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TIA Portal Openness

Unrestricted

www.siemens.com/tia-portal

TIA Portal Openness Introduction

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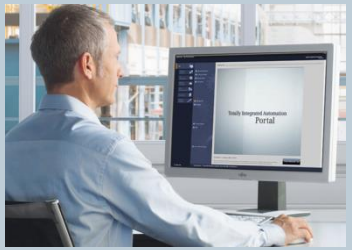
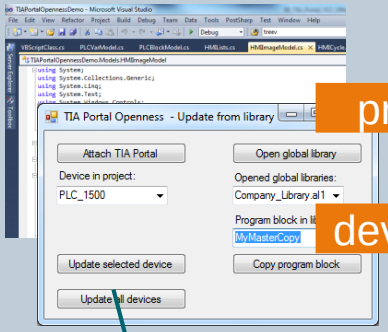
Manual operation of TIA Portal



Automatic execution of actions

Visual Studio



project.Open()

device.Compile()

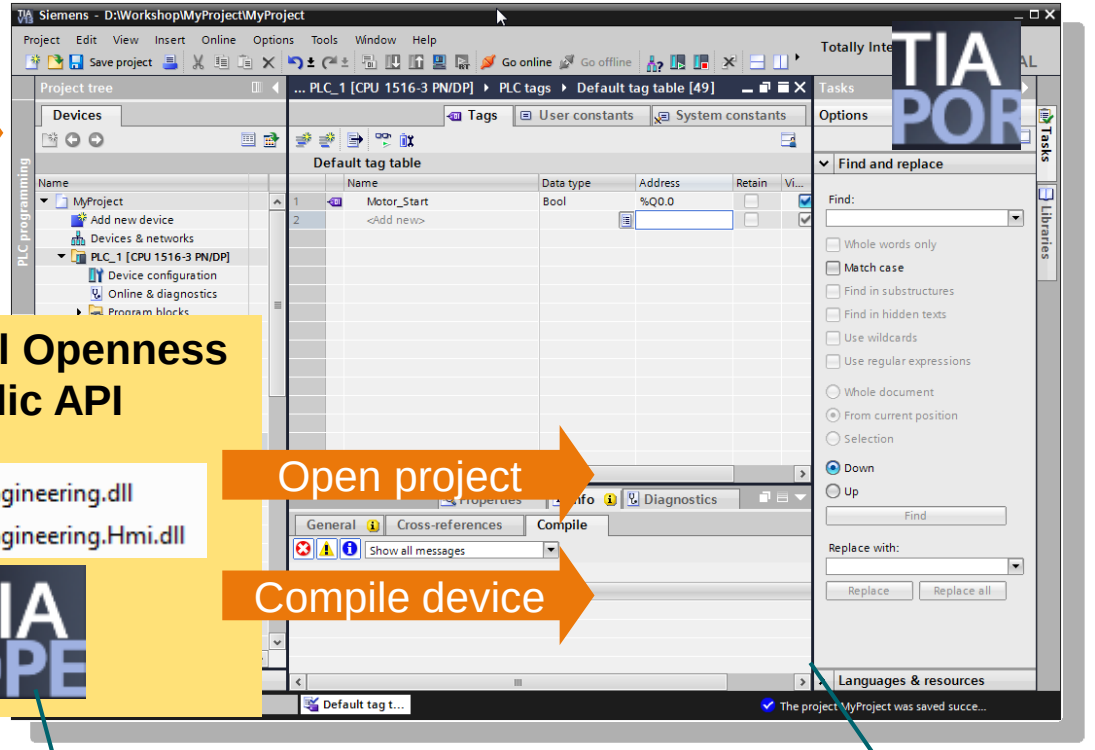
TIA Portal Openness Public API

Siemens.Engineering.dll
Siemens.Engineering.Hmi.dll

TIA OPE

Open project

Compile device



Creation of applications with required functionality with Microsoft Visual Studio

TIA Portal Openness uses DLLs to provide access to objects and functions of TIA Portal

