

OPC in the World - Update

OPC Day Japan, Dec 12th, 2019



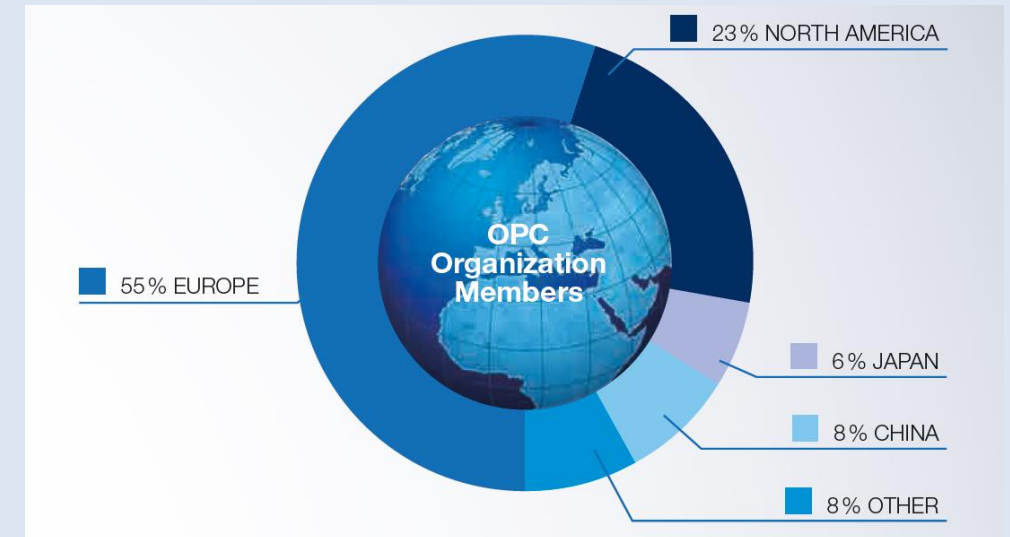
Stefan Hoppe
President & Executive Director OPC Foundation
Stefan.hoppe@opcfoundation.org

- ▶ ビジョン
 - セキュア、信頼性
 - ベンダー、プラットフォーム、ドメイン に非依存
 - センサーからエンタープライズ、更に上位との相互運用
- ▶ グローバルなプロフィール
 - 非営利組織 (1995年設立)
 - オートメーションやIT業界の企業が参加
 - 国際的に認知: OPC UA = IEC62541
- ▶ 提供するもの
 - 仕様書: オープンに利用可能
 - ツール、サンプルコード: 素早く簡単な採用を支援 (AnsiC/C++, C# .NET Standard, Java)
 - 認証: 全ての人にオープンなOPCラボ
- ▶ ツールキットや教育と連携したエコシステム
- ▶ 現代的な IPR ポリシー



組織概要

会員数: 737 (2019/12/03)



2019 役員

Microsoft
SAP
Siemens
Beckhoff

Honeywell
横河電機
三菱電機
Ascolab

Rockwell
Schneider
ABB

OPC Foundation: 2019年 新規クラスA会員

2018/12/12 636 社
2019/04/12 737 社

→ 1年以内に101社の新会員！

注目すべき 10社の新規クラスA会員

Alstom Group
Baumüller
Foxconn Industrial Internet
(株) 牧野フライス製作所
Murrelektronik
(株) ニコン
オークマ (株)
Persistent Systems
TÜV SÜD
Weidmüller

Largest Eco System for Industrial Interoperability



+ 120 ロゴ会員

OPC Foundation: なぜ会員になるのか？

“OPC Foundationの会員になることで、アセットへのセキュアで標準的な情報やインターフェースを提供するOPC UAコンパニオン仕様のような、来るべきキーテクノロジーへの迅速な情報が保証できます。”

Michael Schweiger, フォルクスワーゲン

Volkswagen: 600番目の会員



Stefan Hoppe Michael Schweiger
OPC Foundation Volkswagen

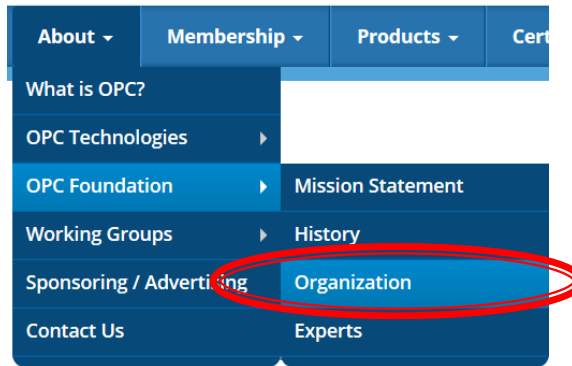
Foxconn Industrial Internet: 699番目の会員



Brand Cheng
CEO Foxconn Fii

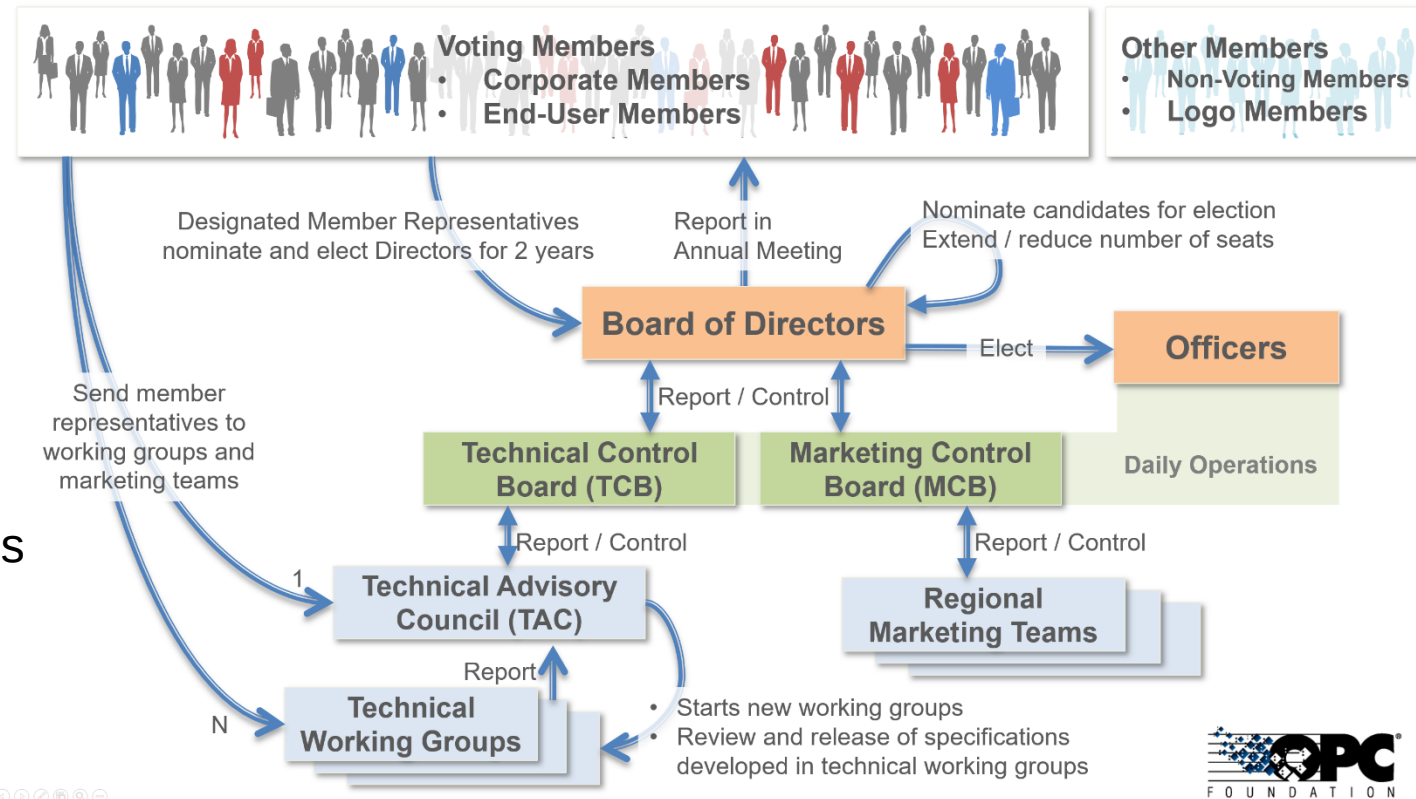
Stefan Hoppe
OPC Foundation

OPC Foundation: 組織



組織の構造

- Board of Director, Officers, Directors (役員会), (執行役), (役員)
- Control Boards (監理委員会)
 - Technical Control Board (TCB)
 - Marketing Control Board (MCB)
- Technical Advisory Council (TAC)
- Markets Advisory Council (MAC)
- ローカルな組織群 (国ごと、など)



OPC Foundation Board of Directors

会長

1996 – 1998 David Rehbein

1998 – 2000 Dr. Gil Pareja

2000 – 2018 Thomas Burke

2018 – 会長 Stefan Hoppe

役員会

Russ Agrusa

• ICONICS → 三菱電機

Matthias Damm

• ascolab

Thomas Hahn

• Siemens (Officer: Vice President)

Stefan Hoppe

• BECKHOFF (Officer: President)

Ziad Kaakani

• Honeywell (Officer: Treasurer)

Shinji Oda

• 横河電機

Veronika Schmid-Lutz

• SAP (Officer: Chairwoman)

Matt Vasey

• Microsoft

Juergen Weinhofer

• Rockwell Automation

Bernhard Eschermann

• ABB

Fabrice Jadot

• Schneider Electric

2018/10 :Stefan Hoppe と Tom Burke



世界におけるOPC UA



IIC



Industrie4.0



中国製造2025



日本 IVI



smart
manufacturing
korea 4.0



Manufacturing Renaissance
'Made in Korea'



OPC UA: Industrial Interoperability for IIoT and Industrie4.0

From Sensor to Cloud

OPC Seminar Tour 2019

[More Details](#)

■ REDMOND

■ TORONTO

■ DETROIT

■ BOSTON

■ PHILADELPHIA

■ PALO ALTO

■ GREENVILLE

■ AUSTIN

■ HOUSTON

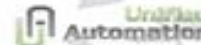
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BECKHOFF

