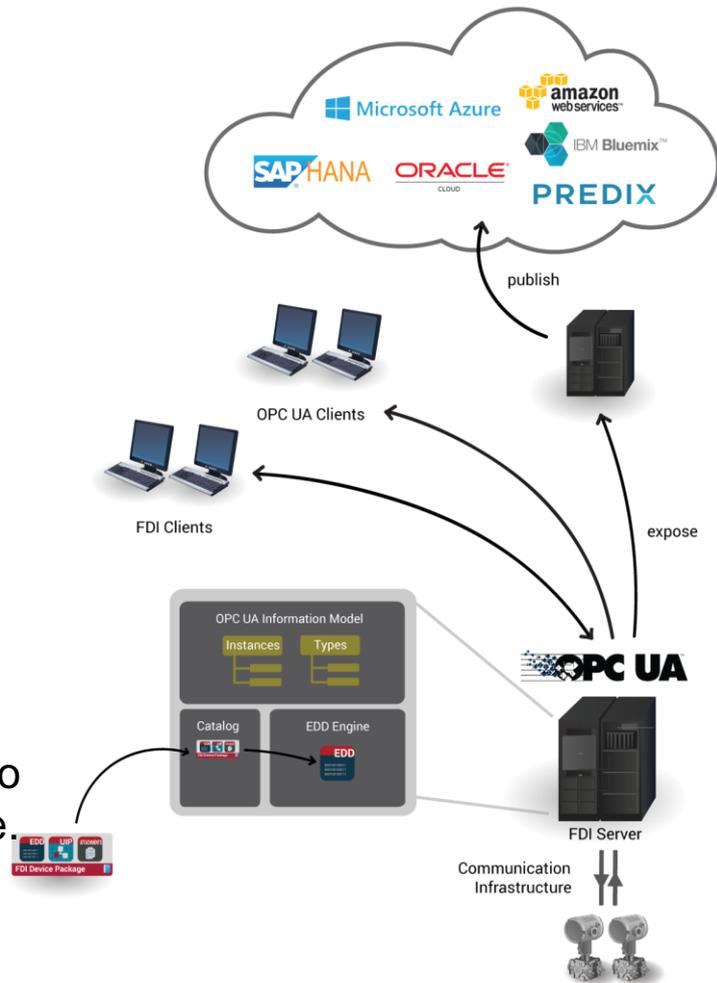
Read only access to device parameters and status information.

FDI Client (full featured)

Access to the entire Information Model, render UID and host UIPs, read/write parameter nodes. Execute logic.

FDI Host with Information Model

Has knowledge about the device data, functions and how to access this data through the imported FDI Device Package.



Questions?

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