Open Process Automation:
Standards, Conformance, Ecosystem

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Outline

1. Motivation: End User pain points and value opportunities

2. Status and outlook of the Open Process Automation Standard (O-PAS™), business ecosystem building, and conformance certification

   ○ Liaison highlight: NAMUR Module Type Package (MTP) and Open Architecture (NOA)

3. Current status of End User companies' OPA projects

4. How End User companies can get started to learn and use O-PAS based systems

1. Motivation

Pain points and value opportunities:

- lack of interoperability and inability to reuse their control applications between systems from different suppliers

- excess cost of system upgrades due to close couplings between components

- barriers to value generation from introduction of new technology – hardware or software
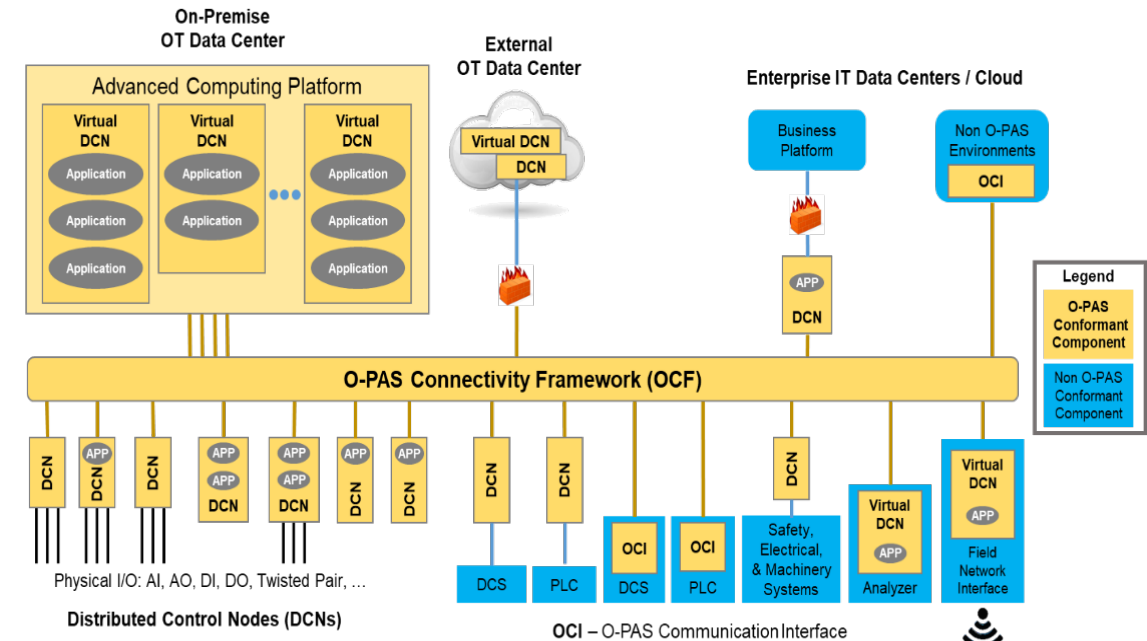
2.0 Open Process Automation (OPA)

Current DCS architecture
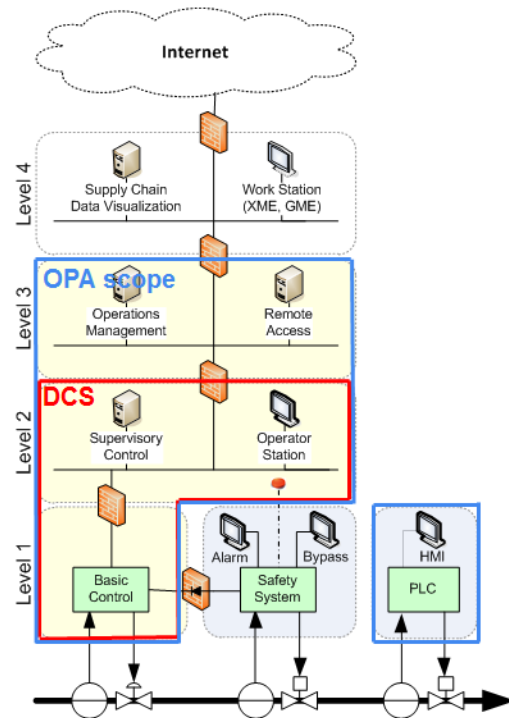
Vision: A standards-based open, secure, interoperable process automation architecture