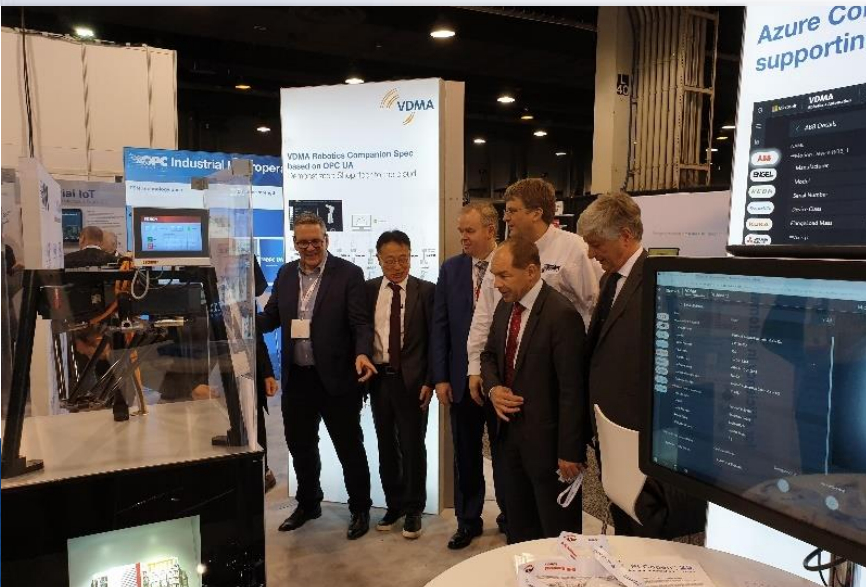


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北米での活動

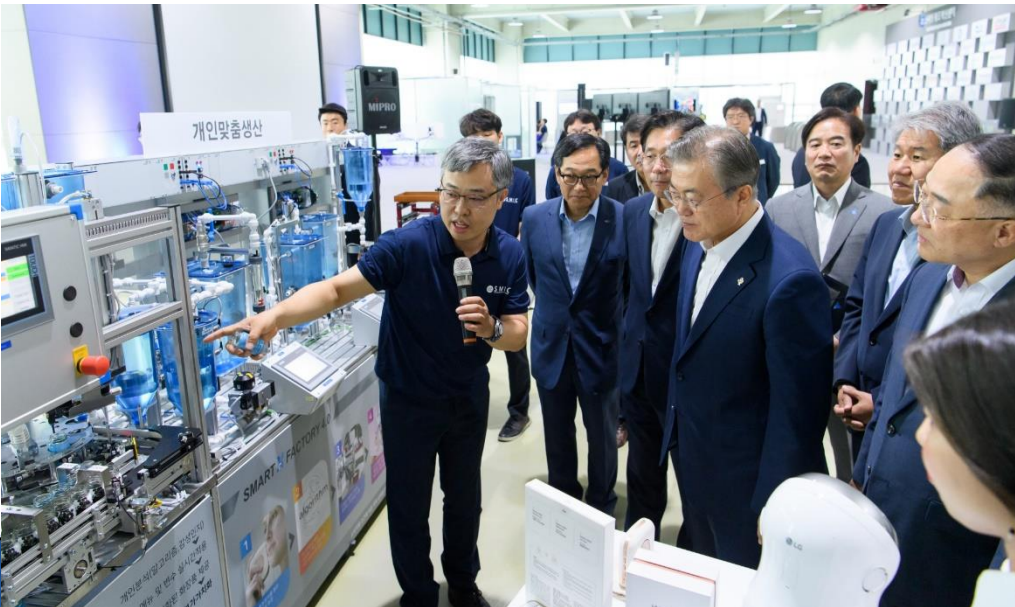
- 展示会：例 Automate, IMTS, PackEXPO, ARC Forum, OTC
- セミナーツアー
- ベンダーの個展：例 Rockwell, Honeywell, ABB



韓国でのOPC Foundation: Manufacturing Renaissance



- ▶ Manufacturing Renaissance ビジョン宣言 (2019/01/19)
 - 2030まで、世界中の製造業の活力のために
 - 新たな産業のために、8兆ウォンの研究開発基金を支援
- ▶ OPC UA は韓国の国内標準
 - Part 1~6 まで完了
- ▶ 政府からの公式アナウンス: “Manufacturing Renaissance : Made in Korea”
 - OPC UA は韓国のスマートファクトリープロジェクトの本質となる標準



OPC UA は中国の国内標準 GB/T 33863



ITEI が OPC Foundation を助けて、
OPC UA (IEC 62541) を中国の国内標準
GB/T 33863に変換。



ITEI と OPC Foundation が協力して、OPC製品
の準拠をテストする OPC China Test Labを設立。

OPC UA: Industrial Interoperability for IIoT and Industrie4.0 – From Sensor to Cloud

OPC Seminar Tour 2019

[More Details](#)

HOSTED BY:



BECKHOFF

FOXCONN



HUAWEI



Microsoft



MITSUBISHI
ELECTRIC
Changes for the Better

SEOUL

NAGOYA

SHANGHAI

TAIPEI

SHENZHEN

SINGAPORE

- 150+ July 3rd – OPC Day Shanghai hosted by Huawei, China
- 151: July 4th – OPC Day 名古屋 ホスト：三菱電機
- 119: July 5th – OPC Day Seoul, Korea
- 157: July 8th – OPC Day Taipei, Taiwan hosted by Microsoft
- 150+ July 9th – OPC Day Shenzhen hosted by Foxconn, China
- 115: July 10th – OPC Day Singapore sponsored by Beckhoff

ハノーバーメッセ 2019: 1st Interoperability Conference - World



- 32 団体 – 306名の参加者
- ネットワーキングのために、コラボレーションやモデリングを知る機会
- 2020/04/20 カンファレンスルーム#2



Presenting Organizations



OPC UA Day Automotive 2019/05/23

- 主催

- AIDA: Audi, BMW, Porsche, Volkswagen
 - OPC Foundation
 - VDMA
-
- ホスト：フォルクスワーゲン @ Wolfsburg
 - 306名の参加者
 - 19 のスポンサー



A promotional poster for the OPC UA Day Automotive event. The background is a blue-tinted image of a car chassis on an assembly line. The text is in white and yellow. The event title is 'OPC UA DAY AUTOMOTIVE' followed by the date '23. MAI 2019' and the tagline 'IT meets Automotive'. The OPC UA logo is prominently displayed, along with the text 'OPC Unified Architecture The Industrial Interoperability Standard'. The event details, including time, location, and host, are listed in the top right corner. A list of sponsors is shown at the bottom under the headings 'Veranstaltung' and 'Marktplatz'.

OPC UA DAY AUTOMOTIVE 23. MAI 2019 IT meets Automotive

9:00–16:30 Uhr

Volkswagen
Mobile Life Campus
(AutoUNI)

Hermann-Münch-Str. 1
38440 Wolfsburg
Germany

OPC UA

OPC Unified Architecture
The Industrial Inter-
operability Standard

Veranstaltung



Ausrichter



Fabrik Automation



Industrielle Interoperabilität

Marktplatz

BECKHOFF



OPC UA: セキュアで標準化されたデータとインターフェースを実現する産業界のフレームワーク

相互運用性

ベンダー、プラットフォーム、市場、OSに
非依存

センサーからクラウドまでスケーラブル

ディスカバー可能なサービス駆動型のアー
キテクチャ

トランスポートプロトコルに非依存

非営利 (OPC Foundation)

広く採用: 5万を超えるインストールベース

GitHub上でのオープンソース

データモデリング

グラフやソースコンテキストの保存のサ
ポート

ベンダーによる拡張可能なコンパニオン仕
様

関連: ドメイン固有の情報モデルを実現

- ディスクリット: Robotics, Machine Vision, ...
- プロセス: FDI, FDT, PA-DIM, MDIS, NOA..
- エネルギー: IEC61850, ..

セキュア

オープンなセキュリティ標準をベースに組
み上げたセキュア設計

監査証跡, 認証, 暗号化...

将来への保証: セキュリティ技術と共に進
化

ベンダー/ユーザー が選択可能なセキュリ
ティレベル

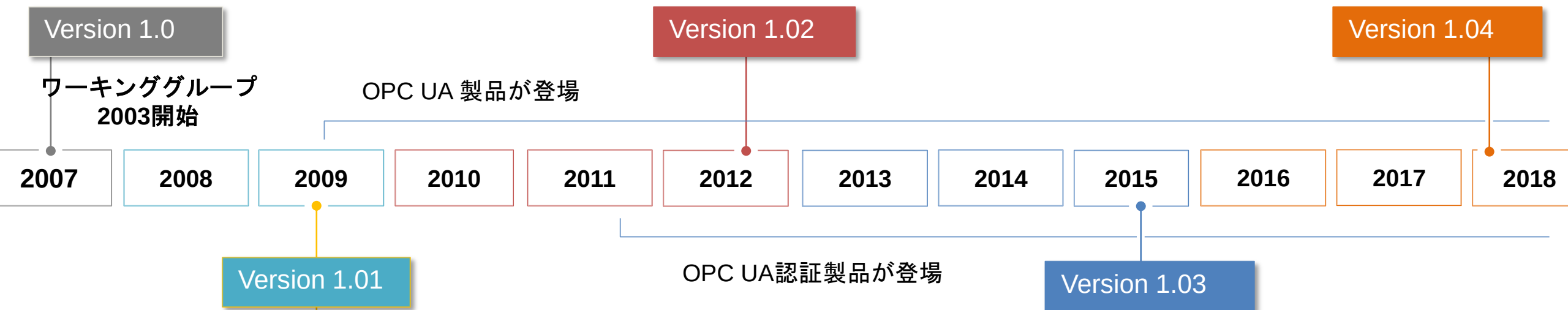
認知: ITでの要求に協調

... 現在 50を超えるイニシアチブ!

OPC UA テクノロジー: サマリ

- **ONE – 情報モデル**
 - オブジェクト指向, 柔軟性, 拡張性
- **TWO – コミュニケーション**
 - クライアント/サーバー – サービスオリエンテッド, リクエスト/レスポンス, オンデマンド
 - パブリッシュ/サブスクライブ – マルチキャスト, 一方向, „サイクリック“
- **THREE – プロトコル**
 - UA-TCP - TCP/IP ベース, UA バイナリ, Port 4840
 - UADP – UDP ベース, UA バイナリ
 - UADP – MQTT ベース, JSON, クラウド, オプションのブローカー
- 将来のサポート: IT基盤 TSN / 5G / Ethernet-APL
- **SECURITY – トランスポート, メッセージ, 認可**

OPC UA ワーキンググループ リリース



強化されたリリースプロセス

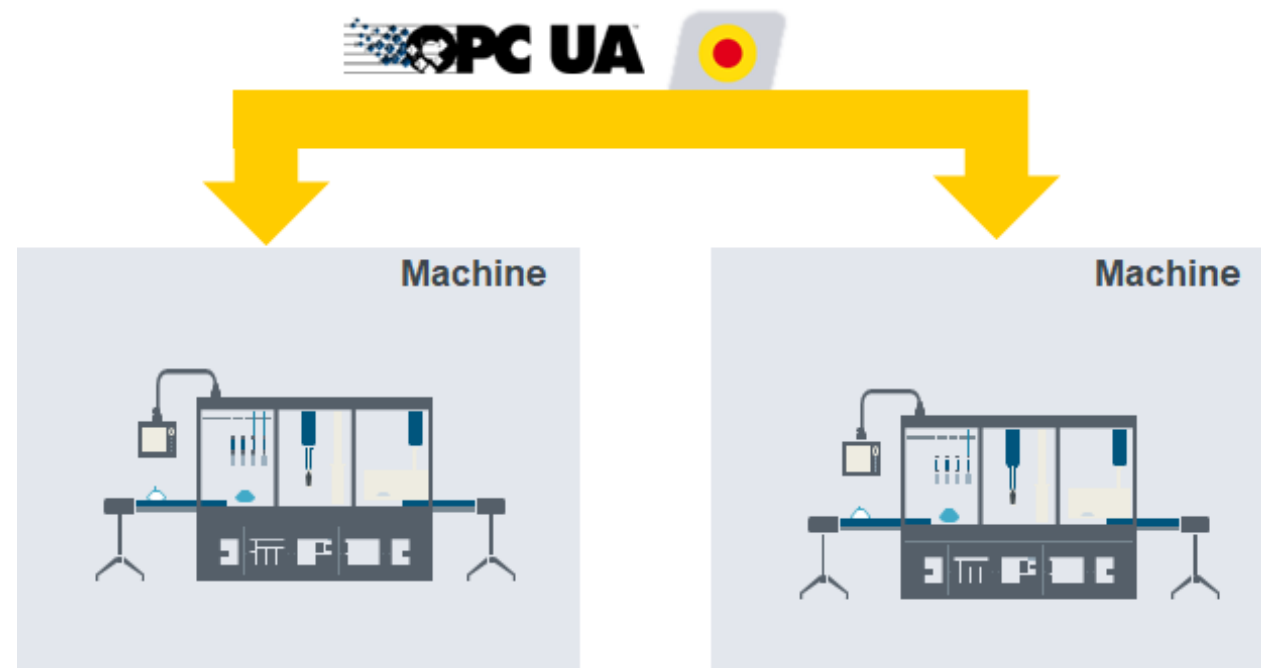
- ▶ 典型的なリリースサイクル: 3年
- ▶ コンパニオンワーキンググループからの要求による短期間のマイナー強化
- ▶ 改正 (Amendments) によるマイナー機能のリリース
- ▶ 正誤表を介した、全てを含めたバージョニング
 - バグフィックスおよびリリース済みの改正をまとめてバージョン取得
 - 変更内容に適用するUANodeSetファイル (ノード定義実装ファイル) と共にリリース