TIA Portal is controlled remotely by the application through Openness

TIA Portal Openness Functionality

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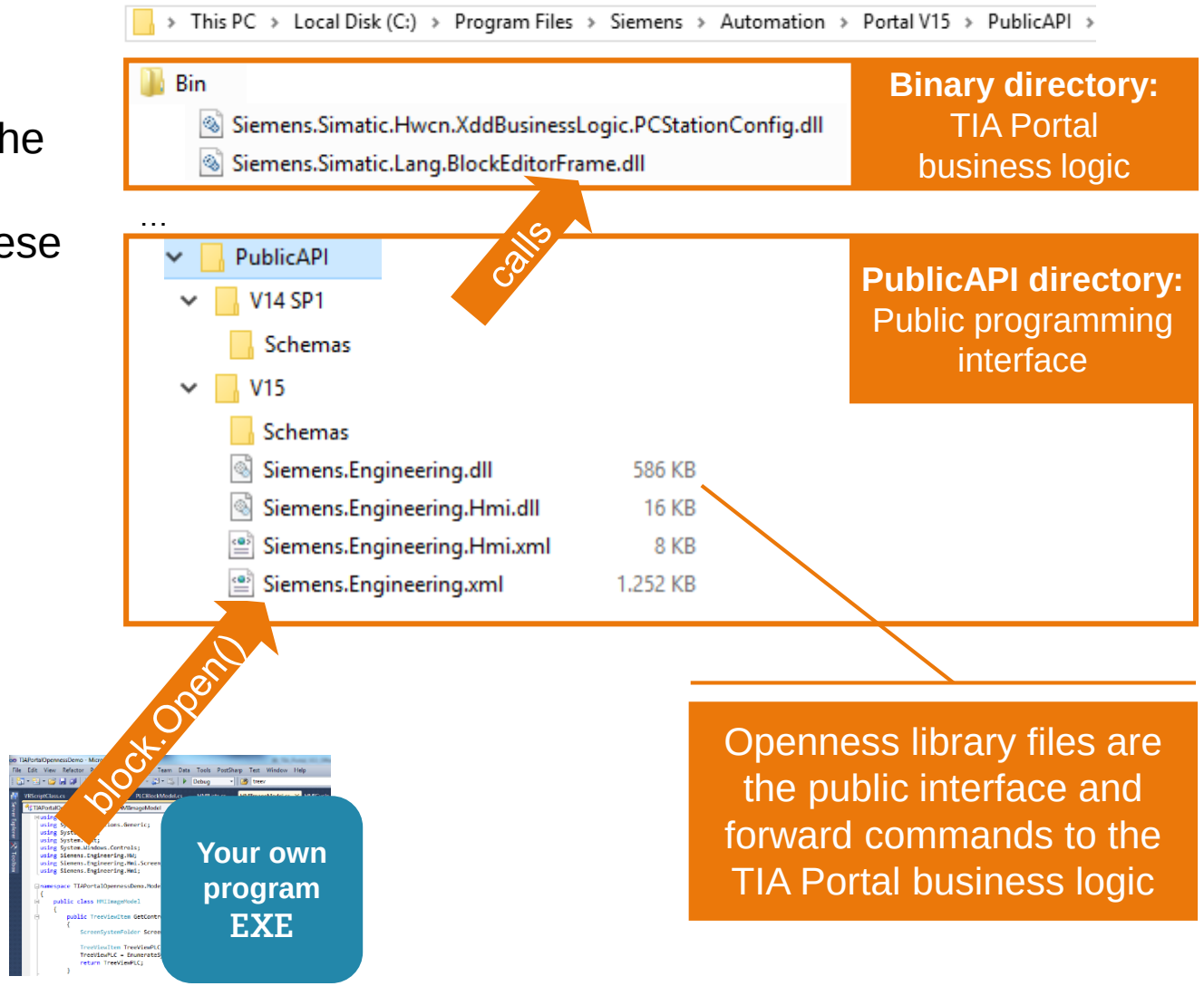
Functionality of the Openness interface

- TIA Portal functionality is stored in program libraries (DLL) in the installation directory of the TIA Portal.
- Openness is the public interface that uses these libraries and forwards commands.