OPA reference architecture

- Proprietary hardware, interfaces and networks
- Vendor-controlled software access
- Cybersecurity not intrinsic: bolted-on, not built in

- Industry standard interfaces and networks
- Interoperable hardware
- Open software access
- Designed-in cybersecurity

4

2.1 OPA Forum

- Organization defining the OPA standard

- Open Process Automation™ Forum of The Open Group
  - Founded Nov 2016
  - Currently 118 member organizations
    - 22 operating companies
    - 6 of 7 global DCS companies
  - Universities are welcome and encouraged to join

Open Process Automation™ Forum Members – Partial List

2.2 O-PAS Standard

- Version 2.1 – Preliminary (link) published on 17 May 2021

O-PAS Part	Subject matter	Referenced standards
Part 1	Technical architecture	IEC 62264 (ISA 95)
Part 2	Security	IEC 62443 (ISA 99)
Part 3	Profiles	n.a.
Part 4	Connectivity framework	IEC 62541 (OPC UA)
Part 5	System management	DMTF (Redfish)
Part 6 (.1 - .6)	Information and exchange models	IEC 62714 (AutomationML) IEC 62682 (ISA 18) IEC 61131 IEC 61499
Part 7	Physical platform	"whitespace"

  - Comments from all industry encouraged; Email to ogspecs@opengroup.org
  - Interoperability Workshop #2 planned for Jan 2022

- O-PAS Version 3 themes:
  - Application portability (Part 8)
  - Distributed Control Node physical platform (Part 7)
  - System orchestration ("systemness") (Part 9)

2.3 Business ecosystem building

- *OPA Business Guide 2.0: Value Proposition and Business Case* in final review ([link to V1](#))
  - Business scenarios (by industry verticals)
  - Stakeholder roles in O-PAS business ecosystem: End Users, System integrators, Suppliers, Service providers
  - Principles, Quality attributes, Goals
  - Conformance, Certification, Contracting

- Marketing and Outreach: "Industry Adoption" theme
  - End User Caucus meeting (Jul 2021; 179 attendees)

- Liaison relationships
  - OPC Foundation
  - NAMUR
  - Control System Integrators Association
  - ISA
  - Others

- Coming events and publications
  - *OPA Business Guide* 2.1 (4Q21)
  - *O-PAS Implementation Guide* (1Q22)
  - *O-PAS Standard V2.1 – Final* (1Q22)
 - Meeting at ARC Forum (Feb 2022)
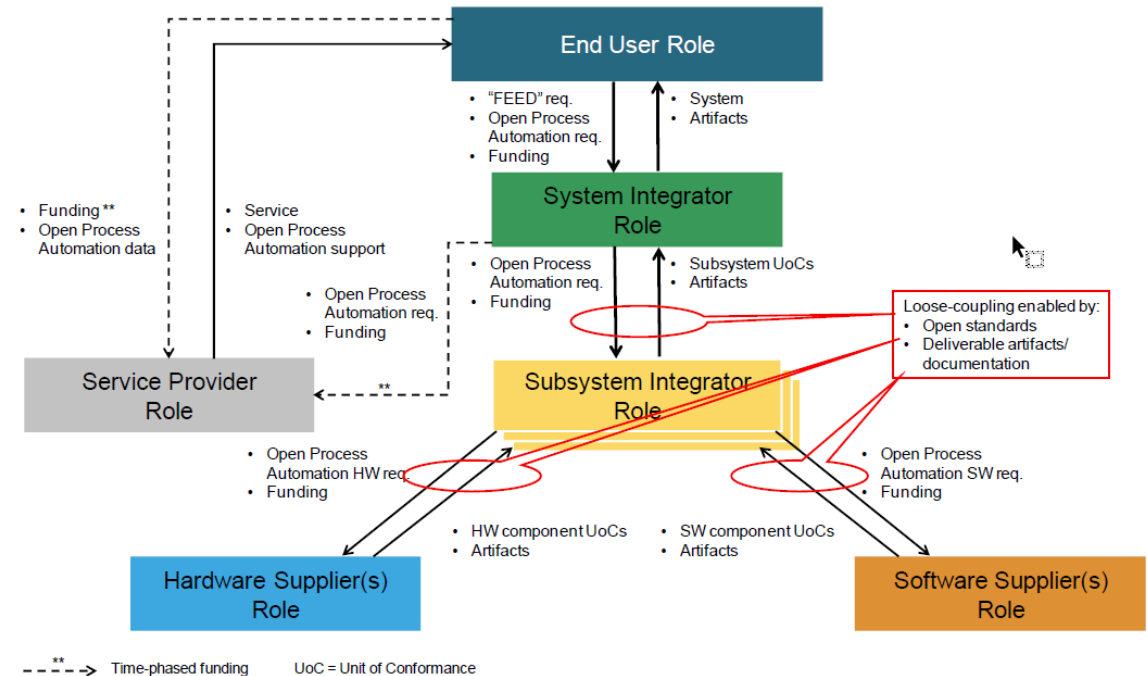
2.4 Conformance certification