1.04.3 正誤表におけるリリースステータス

- ▶ Amendment 1: AnalogItem Types
- ▶ Amendment 2: Choice States and Guards
- ▶ Amendment 3: Method Metadata
- ▶ Amendment 5: Dictionary Reference
- ▶ Amendment 6: UADP Header Layouts
- ▶ Amendment 7: Interfaces and AddIns
- ▶ Amendment 11: Spatial Types
- ▶ More in release process

OPC UA セーフティ

- ▶ 発端: PNOとOPC Foundationの間での“Safety over OPC UA based on ProfiSafe” ジョイントワーキンググループ
- ▶ 範囲: 全てのレベルにおける機能安全コミュニケーション
- ▶ キーとなる機能:
 - black channel アプローチをベース
(同一ネットワークを介したフェールセーフと標準データの伝送)
 - IEC 61508 と 61784-3に準じた開発
 - ランタイム中の接続の動的な確率
- ▶ OPC 10000 – 15 OPC UA Safety リリース
クライアント/サーバーをカバーしたものが2019/12に利用可能
- ▶ Pub / Sub対応を開発中
– black channelの一部



OPC UA for Device (DI) ワーキンググループ

- ▶ Version 1.01 : 2013より利用可能
- ▶ Version 1.02 : 2019/04リリース
 - 利用に関するクリーンアップと明確化
 - デバイスモデルの拡張
- ▶ 開発中の改正 (Amendment)
 - ファームウェア更新
 - パラメータ バックアップ / リストア
 - ソフトウェア管理 (インストール, アンインストール, スタート)

OPC UA 仕様書の付番と、オンラインリファレンス

新たな仕様書の付番スキーマ

- コンパニオン仕様を含む全てのOPC UA仕様書に5桁の番号を割り当て
- 仕様を独自に翻訳されたタイトルではなくユニークな番号で識別（国際化）

公開

- オンラインによる仕様リファレンス
<https://reference.opcfoundation.org>
- タイプ情報の辞書
 - 全ての OPC UA 仕様
 - 全てのジョイント定義の情報モデル

Published Information Models

OPC UA Specifications

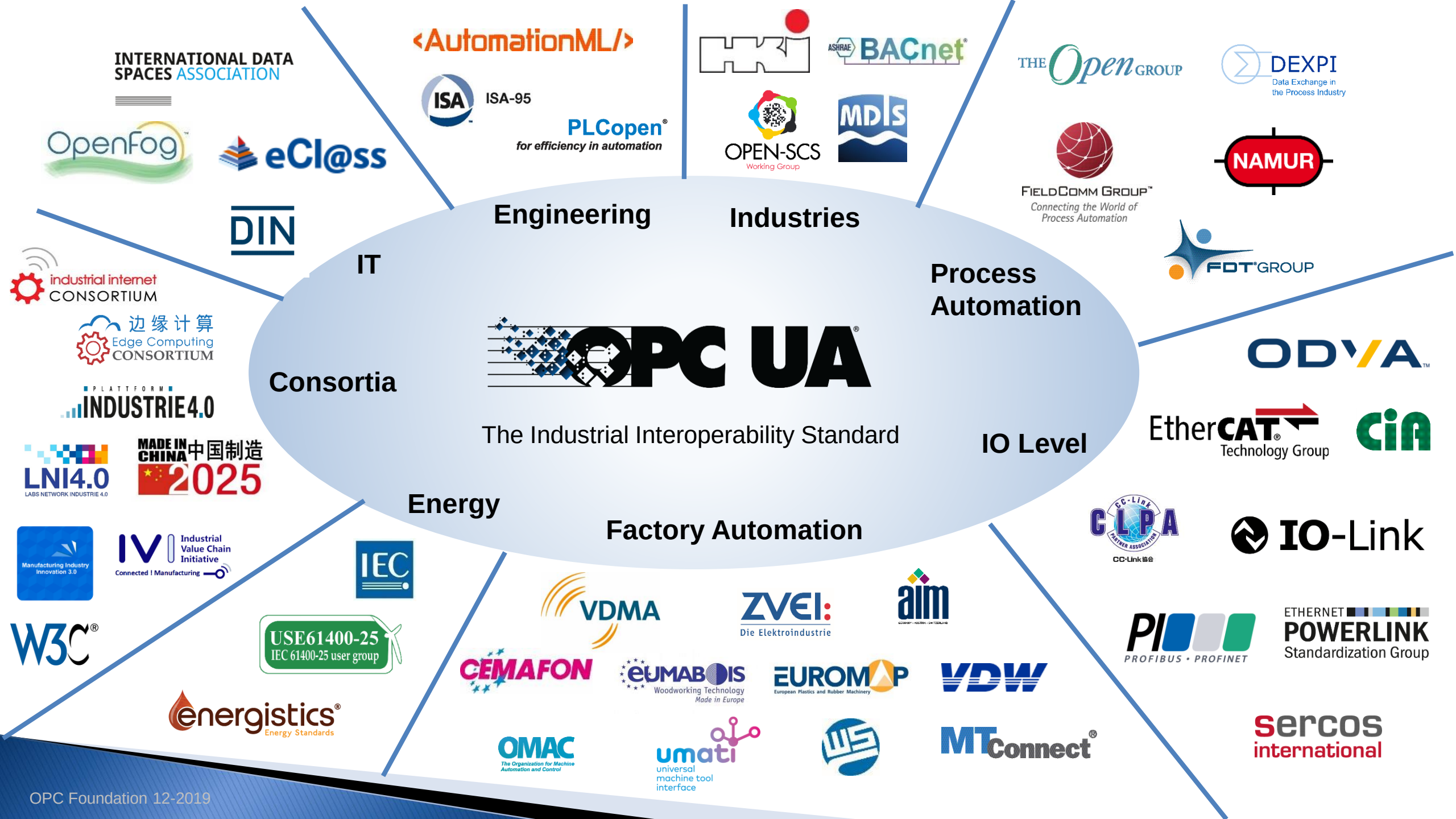
Model	Specification
Core	OPC 10000-1 - Part 1: Overview and Concepts
Core	OPC 10000-2 - Part 2: Security Model
Core	OPC 10000-3 - Part 3: Address Space Model
Core	OPC 10000-4 - Part 4: Services
Core	OPC 10000-5 - Part 5: Data Model

Joint Companion Specifications

Model	Specification
DI	OPC 10000-100 - Part 100: Device Information Model
ADI	OPC 10020 - UA for Analyzer Devices
ISA-95	OPC 10030 - UA for ISA-S95
PLCopen	OPC 30000 - UA for Programmable Logic Controller
AutoID	OPC 30010 - UA for AutoID Devices
AutomationML	OPC 30040 - UA for AutomationML
PackML	OPC 30050 - UA for PackML (OMAC)
TMC	OPC 30060 - UA for Tobacco machinery (TMC)

ドメイン特化の相互運用例





OPCF ジョイントワーキンググループ (JWG) – 定義, 基準, How-to



ジョイントワーキンググループに関する公開情報

<https://opcfoundation.org/about/working-groups/joint-working-groups/>

- 定義 / 基準 / How to create
- 適用レベル (仕様書有無 / 適用有無 / 認証有無)
- 現存グループのリスト: What / Who / Contact / Version
- リリース物へのリンク
- 状態表示: Implemented / IP tested / Certified

“ジョイントコンパニオン仕様” はOPC Foundationのテクノロジーではありません。

OPC Foundation Joint Working Groups

Introduction

OPC UA is a series of specifications providing multivendor multiplatform secure reliable information integration interoperability from the embedded world to the cloud. Key parts of OPC UA is about information modeling, and is the foundation providing a complete infrastructure to facilitate other organizations complex data modeling leveraging the OPC UA infrastructure to take advantage of the seamless interoperability.

The modelling capabilities of OPC UA are the fundamental components necessary for semantic interoperability. An increasing number of organizations created standard OPC UA information models for specific domains and/or are currently under development. These OPC UA information models are described in what is known as OPC UA companion specifications.

OPC UA companion standards address use cases and with that increase the applicability and adoption of the OPC UA technology in different verticals.

See <https://opcfoundation.org/developer-tools/specifications-unified-architecture> for released companion specifications.

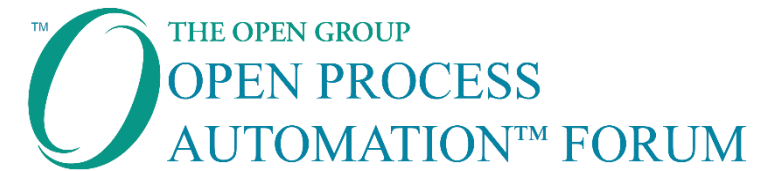
The OPC Foundation has been providing support to other consortiums and standard organizations to develop the OPC UA companion specifications via an infrastructure known as joint working groups (JWG).

A “Joint Working Group (JWG)” is a working group formed between an organization (subsequently called “cooperating organization”) and the OPC Foundation. The goal of the JWG is the development of an OPC UA companion standard for use cases defined by the cooperating organization, with a compliance testing strategy to insure compliant implementations of the OPC UA companion standard.

Version 2019-02-11

Title	Active	Abstract	Contacts	Version	Status	Status Date	Implemented	IOP tested	Certification	Key Words
Generic Device Models (Controller, Field Device, Process Device)										
OPC Foundation: UA for Devices (DI)	Y	generic representation of devices, e.g. Field devices, controllers, robots, machine tools	Matthias Damm, chair	V1.00	Released	Dec-09				physical device,software component, functional grouping
				V1.01	Released	Jul-12				
				V1.02	Release Candidate	Jan-19				
OPC Foundation: Analyzer Devices (ADI)		A unified view of analysers irrespective of the underlying device protocols. Analyzer devices are comprised of one or more analyser channels with a single address space which has its own configuration, status and control. Examples: Particle Size Monitor, Acoustic Spectrometer, Gas Chromatograph	<AskOPC>	V1.00	Released	Oct-09				
				V1.00	Released	Jan-15				
UA for 61131-3 (PLCopen)	Y	Control program, tasks, controller variables, structured data, function blocks	Stefan Hoppe, chair	V1.00	Released	March-10				PLC, Controller, Automation
UA Client FunctionBlocks (PLCopen)	Y	PLC controller initiates UA communication. Controller-Controller, Controller-MES, ...		V1.01	In work					
				V1.00	Released	Apr-14				
				V1.01	Released	Sep-16				
UA for Autold Devices (Autold)		Identificaton device executing a scan, read or write process. Comprises barcode, OCR, 2D code, RFID,	info@AIM-D.de	V1.00	Released	Anr-16				

Open Process Automation Forum



- ▶ Open Process Automation Forum (The Open Groupの一部)
www.opengroup.org
- ▶ The Open Group はIT標準の非営利でグローバルなコンソーシアム
- ▶ エクソンモービルがThe Open Groupを選定
- ▶ <https://www.opengroup.org/open-group-open-process-automation-forum-launches-o-pas-standard-1>

~ New reference architecture Standard developed to ensure the security, interoperability and scalability of process control systems ~

San Francisco, California – February 5th, 2019: Today at the ARC Industry Forum event in Florida, [The Open Group](#), the vendor-neutral technology consortium, has announced the launch of its new [O-PAS™ Standard, Version 1.0](#), a preliminary standard of The Open Group. Developed by [The Open Group Open Process Automation™ Forum \(OPAF\)](#), the standard will provide a vendor-neutral reference architecture to enable the construction of scalable, reliable, interoperable and secure process automation systems.