Advantages:

- Documented interface
- Consistency even when functions of the TIA Portal program libraries change



TIA Portal Openness
Overview of basic functionality

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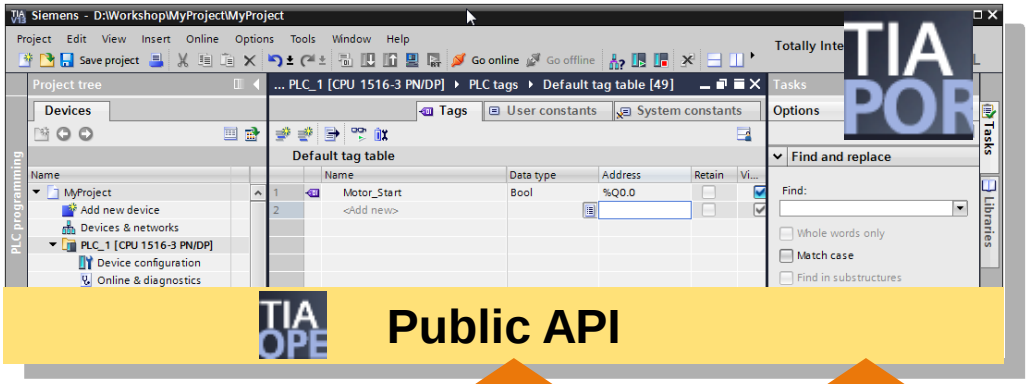
TIA Portal Openness

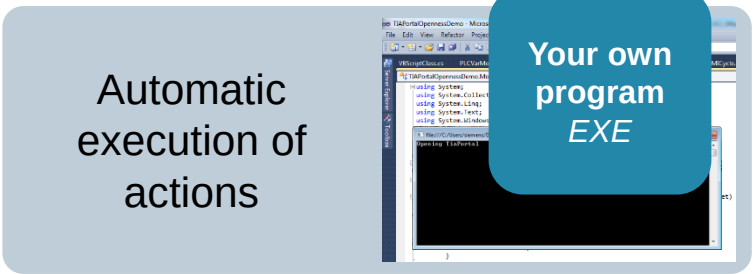
- An interface to TIA Portal functions
- Access to these functions via a public API
- Automates engineering through remote control by means of self-created applications

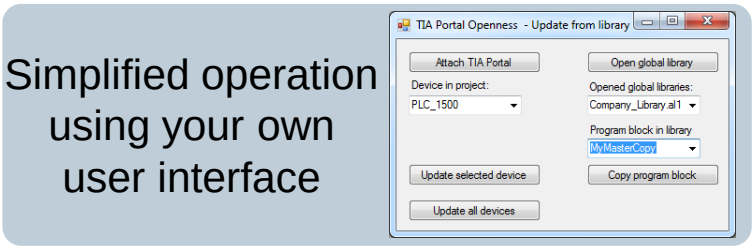


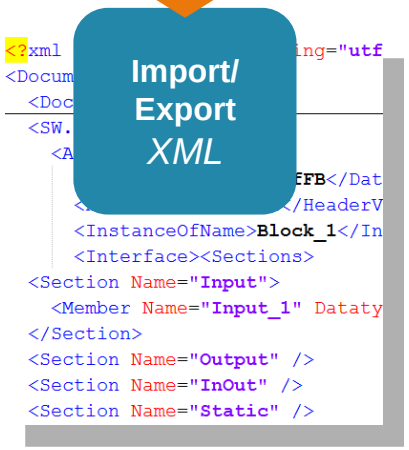
Examples

Automatic actions

- Create project data
- Modify projects and project data
- Delete project data
- Read in project data
- Make projects and project data available for others







TIA Portal Openness
Application options

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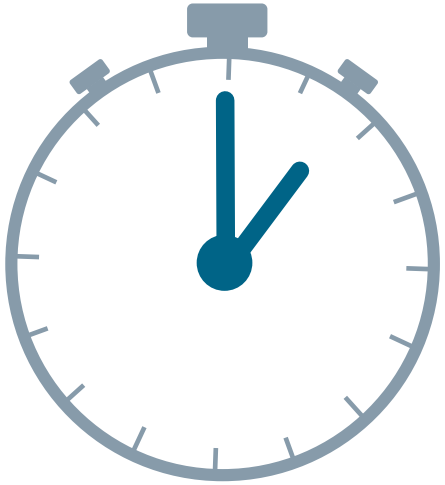