- *OPA Certification Policy* ([link](#)) published in Feb 2020
  - Verification
  - Certification
  - Registry
  - Product certification lifecycle

- Agreements with multiple O-PAS Verification Labs in-development

- Certification Wave 1
  - Operational by 1Q22
  - Profiles:
    - Security: Part 2, SEC-F-001
    - Connectivity: Part 4, OCF-001/002, NET-001/002
    - System management: Part 5, OSM-001/002/003
    - Physical platform: Part 7, DCP-001

O-PAS Verification Process
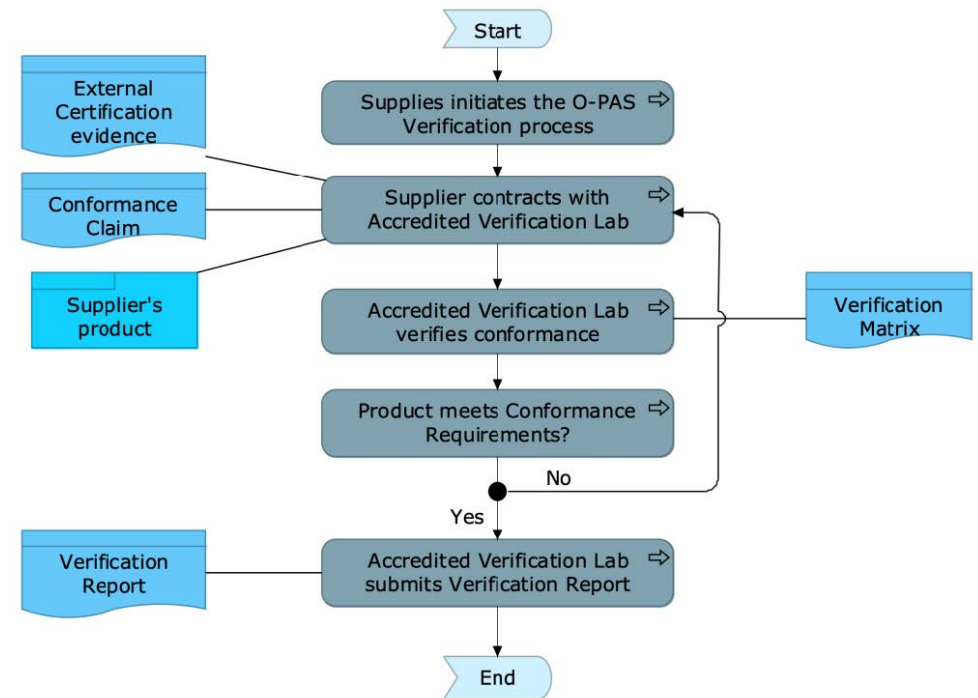
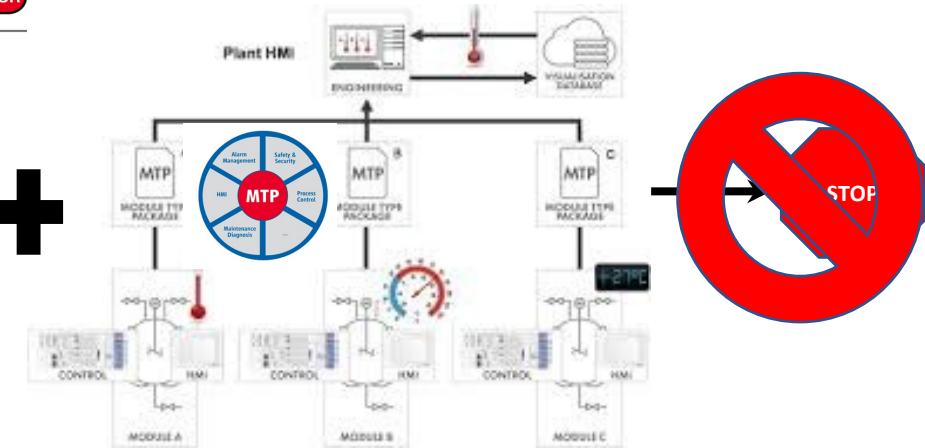# 2.5.0 Liaison highlight: OPAF O-PAS with VDI/VDE/NAMUR MTP and NOA
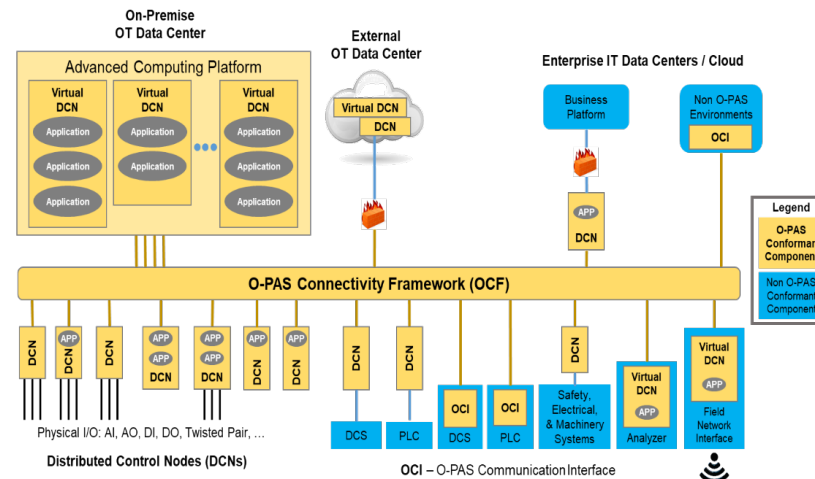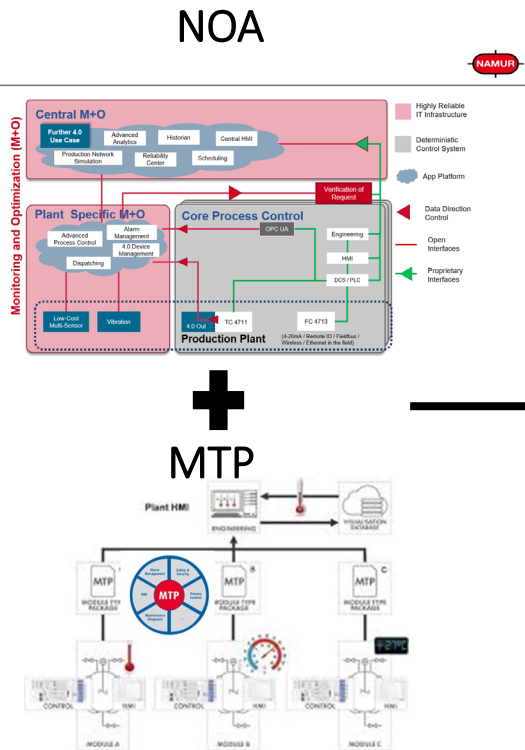