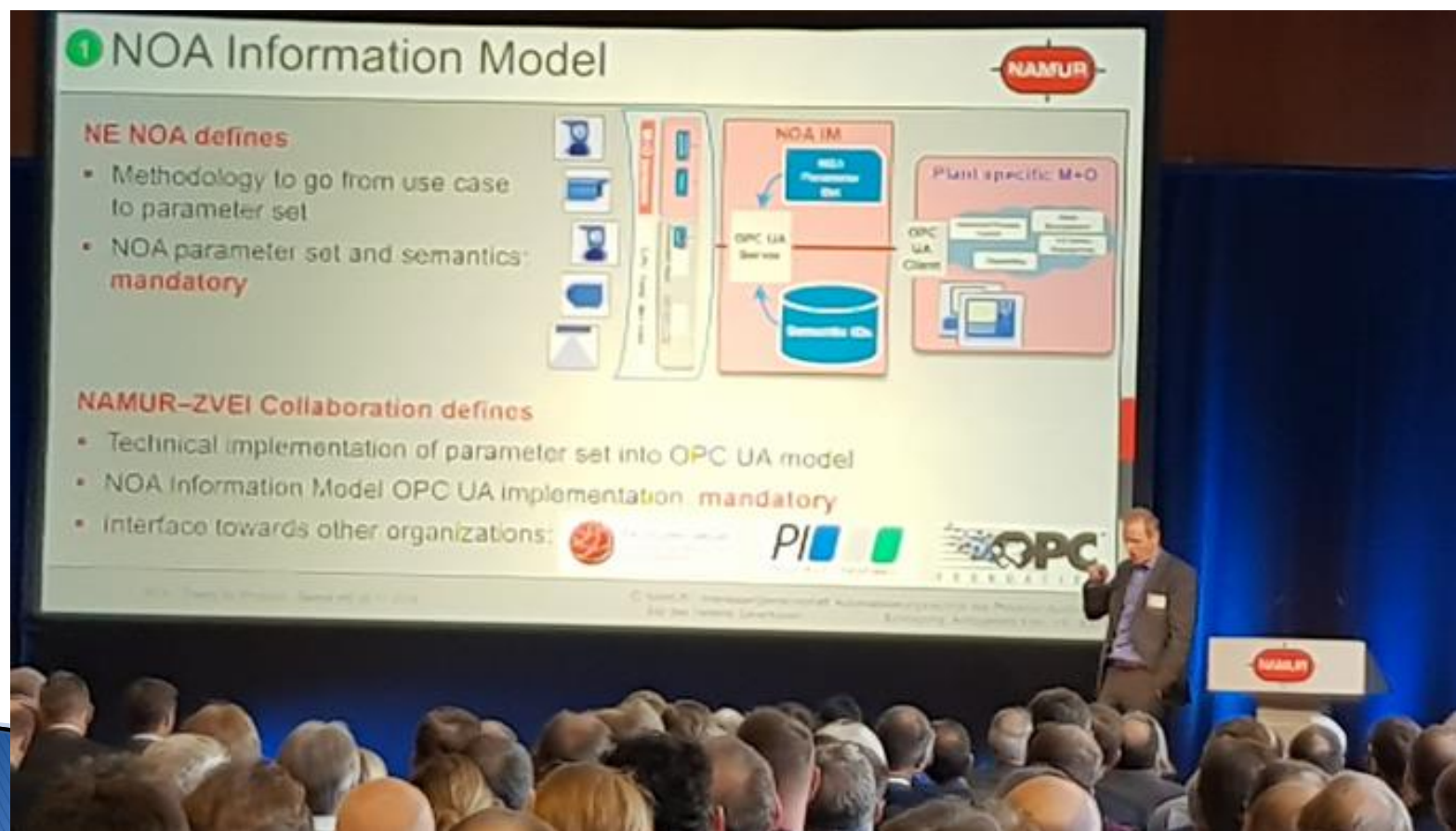
The O-PAS Standard, Version 1.0, is focused on meeting the minimum standard and specification requirements for federated process automation systems, using an open and interoperable reference architecture. A key tenet of the Standard is to adopt 'fit-for-purpose' industry standards that exist in the marketplace today. As a result, the Standard will incorporate a variety of functional elements that are already provided by multiple vendors, including:

- Security: ANSI/ISA 62443 (adopted by IEC as IEC 62443)
- Connectivity: OPC UA
- Systems Management: DMTF Redfish



プロセスオートメーション: NOAに必須のOPC UA

- ▶ NAMUR はプロセス産業のオートメーションテクノロジーにおける国際的なユーザー協会
<https://www.namur.net/en.html>
- ▶ The NAMUR Open Architecture (NOA) というコンセプトは新規および既存プラントの革新的なソリューションを実現する可能性として “NOA 情報モデルの OPC UA 実装は 必須”を提示



