



# Open Source @ MindSphere

Open Source @ Siemens 2022  
Igor Milovanović, Siemens Digital Industries

# Welcome



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## Agenda

- MindSphere and Siemens –  
Industrial IoT Stack
- Theoretical Background –  
Ecosystem Building
- MindSphere –  
Open Source Journey
- MindSphere Open Source –  
Selected Projects
- Open Source in  
Siemens Industrial IOT Stack
- Managing  
Open Source Projects

# What is MindSphere?

## Industrial IoT as a service

Centralized compute and storage,  
with solutions, apps and services



# MindSphere in Siemens Industrial IoT Stack

## Low-code platform

Build apps faster for cloud, on-premise or hybrid infrastructure

## IIoT as a service

Centralized compute and storage, with solutions, apps and services

## Edge computing

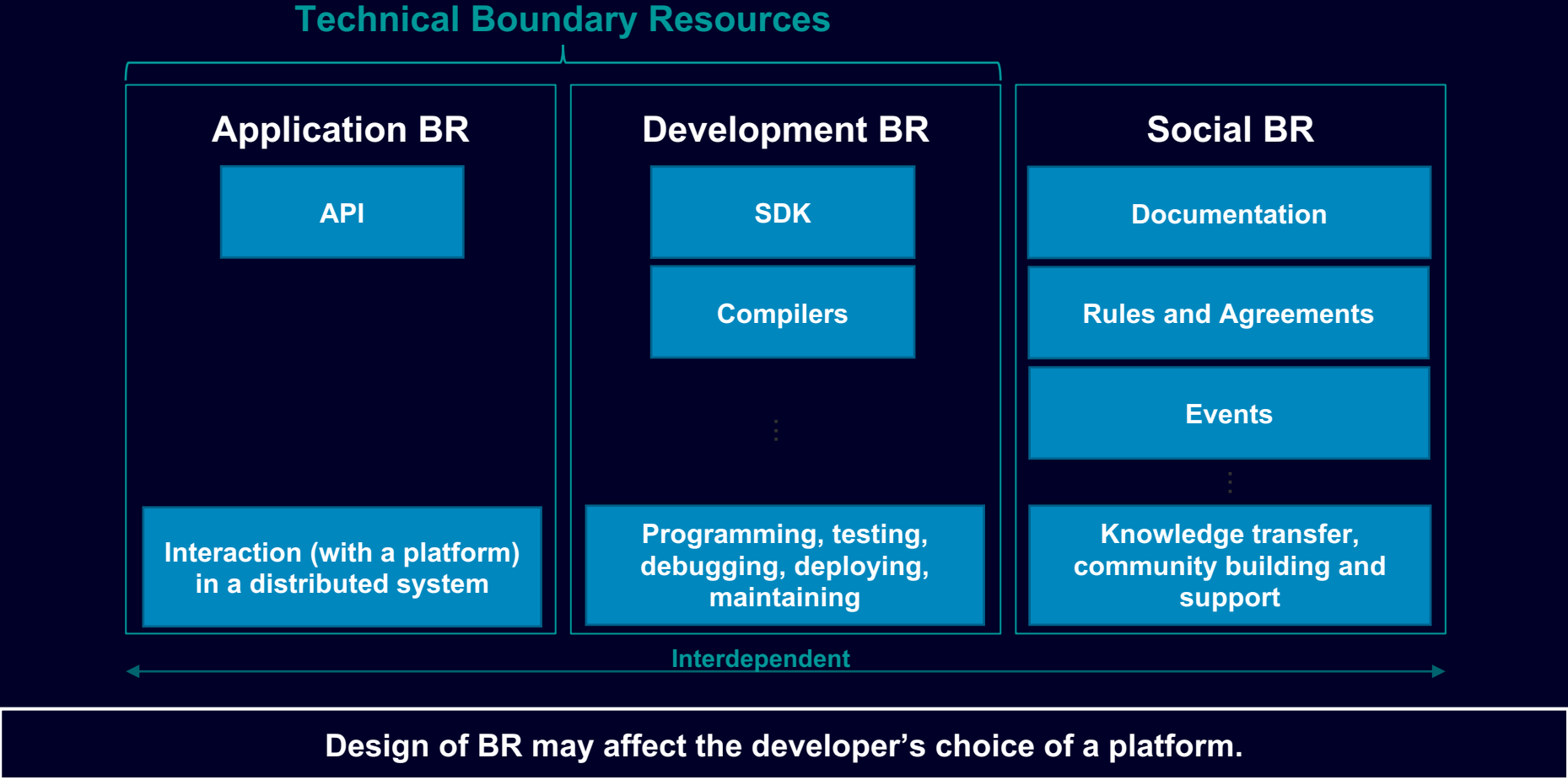
Decentral compute and storage with device runtime, apps and management