Current DCS architecture
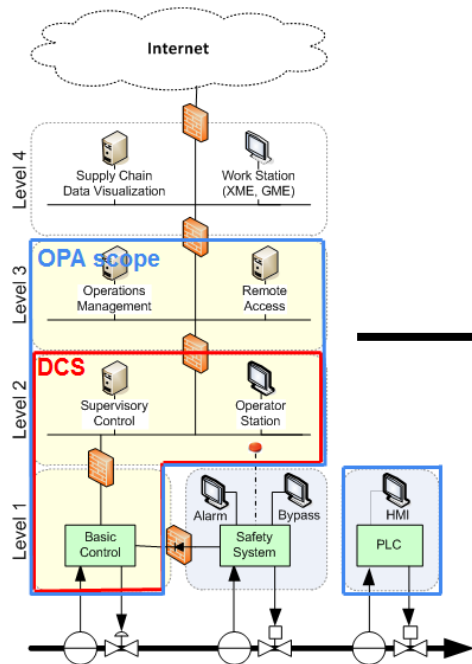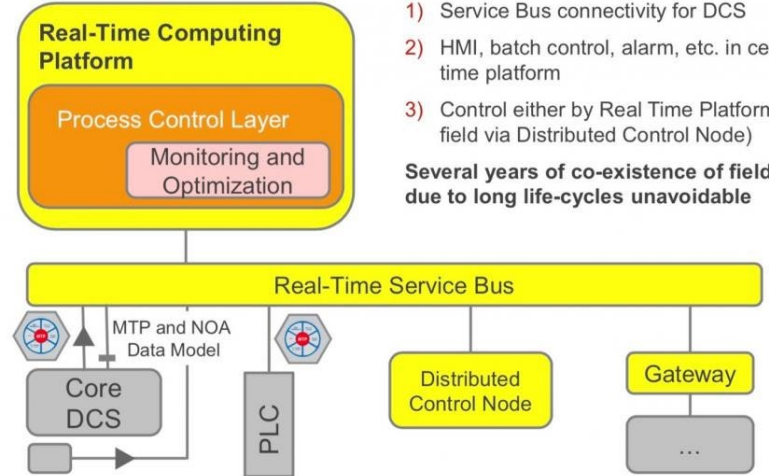
NAMUR Open Architecture
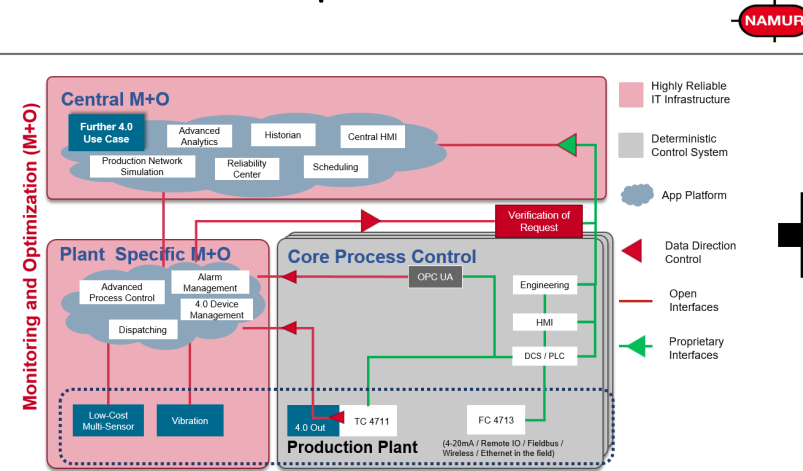
Module Type Package