NOAに関する情報:
<https://www.namur.net/en/focus-topics/namur-open-architecture/>



OPEN-SCS: 製薬業界におけるOPC UA Packaging Serialization Functional Hierarchy

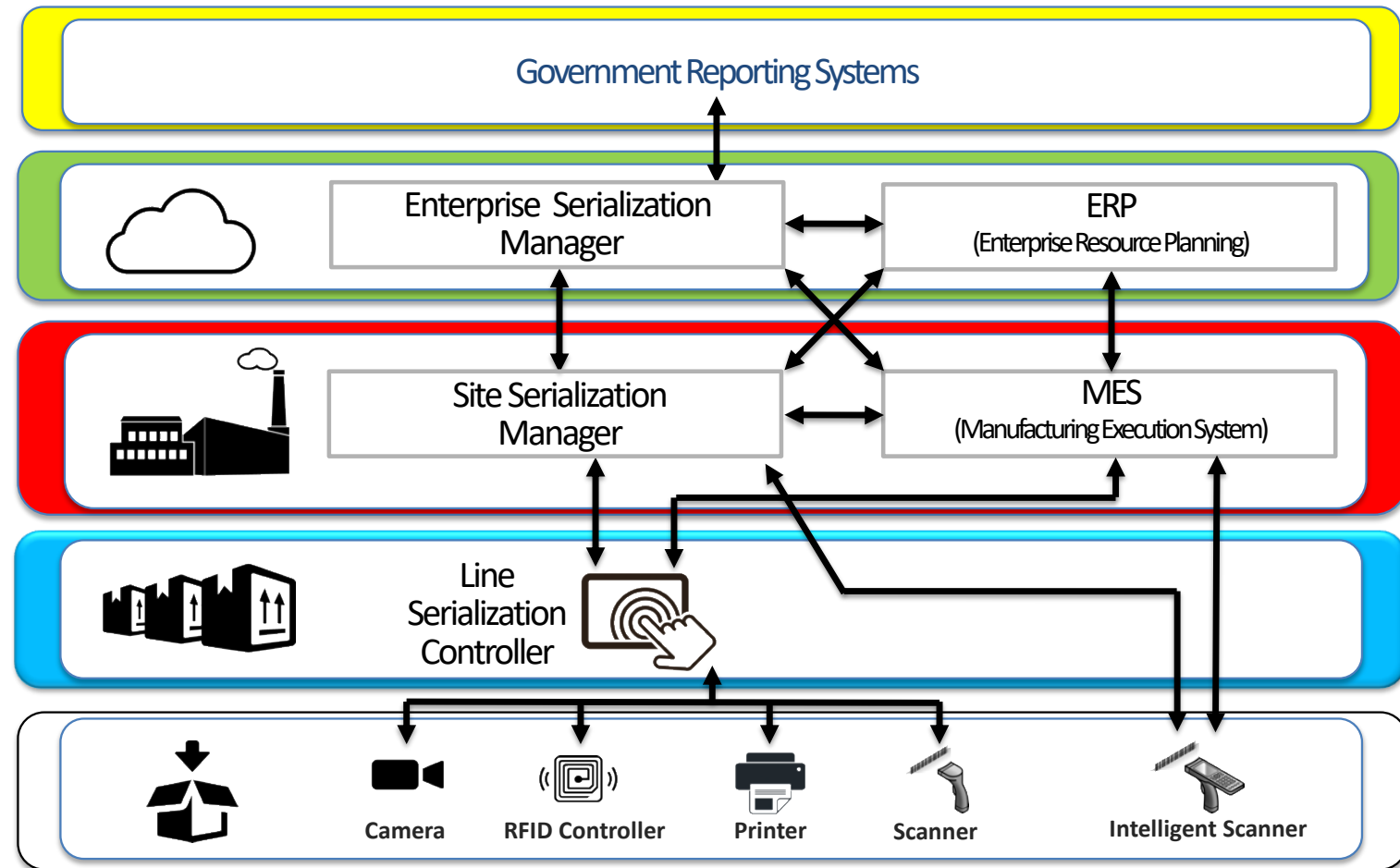
LEVEL 5
Government Reporting

LEVEL 4
Enterprise Planning,
T&T, and Reporting

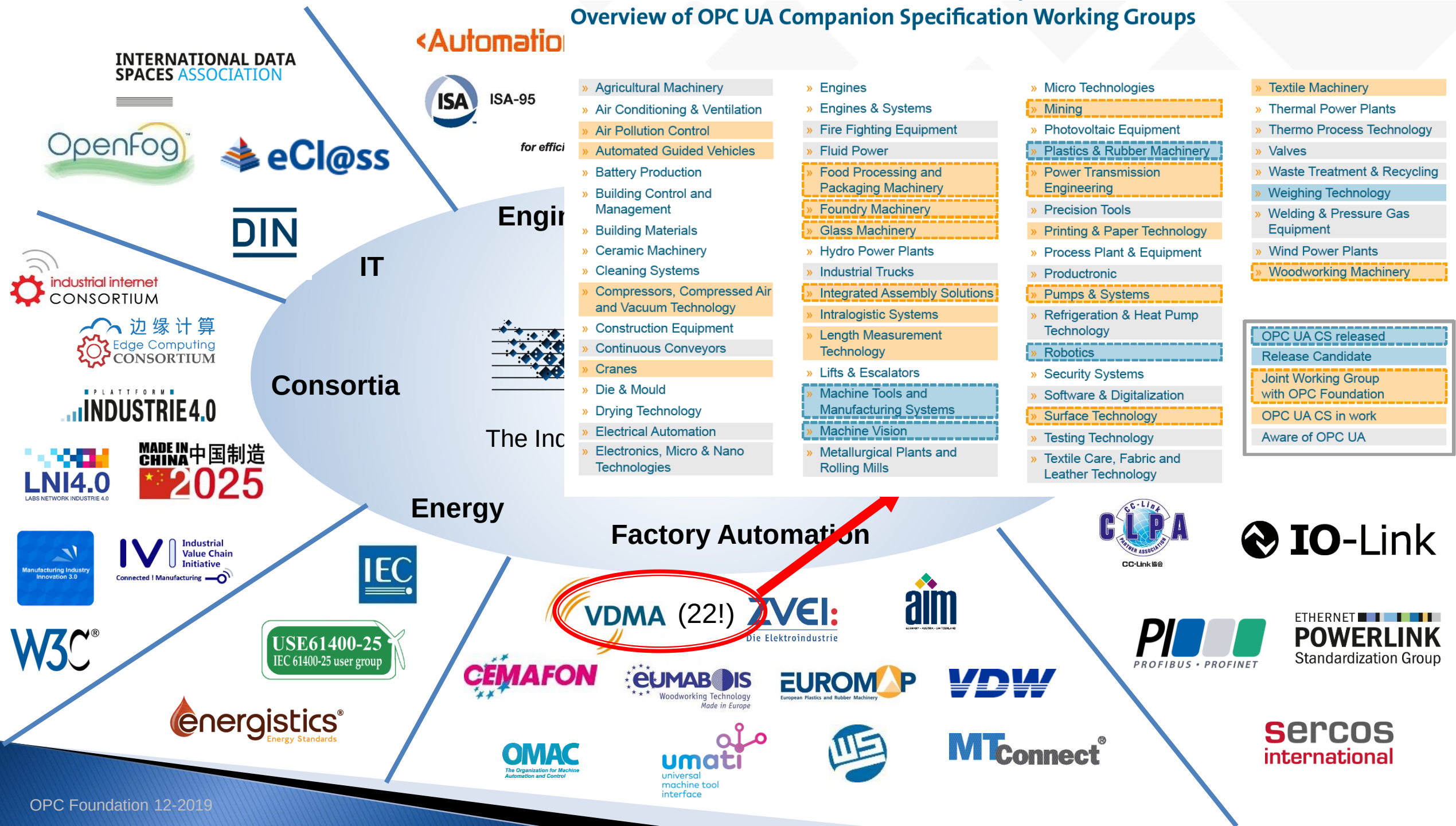
LEVEL 3
Plant / Distribution
Centre Operations

LEVEL 2
Packaging Line Control

LEVEL 2A
Intelligent Devices



Overview of OPC UA Companion Specification Working Groups



VDMA: FAコンパニオン仕様のキーパートナー

Overview of OPC UA Companion Specification Working Groups

» Agricultural Machinery

» Air Conditioning & Ventilation

» Air Pollution Control

» Automated Guided Vehicles

» Battery Production

» Building Control and Management

» Building Materials

» Ceramic Machinery

» Cleaning Systems

» Compressors, Compressed Air and Vacuum Technology

» Construction Equipment

» Continuous Conveyors

» Cranes

» Die & Mould

» Drying Technology

» Electrical Automation

» Electronics, Micro & Nano Technologies

» Engines

» Engines & Systems

» Fire Fighting Equipment

» Fluid Power

» Food Processing and Packaging Machinery

» Foundry Machinery

» Glass Machinery

» Hydro Power Plants

» Industrial Trucks

» Integrated Assembly Solutions

» Intralogistic Systems

» Length Measurement Technology

» Lifts & Escalators

» Machine Tools and Manufacturing Systems

» Machine Vision

» Metallurgical Plants and Rolling Mills

» Micro Technologies

» Mining

» Photovoltaic Equipment

» Plastics & Rubber Machinery

» Power Transmission Engineering

» Precision Tools

» Printing & Paper Technology

» Process Plant & Equipment

» Productronic

» Pumps & Systems

» Refrigeration & Heat Pump Technology

» Robotics

» Security Systems

» Software & Digitalization

» Surface Technology

» Testing Technology

» Textile Care, Fabric and Leather Technology

» Textile Machinery

» Thermal Power Plants

» Thermo Process Technology

» Valves

» Waste Treatment & Recycling

» Weighing Technology

» Welding & Pressure Gas Equipment

» Wind Power Plants

» Woodworking Machinery

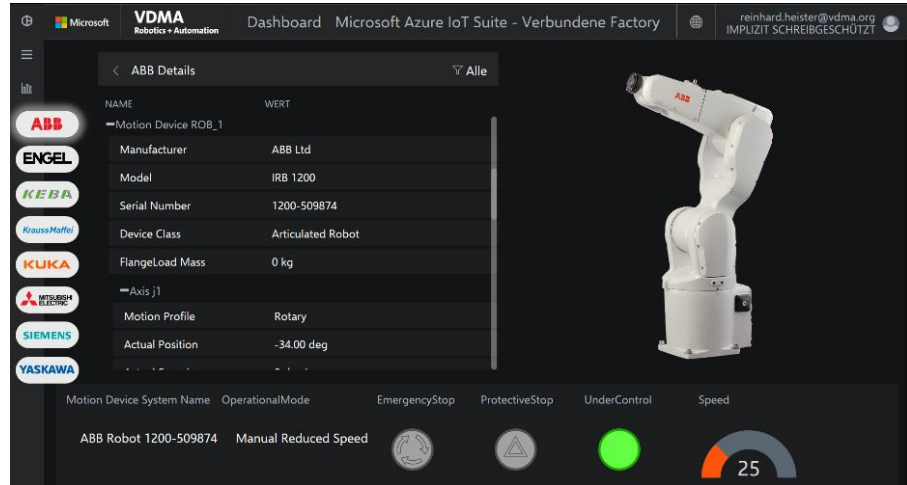
» OPC UA CS released
Release Candidate

» Joint Working Group
with OPC Foundation

» OPC UA CS in work

» Aware of OPC UA

VDMA ロボティクス OPC UAコンパニオン仕様

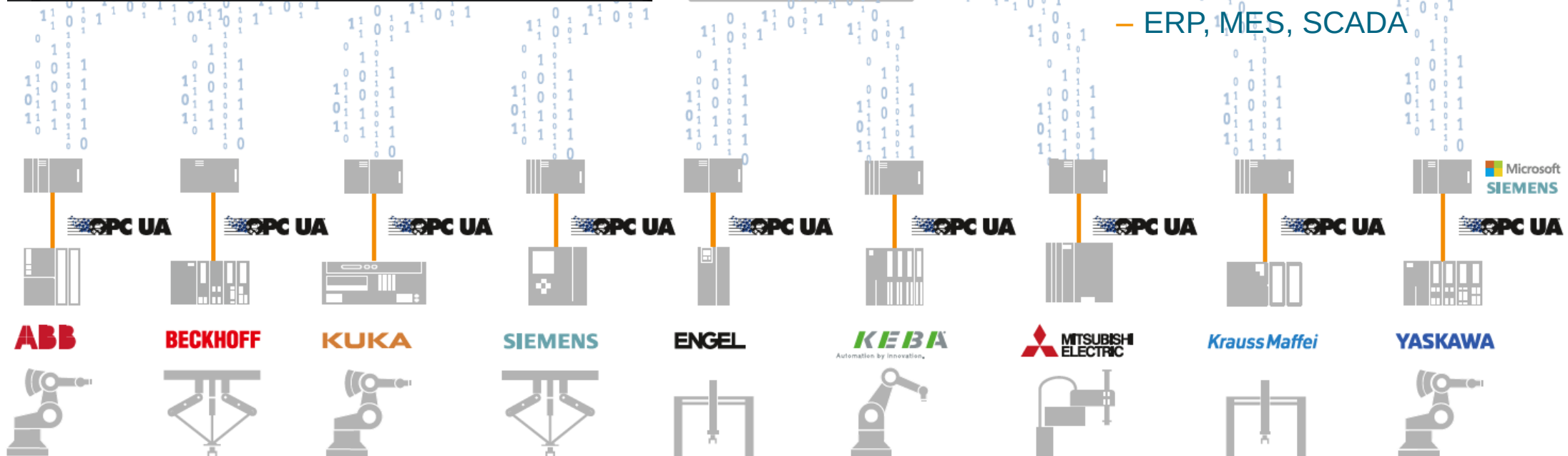


デモアプリケーション

- » アセット管理
- » コンディションモニタリング
- » 予防保全
- » 垂直統合



— ショップフロアからクラウドまでの情報フロー
— ERP, MES, SCADA



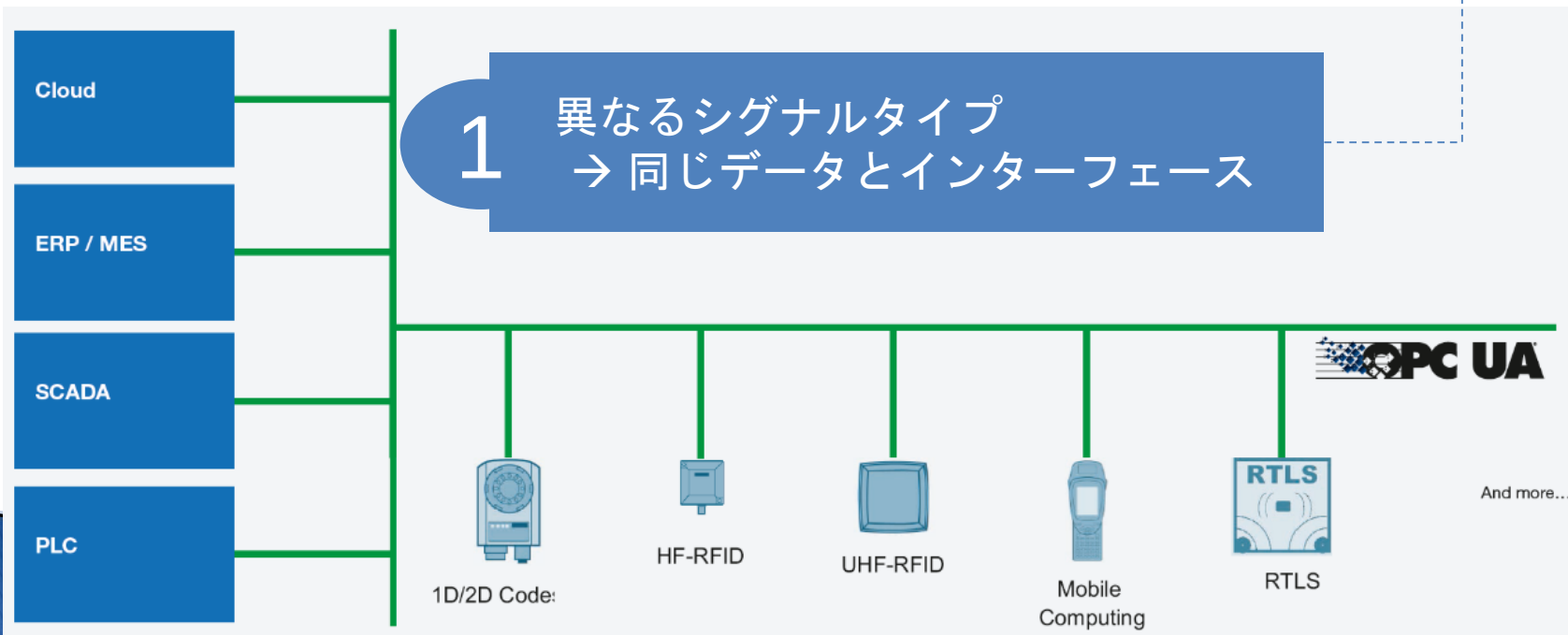
OPC UA for AutoID

AutoIDの世界で一つのコミュニケーションスタンダード

- ▶ 標準化された、セキュアなデータとインターフェース
- ▶ 異なるシグナルタイプ:
HF/UHF-RFID, OCR, Optical (1D/2D barcode), RTLS