	First execution	Any repeated execution
Manual	180 min	160 min
With TIA Portal Openness	360 min	75 min

-10%

-80%

More time due to creation of the application

TIA Portal Openness Compatibility

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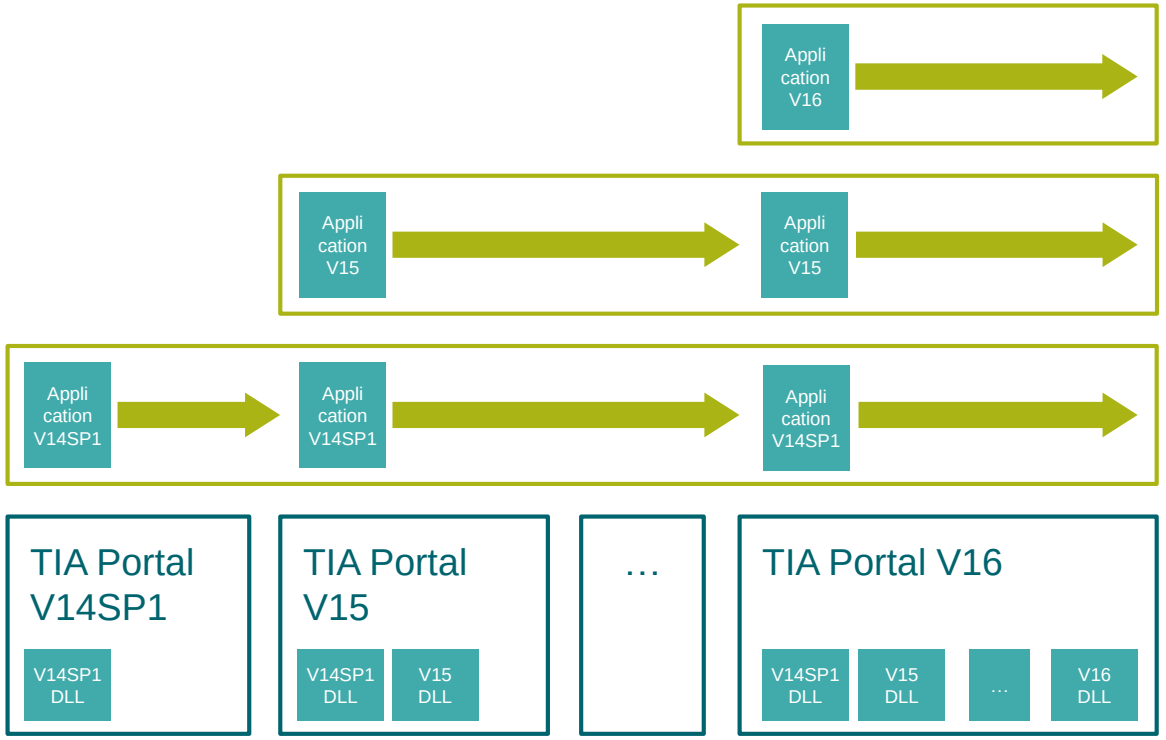
Openness libraries of all previous versions are available in TIA Portal V16

The Openness DLLs from V14 SP1, V15 and V15.1 are also available in the TIA Portal V16 in addition to the new V16 DLL.



Customer benefits

Openness applications based on older versions of TIA Portal can run unchanged with the TIA Portal V16 environment.

New Openness functions can be expanded by exchanging the earlier Openness DLL for the V16 DLL and used after a re-compile.