Open Process Automation

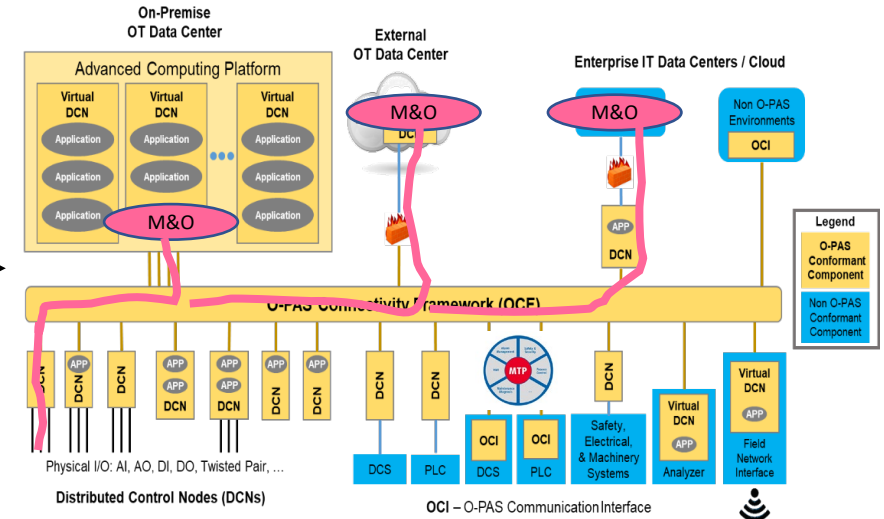# 2.5.1 Liaison highlight: OPAF O-PAS with VDI/VDE/NAMUR MTP and NOA

NOA

MTP

NOA/MTP/OPA evolution

Open Process Automation

Vision/Goals

- harmonious design
- holistic system
- open architecture
- digital transformation