採用

- Harting, Siemens (4 タイプ)
- Balluff, Leuze (2 タイプ), Sick, Turck, (P+F 2019)

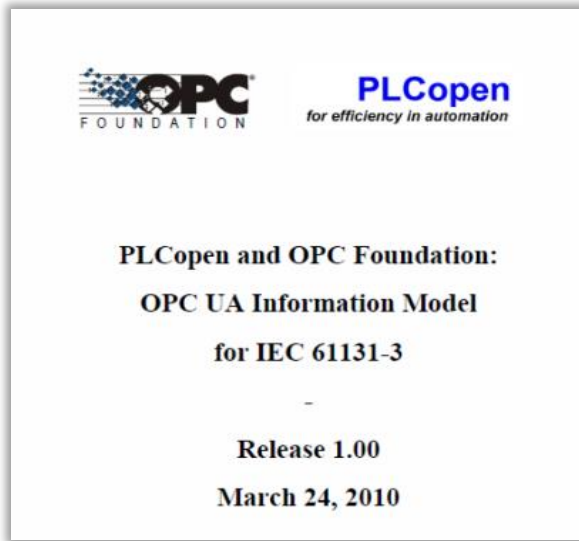


2

採用!



採用: PLC コントローラ



“OPC UA for IEC61131-3” サポート

- 3S
- BECKHOFF
- Bosch-Rexroth
- B&R
- Honeywell
- Phoenix Contact
- WAGO

OPC UA: Protocol agnostic – extendable

Client/Server: TCP/HTTPS for peer-to-peer communication
Pub/Sub: UDP/MQTT/AMQP for broadcast messaging

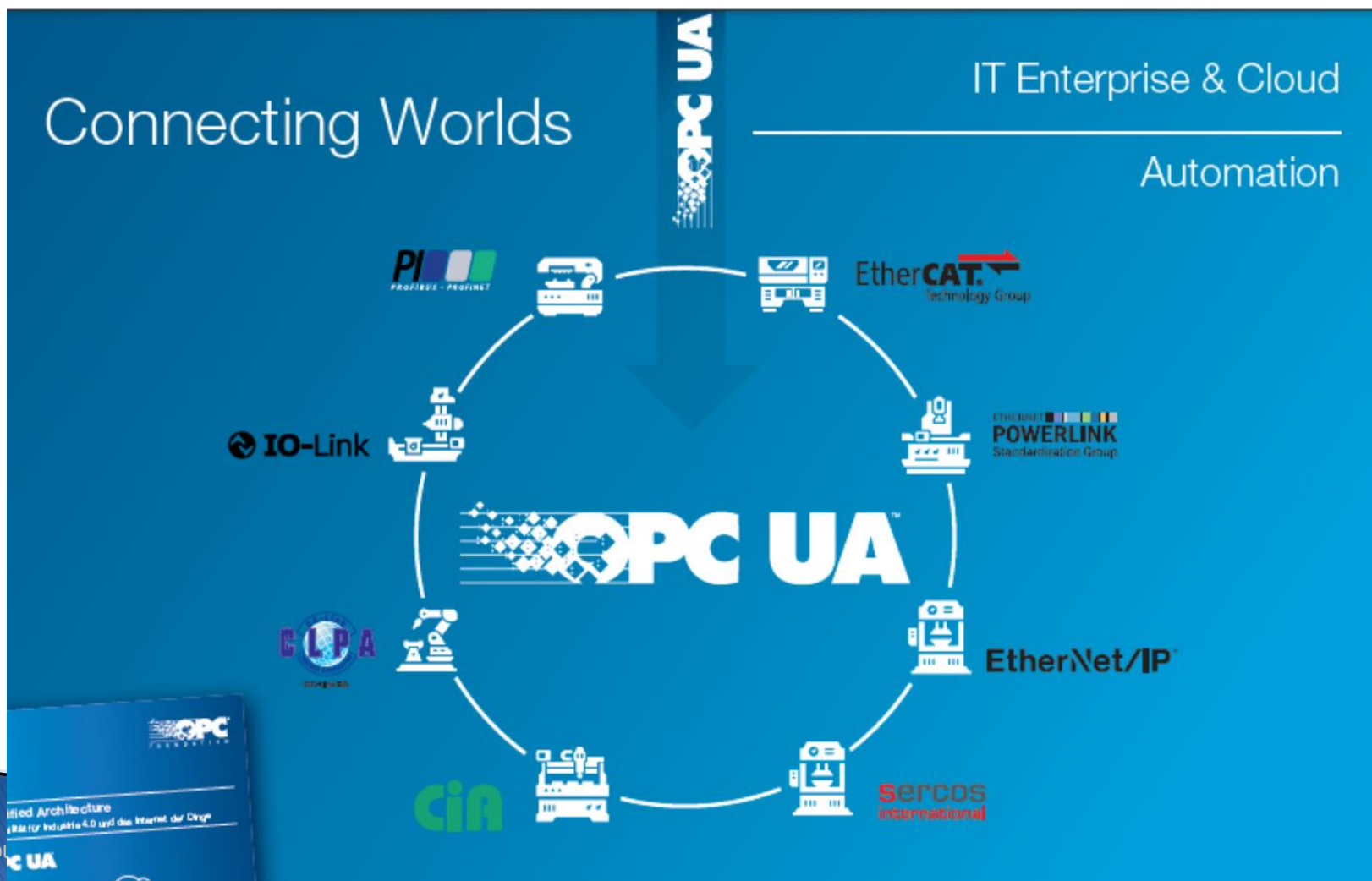
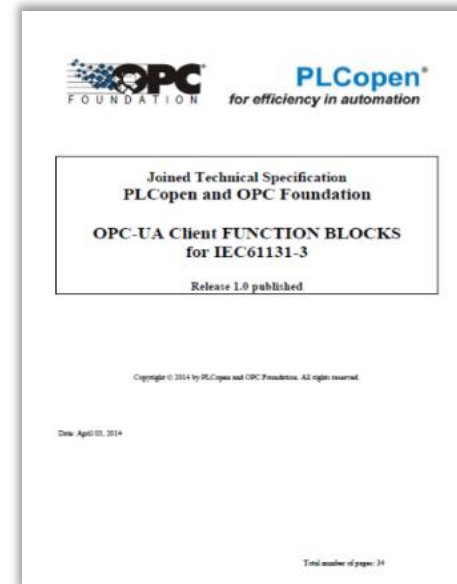


OPC UA搭載PLC

- ABB
- BECKHOFF
- Bosch-Rexroth
- B&R
- FESTO
- Honeywell
- Lenze
- 三菱電機
- National Instruments
- Siemens
- Schneider
- Phoenix Contact
- Rockwell
- オムロン
- WAGO

#2: PLC's with OPC-UA Client FBs for IEC61131-3

PLCopen OPC UA FB's: 水平&垂直 コミュニケーション
フィールドバス非依存
速い、しかしフィールドバスではない!



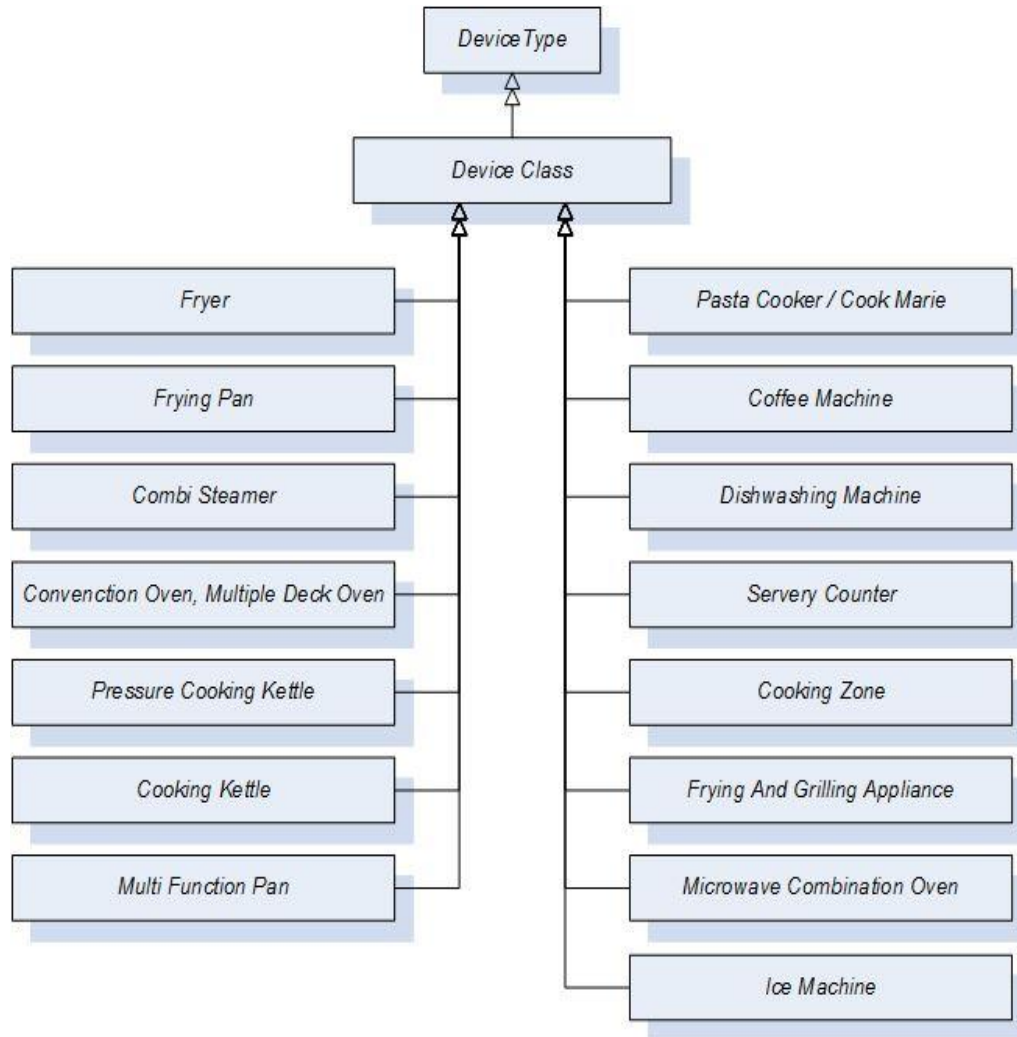
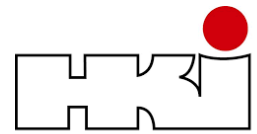
“OPC UA クライアント FBs”
サポート企業

- 3S
- BECKHOFF
- Bosch-Rexroth
- B&R
- Honeywell
- Phoenix Contact
- Siemens



OPC UA 産業向けキッチン装置

OPC UA産業向けキッチンデバイスのオーバービュー



Double tank frying station
OPC UA enabled

2019 ニュース: テクニカル、ジョイントワーキンググループ(JWG)