How can you program with Openness?
Savings of code

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Example

Application in C#

- Connect to TIA Portal process and open a project
- Select PLC "PLC_1"
- Compile PLC software and hardware
- Disconnect TIA Portal from the application

Savings of about 95% of code

```
using System.Collections.Generic;
using System.Linq;
using System.Threading;
using Siemens.Engineering;
using Siemens.Engineering.Compiler;
using Siemens.Engineering.HW;

namespace Siemens.OpennessScript
{
    public static class OpennessExamples
    {
        // Open project, find controller, compile it, close.
        public static void MyOpennessFunction1()
        {
            const string projectPath = "D:\\My_TIA_Project.ap13";
            const string controllerName = "PLC_1";
            TiaPortal tiaPortal = null;
            try
            {
                // Attach to an open project
                var processes = TiaPortal.GetProcesses().ToList();
                var process = processes.FirstOrDefault(element => element.ProjectPath == projectPath);
                if (process == null) return;
                new Thread(Portals.ClickBot.DoMagic).Start();
                tiaPortal = process.Attach();
                var project = tiaPortal.Projects[0];

                // Find all devices, loop trough all subfolders
                var devices = project.Devices.ToList();
                var stack = new Stack<DeviceUserFolder>(16);
                foreach (var element in project.DeviceFolders) stack.Push(element);
                while (stack.Any())
                {
                    var subFolder = stack.Pop();
                    devices.AddRange(subFolder.Devices.ToList());
                    foreach (var element in subFolder.Folders) stack.Push(element);
                }

                // Select a controller from the devices by name
                var controllerTarget = devices.SelectMany(device => (
                    from deviceItem in device.DeviceItems
                    where
                        deviceItem is ControllerTarget &&
                        (device.Name == controllerName || deviceItem.Name == controllerName)
                    select deviceItem as ControllerTarget)).FirstOrDefault();
                if (controllerTarget == null) return;

                // Compile
                var compilerResult = controllerTarget.Compile(CompilerOptions.Software, BuildOptions.Build);
                Console.WriteLine(compilerResult.State.ToString());
                if (compilerResult.State == CompilerResultState.Error) return;
                compilerResult = controllerTarget.Compile(CompilerOptions.Hardware, BuildOptions.Build);
                Console.WriteLine(compilerResult.State.ToString());
                if (compilerResult.State == CompilerResultState.Error) return;

            }
            catch (Exception exception)
            {
                Console.WriteLine(exception.ToString());
            }
            finally
            {
                // Detach
                if (tiaPortal != null) tiaPortal.Dispose();
            }
        }
    }
}
```

How can you program with Openness?
Code example

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TIA Portal with UI instantiate

```
TiaPortal myPortal = new TiaPortal( TiaPortalMode.WithUserInterface );
```

Open project

```
myPortal.Projects.Open( @"C:\TiaProjects\OpennessProject\OpennessProject.ap16" );
```

Creating a device (PLC)

```
Device device = devices.CreateWithItem("OrderNumber:6ES7 510-1DJ01-0AB0/V2.0", "PLC_1",
                    "NewDevice");
```

Complie PLC

```
compileResult = my1500Plc.Compile( CompilerOptions.Hardware, BuildOptions.Build );
```

TIA Portal Openness Functionalities

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XML export of the snapshot of actual values

The snapshot of the actual values is stored in the XML file during export via Openness.

Fault-tolerant XML import of inconsistent blocks

Block XMLs can be imported, even if used UDTs or called blocks are not available or not matching in the target project

Archiving/retrieving a project

API-controlled access to UI function project archiving or project retrieval

Opening two projects in TIA Portal

Two projects can be opened simultaneously in a TIA Portal instance, one of them in read mode

PLC offline/offline comparison

Automatically triggered comparison of 2 PLCs which can be in different projects

Automatic protection of blocks

A block can be know-how protected via Openness API

Conversely, a know-how-protected block can be unlocked via Openness

Download to an R/H PLC

Automated loading of the R/H PLC, which can be operated redundantly since V15.1, consisting of primary and backup PLC

Export/import of watch tables

Import and export of watch tables in XML

TIA Portal Openness
New Functionalities in V16

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Reading of block checksums

Reading out of checksums of a PLC S7-1500 and S7-1200. Checksums of blocks can be determined by code, interface, comment, etc.