Actions: Liaison relationships

- OPAF and NAMUR (2018)
- OPAF and ZVEI (2018)
- OPAF and Profibus International (in-development) on IEC standard for MTP
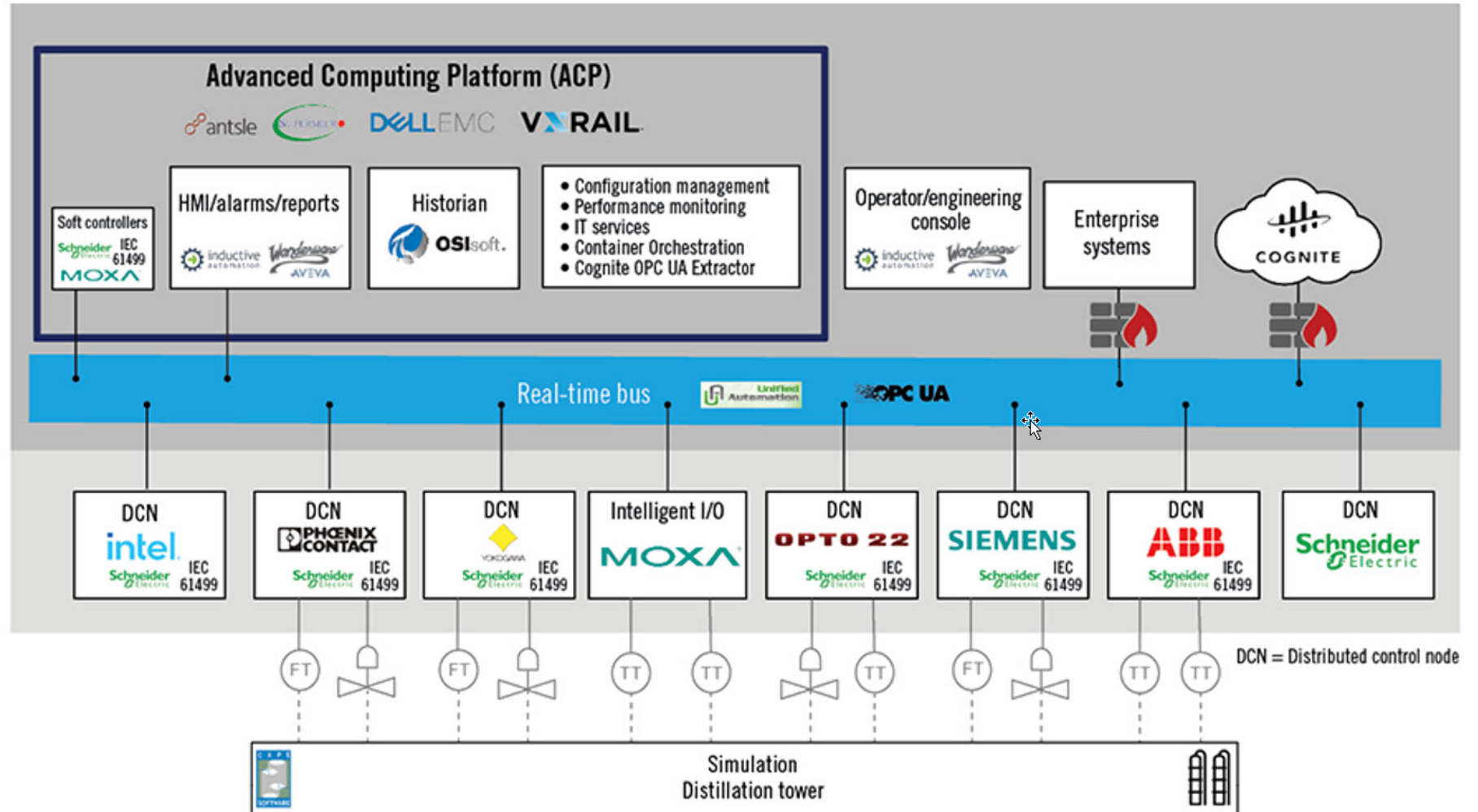
10