- テクニカルニュース 2019

- Amendments for version 1.04 of the OPC UA specification
- Version 1.02 of OPC UA for Devices is available as ReleaseCandidate
- OPC Foundation & IIC Liaison Workshop February 14th, 2019 in Raleigh (NC) USA
- Kick-Off VDW & OPCF WG “umati OPC UA JWG” February 22nd, 2019
- Kick-Off VDMA & OPCF JWG “End-of-Arm Tools (EoAT)” February 21, 2019
- Release Candidate (RC): OPC UA Commercial Kitchen Equipment – V1.02”
- Kick-Off VDMA & OPCF JWG “Surface Technologies” April 1st, 2019
- Kick-Off VDMA & OPCF JWG “Glass Industries” April 29th, 2019
- Kick-Off VDMA & OPCF JWG “Plastics and Rubber Machinery” April 30st, 2019
- OPCF “OPC UA Harmonization Working Group” June 19th, 2019
- OPC UA Interoperability Workshops (IOP) Europe in July 2019
- Release Candidate (RC): OPC UA Companion Specification for Machine Vision
- Kick-Off - WCI & OPCF JWG “UA for ISA100 Wireless” July 10th, 2019
- Kick-Off – WS & OPCF JWG “UA for Weihenstephan Standards” July 28th, 2019
- Kick-Off - EUMABOIS & OPCF JWG “Woodworking Machines” Sept 30th, 2019

OPC Foundation: Industrial Thingsの記述のライブラリ



OPC UA コンパニオン仕様:

“OPC Foundationはindustrial thingsを記述した世界的なライブラリになる”

OPC UA コンパニオン仕様

... データ、インターフェース、
機能、ふるまいの記述,

... thingの記述

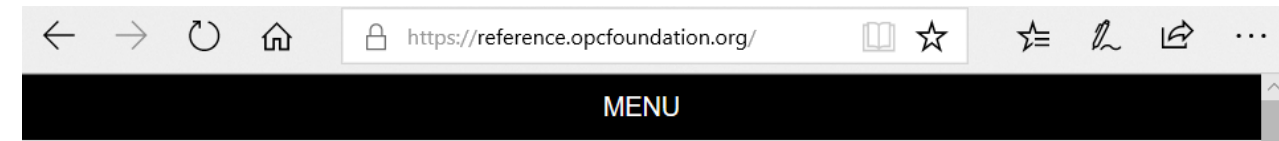


OPC Foundation: 情報

<https://opcfoundation.org/>

発行

- オンラインリファレンス
<https://reference.opcfoundation.org>
- データタイプ、インターフェースなどのリスト
 - 全ての OPC UA 仕様
 - 全てのジョイント情報モデル



OPC UA Online Reference

Online versions of OPC UA specifications and information models.

Published Information Models

OPC UA Specifications

Model	Specification
Core	OPC 10000-1 - Part 1: Overview and Concepts
Core	OPC 10000-2 - Part 2: Security Model
Core	OPC 10000-3 - Part 3: Basic Message Exchanges
Core	OPC 10000-4 - Part 4: Basic Data Types
Core	OPC 10000-5 - Part 5: Basic Objects

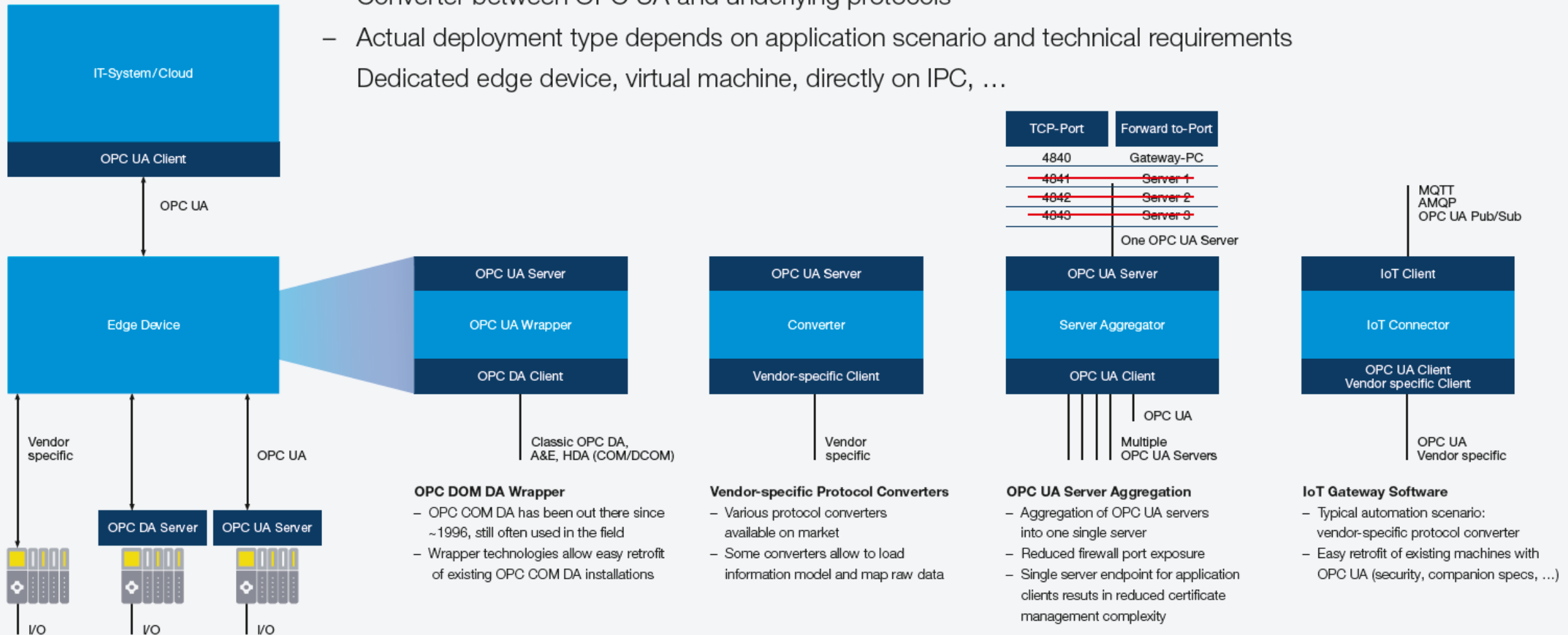
Joint Companion Specifications

Model	Specification
DI	OPC 10000-100 - Part 100: Device Information Model
ADI	OPC 10020 - UA for Analyzer Devices
ISA-95	OPC 10030 - UA for ISA-S95
PLCopen	OPC 30000 - UA for Programmable Logic Controller
AutoID	OPC 30010 - UA for AutoID Devices
AutomationML	OPC 30040 - UA for AutomationML
PackML	OPC 30050 - UA for PackML (OMAC)
TMC	OPC 30060 - UA for Tobacco machinery (TMC)

OPC UA in Brownfield Scenarios (既存システム資産の有効活用)

いかにして既存の世界と接続するか

- Gateway devices with integrated OPC UA client/server functionality
- Converter between OPC UA and underlying protocols
- Actual deployment type depends on application scenario and technical requirements
Dedicated edge device, virtual machine, directly on IPC, ...