Parameter-specific access to S7-1500 PLCs and ET 200SP modules

Read and write of hardware module parameters of S7-1500 PLCs and ET 200SP are now both supported

TIA Portal Add-Ins

Add-Ins offer a convenient way to enrich TIA functionality using the Openness API

Openness libraries of previous versions are available

Openness DLLs from V14SP1, V15 and V15.1 are available besides the new V16 DLLs

Systemfunktionen
TIA Portal Add-Ins

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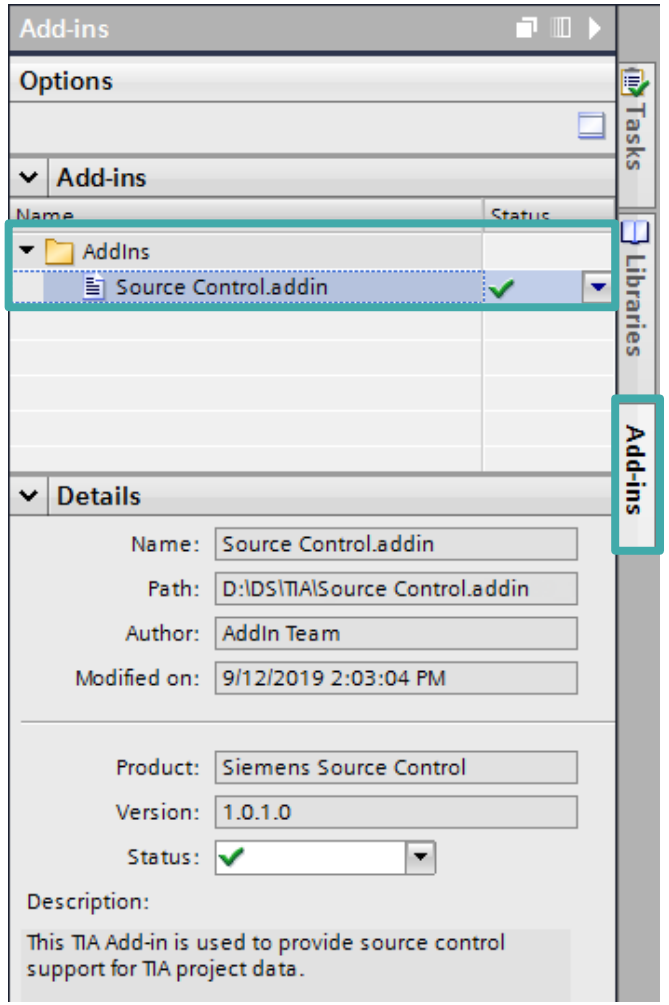
Overview

- Add-Ins offer a convenient way to enrich TIA functionality using the Openness API
- Add-Ins are written as .NET programs
- Add-Ins can be easily shared within a company and even distributed to third-party vendors

Installation

- Add-Ins can be easily installed by copying the .add-in file into the “Add-Ins/” folder in the TIA Portal installation directory
- Add-Ins can be activated or deactivated in the Add-Ins task card (by default Add-Ins are deactivated)
- Additional information about the Add-In like the author, description or the required permissions are also shown in the Add-Ins task card