3.1 End User prototypes and test beds

- ExxonMobil

- BASF

- Koch Industries – Georgia Pacific

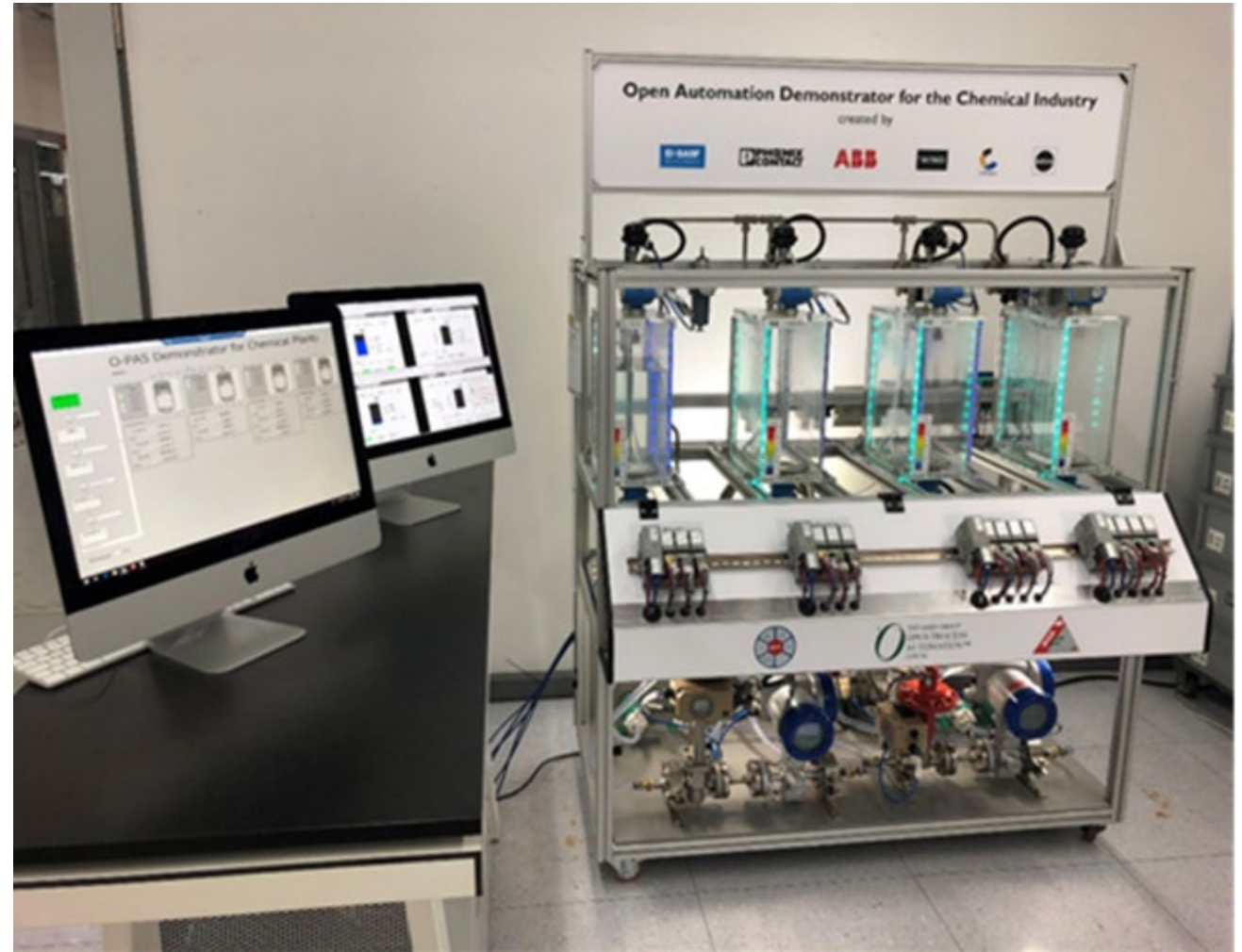- Saudi Aramco

- Petronas

3.2 ExxonMobil Test Bed

- ExxonMobil's 3rd OPA system

- Components shown in figure

- Systems integration: Lockheed Martin, Yokogawa

- Testing and staging for field trial
  - ~2,000 IO
  - Commission 2003

3.3 BASF

- Demonstrate:
  - OPA
  - MTP
  - NOA

- Components:
  - DCN: Phoenix Contact plcNext
  - OCF: OPC UA
  - ACP: HPE computer with Wind River Titanium Controller hypervisor
  - Software: ABB 800xA
  - Valves: Samson

- Systems integration:
  - TU – Dresden
  - Codewrights

3.4 Georgia Pacific

- Components:
  - DCNs
    - Rockwell
    - Phoenix Contact
    - Siemens
    - Schneider Electric
    - Stahl
    - Yokogawa