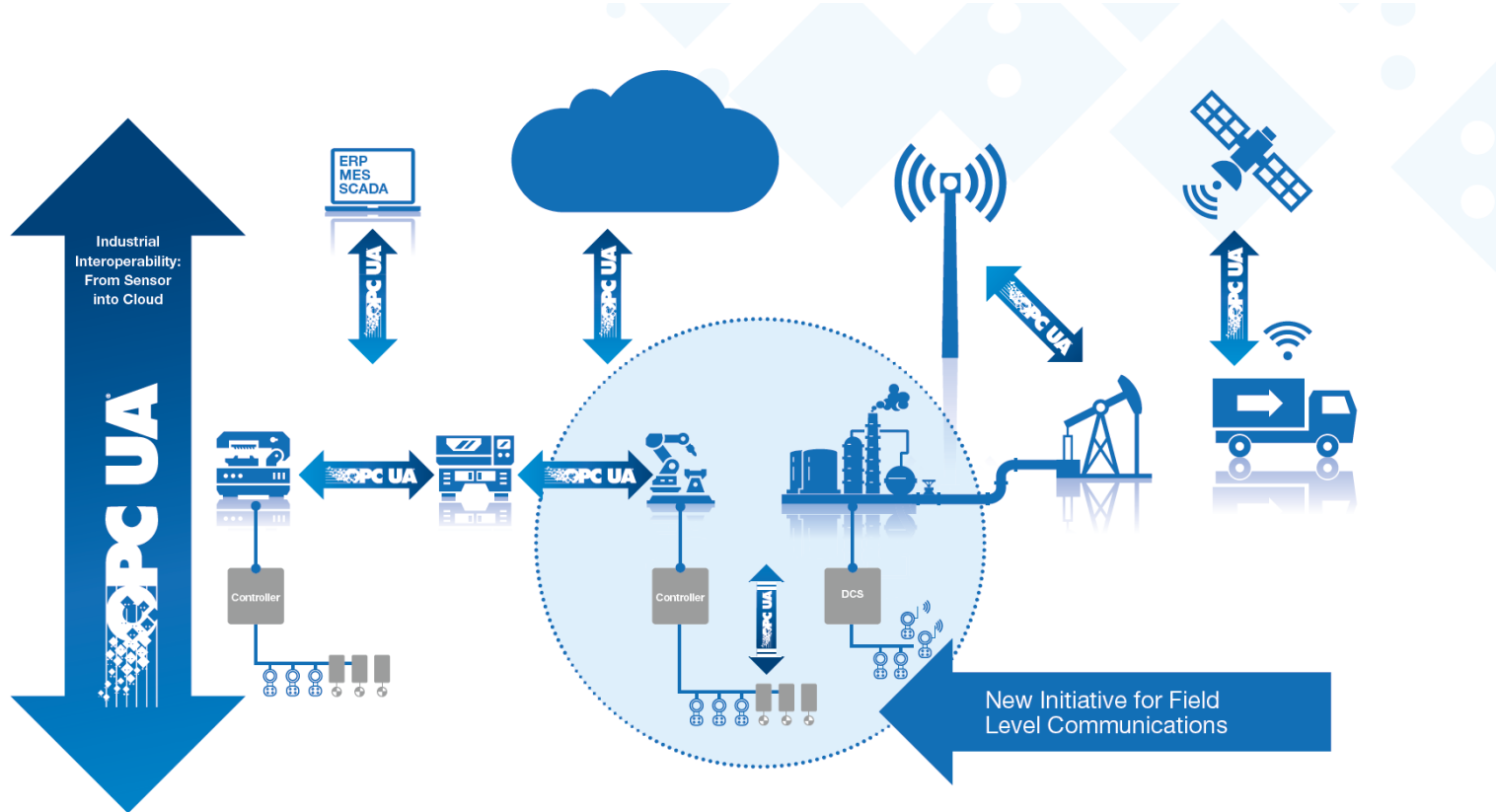
将来

OPC Foundation: ロードマップ

<https://opcfoundation.org/about/opc-technologies/opc-ua/opcua-roadmap/>

Recent innovations in v1.04	2019/2020 – Features worked on	2021 and beyond – Vision
2019: Relate with established semantic models (Dictionary Reference) - An infrastructure to reference from an OPC UA Information Model to external dictionaries like IEC Common Data Dictionary or eCl@ss. 2019: Interfaces and AddIns <i>Interfaces</i> and <i>AddIns</i> complement the type model and can be used when subtyping is not suitable for a required extension. PubSub - New communication schema to enable and optimize OPC UA for one-to-many, many-to-one, or many-to-many configurations. JSON Web Token, OAuth2 - User identification using the authorization service well-established in modern cloud applications (Azure, Google, Facebook, ...) Reverse Connectivity - Servers behind firewalls can use reverse connectivity. SessionLess Services - Avoids session establishment for use cases where Servers are called infrequently. Security	Deterministic UA: Mappings to TSN - This project will add a transport mapping of OPC UA PubSub to Time Sensitive Networking (TSN). Based on this mapping, deterministic data exchange between UA applications is possible. Field-Level Communication (FLC) - The goal of this initiative is to extend OPC UA to the field by addressing all relevant use-cases for Process- and Factory Automation including for instance determinism, safety and motion. Alias names - This feature will enable locating Nodes (Objects, Methods, or Variables) on a global level (e.g. in an entire system). An AliasName is an alternate well defined name. Global OPC UA discovery services maybe constructed that aggregate all AliasNames on OPC UA Servers in a system and then serve as a system-wide lookup service for <i>Clients</i>. Harmonization of companion standards - Many organizations use OPC UA to model and expose their existing information. Sometimes, however, the definitions overlap or are identical. This project supports companion working groups to harmonize their models.	The following features are under consideration. No concrete specification work has been initiated. Transactions - With the increasing popularity of OPC UA in various industries, we also see more and more scenarios where OPC UA is used for configuration. Simple configuration tasks can be solved with <i>Methods</i>, for more complex scenarios, transactions will be needed. MetaData in the Cloud - When data are published to cloud applications, most of the meta information that is in the Server's AddressSpace is not part of these data. The "MetaData in the Cloud" project targets this deficiency. Cloud-Relay - The cloud-relay capability allows for connectivity between UA applications even when both <i>Client</i> and <i>Server</i> are behind separate firewalls. Deterministic communication using 5G - The 5th generation wireless systems will provide better performance and determinism. Similar to the TSN mapping a mapping of PubSub to 5G protocols may be considered.

OPC Foundation “Field Level Communications Initiative”: OPC UAを時間遅延のない、セーフティでモーションな下位フィールドレベルに拡張



OPCF Press Conference SPS 2018
Overcrowded!



OPCF Press Conference SPS 2018
ABB, Beckhoff, Mitsubishi,
Rockwell, Siemens, Schneider

FLC Steering Committee

- ▶ Initial members (November 2018): 23, two new members: Murrelektronik (D) and Festo (D)



ロードマップ Field Level Communications Initiative (1)

	Specification Version V1	Specification Version V2
Use Cases (main focus)	Controller-to-Controller (C2C)	Controller-to-Controller (C2C) Controller-to-Device (C2D)
Communication Models	Peer-to-Peer	Peer-to-Peer I/O Style & Autonomous Publisher
PubSub Mechanisms	Single-/Multi-Subscriber Uni-/Multicast	Single-/Multi-Subscriber Uni-/Multicast
Transport Protocols	Ethernet (non-TSN, via UDP) Ethernet TSN (direct layer 2 mapping)	Ethernet (non-TSN, via UDP) Ethernet TSN (direct layer 2 mapping)
Diagnostics	Basic (device & network)	Extended (device & network) Application alarms
Device Information Model	Discoverable Identity & capabilities (for controllers)	Discoverable Identity & capabilities (for controllers and devices)

ロードマップ Field Level Communications Initiative (2)

	Specification Version V1	Specification Version V2
Use Cases (main focus)	Controller-to-Controller (C2C)	Controller-to-Controller (C2C) Controller-to-Device (C2D)
Safety	Client-Server & PubSub	Client-Server & PubSub Parametrization
Security	Adoption of existing OPC UA Security mechanisms	Adoption of existing OPC Security mechanisms + extensions (if needed)
Configuration	Online & Offline Shallow TSN Configuration	Online & Offline Deep TSN Configuration
Conformance Testing	Test plan for controllers	Test plan for controllers & devices
Timeline	Release candidate (April 2020)	

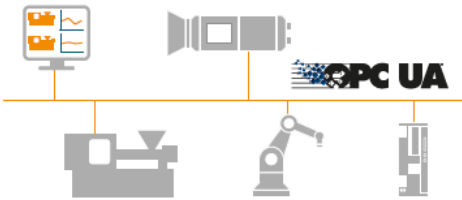
OPC Foundation: ロードマップ

<https://opcfoundation.org/about/opc-technologies/opc-ua/opcua-roadmap/>

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将来: 産業間の相互運用

Industrie 4.0



Interoperability

Cross domain harmonized information models

- ▶ 産業界を横断した相互運用
 - 産業界全体の標準コンパニオン仕様のOPC UA

Domain specific harmonized information models

- ▶ 産業界内の、ベンダーを横断した相互運用
 - 産業界特価のコンパニオン仕様のOPC UA

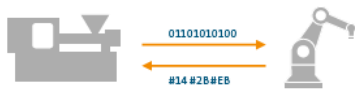
Meshed communication network

- ▶ モデルの無い産業アクティビティ
 - 個別ユースケースのOPC UA

Proprietary communication

- ▶ プロプライエタリなソリューション

I 3.0



ハーモナイゼーション活動の話題の例

▶ Micro Level

- Spatial Types (TBD)
- Units
- Currency
- Coordinate DataTypes (GPS, local)
- Calendar / Schedule DataTypes

▶ Feature Level

- Software Update / Patch Management
- Device Commissioning (e.g. network address)
- Alarm Configuration
- Configuration of Time Synchronization (e.g. NTP or AS-Rev)
- Logging (Events)

▶ Top Level

- Energy Management
- Asset Management
- Job and Recipe Management
- OEE / KPIs
- Operation or Machine State Machines

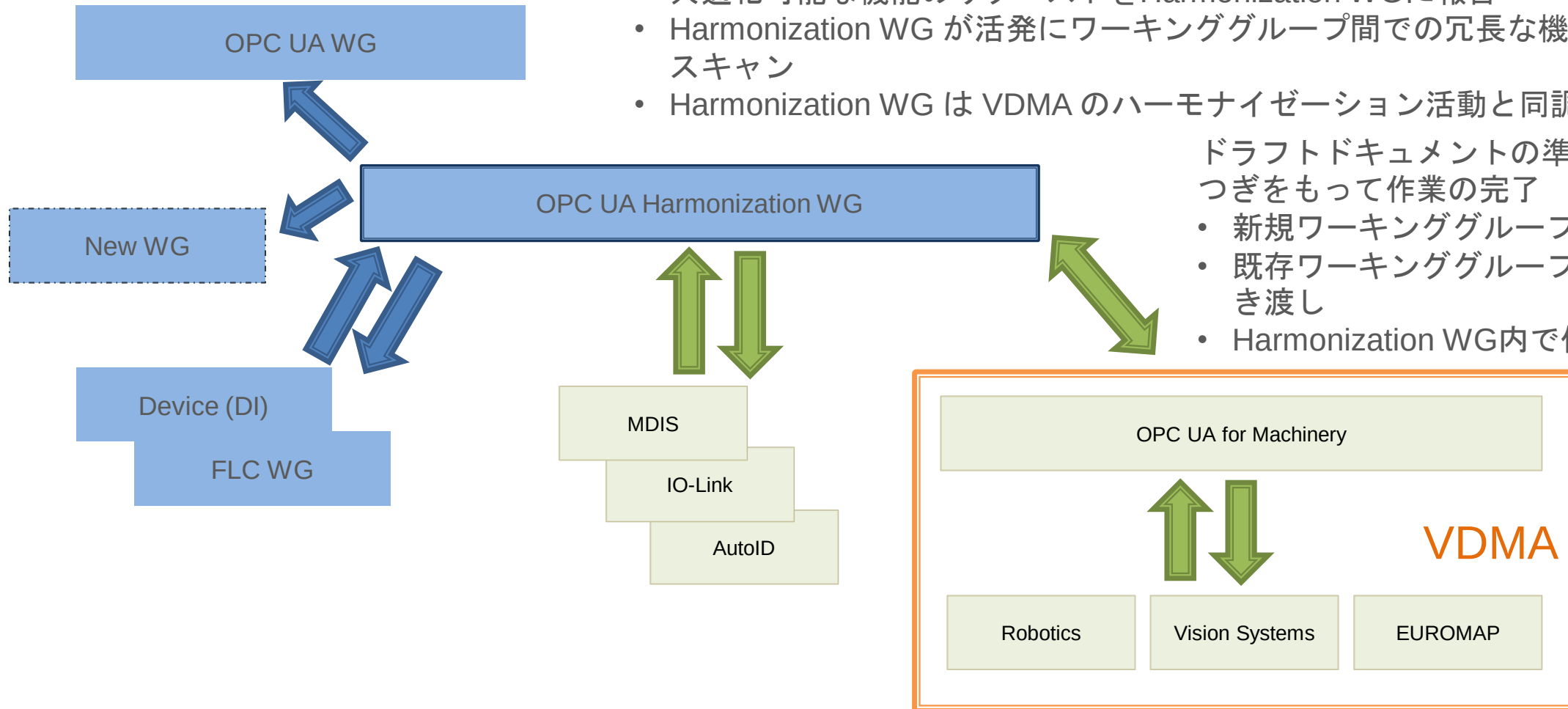
*Kick off on June 19th
via web conference*

OPC UA Harmonization Working Group (NEW)

- コンパニオン仕様のワーキンググループ (OPC F とジョイントグループ) が共通化可能な機能のリクエストをHarmonization WGに報告
- Harmonization WG が活発にワーキンググループ間での冗長な機能の有無をスキャン
- Harmonization WG は VDMA のハーモナイゼーション活動と同調する

ドラフトドキュメントの準備
つぎをもって作業の完了

- 新規ワーキンググループの開始
- 既存ワーキンググループへドラフトの引き渡し
- Harmonization WG内で仕様の生成



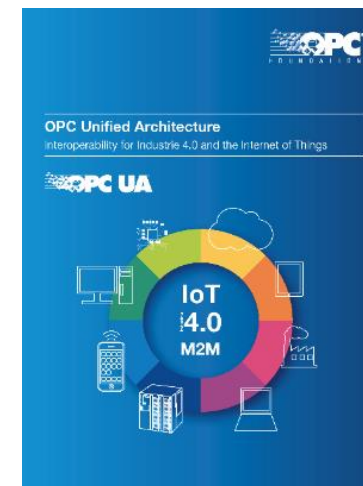
インフォメーション:

- ▶ 新版 v10 : “Interoperability for Industrie 4.0 and the Internet of Things”
<https://opcfoundation.org/resources/brochures/>

2020年版: つぎの拡張

- ▶ 新規: OPCの歴史
- ▶ 更新: UA テクノロジー記事 (例 : PubSub integrated into OPC UA)
- ▶ 新規: FLC (2 ページ)
- ▶ 新規: コラボレーション (リリース済みのもの)

更新!



- ▶ Podcastの開始
<https://opcfoundation.org/podcast/>
- ▶ iTunes / Spotify
„OPC Foundation“で検索してみてください

iTunes <https://apple.co/2CzTGsL>
Spotify <https://spoti.fi/2Kax46k>



OPC in the World - Update



Thank you!



Stefan Hoppe
President & Executive Director OPC Foundation
Stefan.hoppe@opcfoundation.org

Looking for more information?
<https://opcfoundation.org/>