Systemfunktionen
TIA Portal Add-Ins

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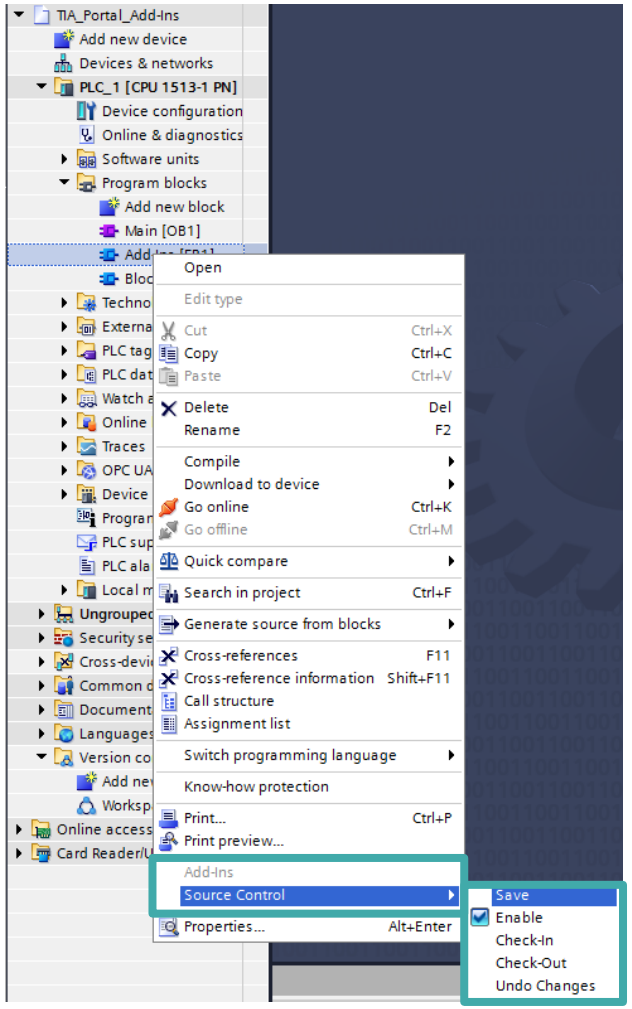
Benefits

- Add-Ins integrate as a part of the TIA Portal environment
- Add-Ins can be run without having any knowledge of high-level programming languages
- Add-Ins are context sensitive. This means they only appear for the selected objects within a TIA Portal project
- Add-Ins can also execute Windows system functions, file or network operations and interact with other application

Utilization

Add-Ins can be used inside the following areas of the TIA Portal

- Project tree
- Library view
- Version Control Interface
- Devices and network view



System functions
TIA Portal Openness – HW configuration of modules

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Extension of the support of the configuration of modules and components

Configuration of the S7-1500 PLCs and ET200SP modules such as

- OPC UA server configuration and user management
- Certificate management
- Web server configuration and user management
- Watch tables for Web server and display

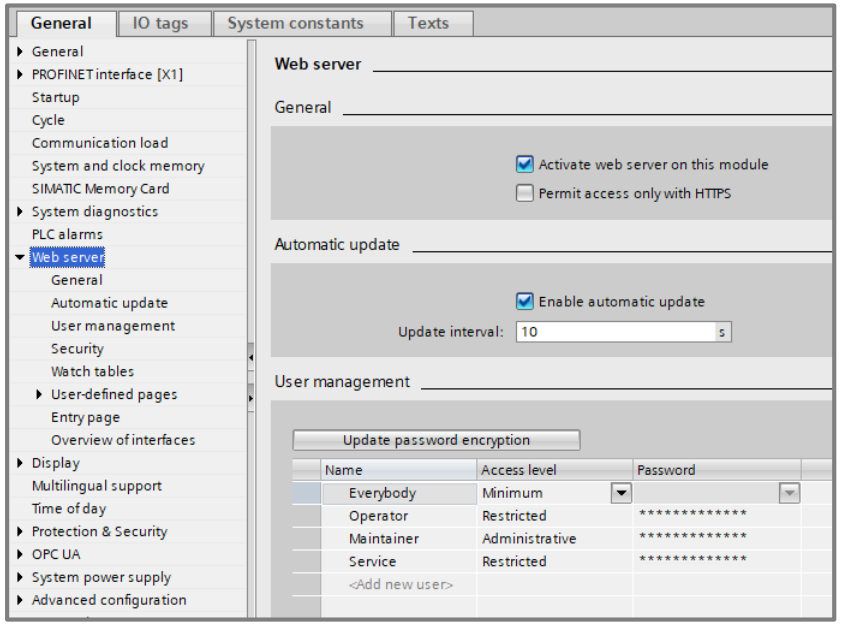
Advantages of the function

In addition to the automated placement of devices/ modules in a networked configuration, automated configuration of the S7-1500 PLCs and ET 200SP modules is now also possible.

This enables, for example, the consistent and full generation of the hardware configuration of a plant object.