- Systems integration:
  - Hargrove
  - Siemens

- Portable unit for demonstrations at multiple paper mills

3.5 Saudi Aramco and Petronas

- Saudi Aramco

  o Test bed in Dhahran, KSA

  o Systems integration: Schneider Electric

- Petronas

  o Test bed announced Feb 2021

4.1 Coalition for Open Process Automation

- Small-scale functional system and structured training program

- Systems integration by *Collaborative Systems Integration* and *CPLANE.ai*

- Components from *OPAS-aligned* suppliers
  - *Phoenix Contact, CODESYS, Nova SMAR, Stahl, ASRock Industrial, Vecow, Supermicro, Yokogawa*

- Benefits demonstration goals:
  - Increase value generation
  - Reduce total cost of ownership
  - Secure by design and adaptation

COPA *QuickStart*
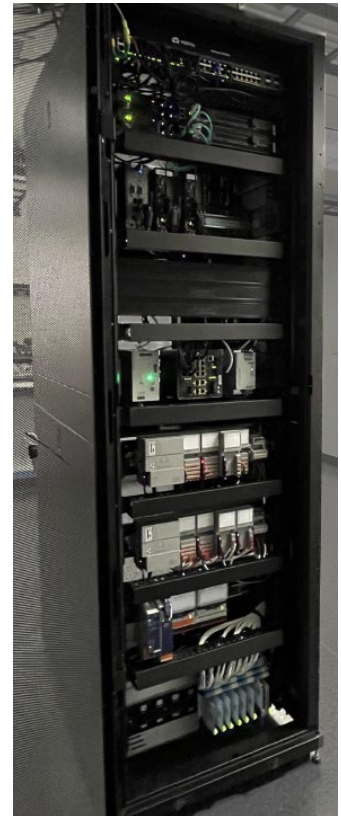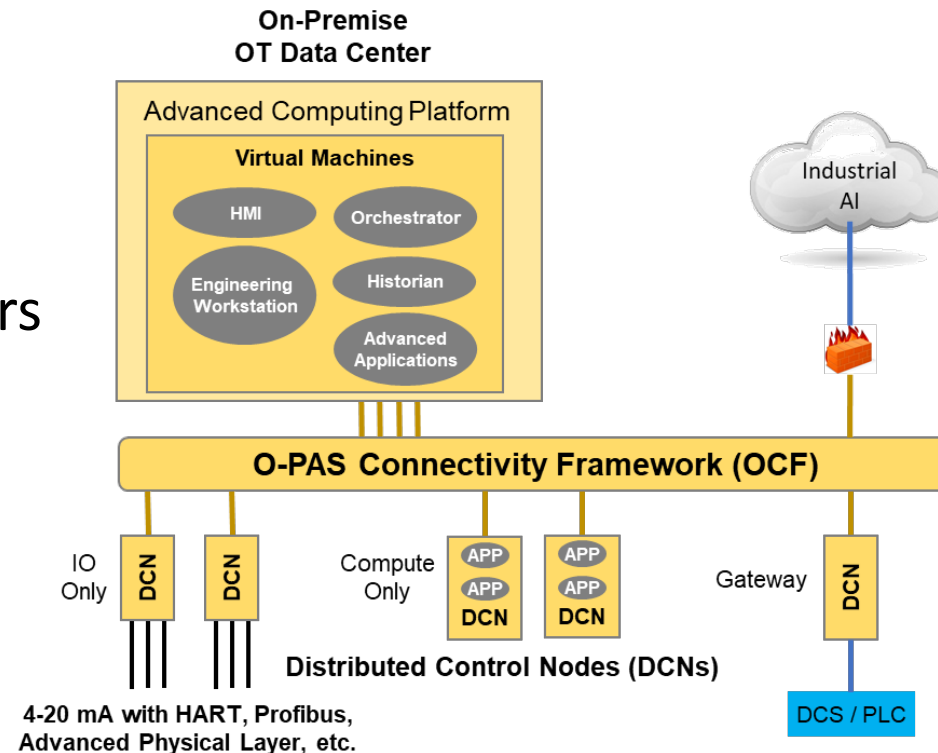
COPAcontrol.org

Summary

- O-PAS Standard Version 2.1 Preliminary ([link](#)) published in May 2021. Requesting comments from all of industry to ogspecs@opengroup.org

- Alignment of O-PAS, MTP, and NOA is a high priority

- O-PAS Certification Wave 1 ([link](#)) operational by 1Q22

- At least 5 End User companies are building OPA prototypes or test beds with multiple *OPAS-aligned* system integrators and suppliers

- OPA starter kits and training are being developed by *OPAS-knowledgeable* system integrators