Openness API

Read and write complex module parameters



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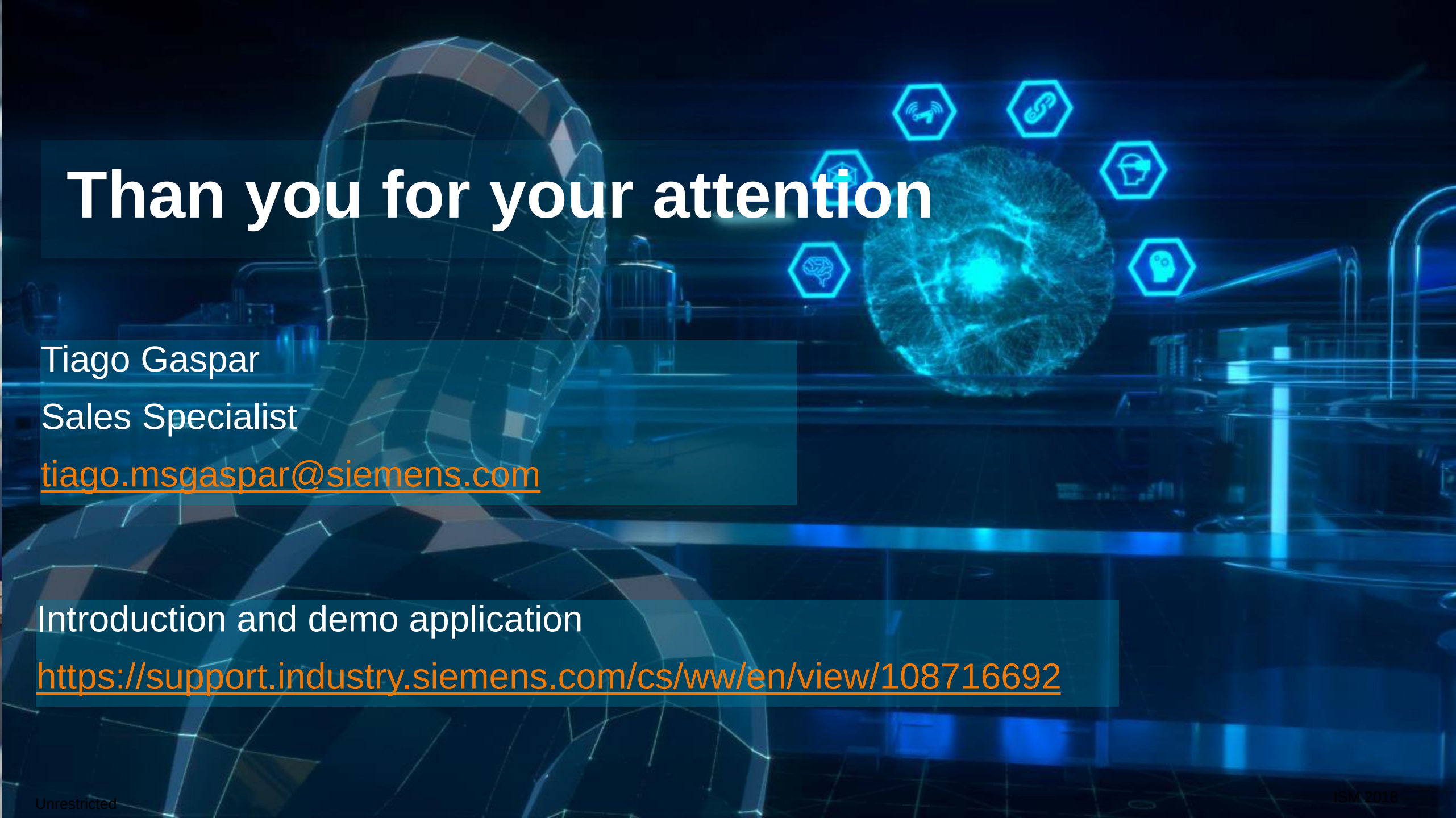

Than you for your attention

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Introduction and demo application

https://support.industry.siemens.com/cs/ww/en/view/108716692