## Field/control

Automation runtime and engineering connectivity

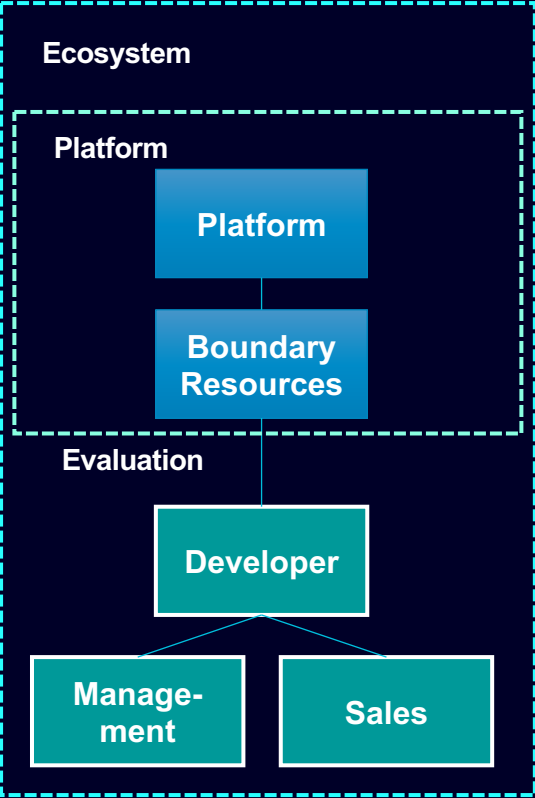


# Theoretical Background – Ecosystem Building

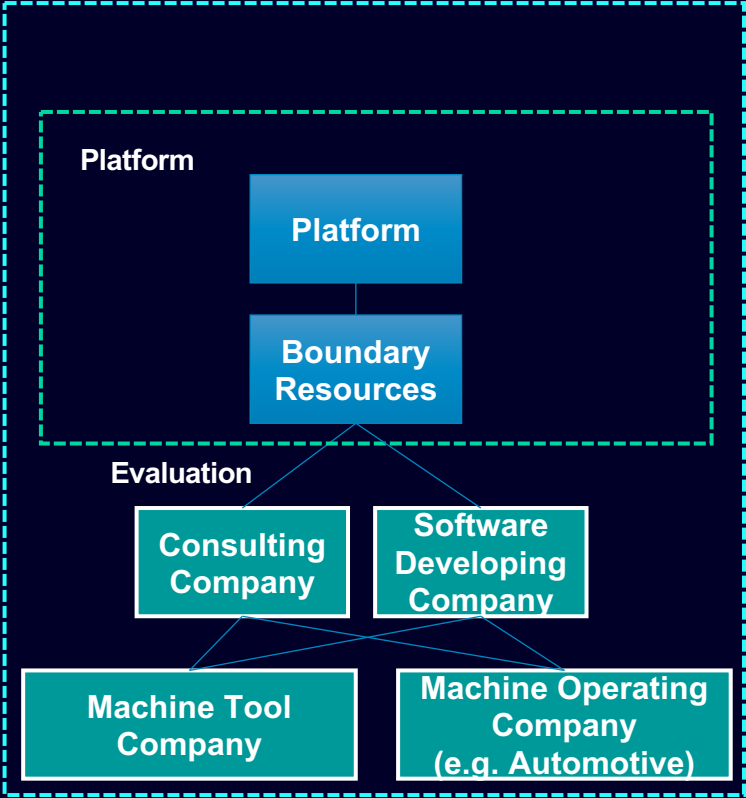


# Theoretical Background – Ecosystem Building

## Intraorganizational Level

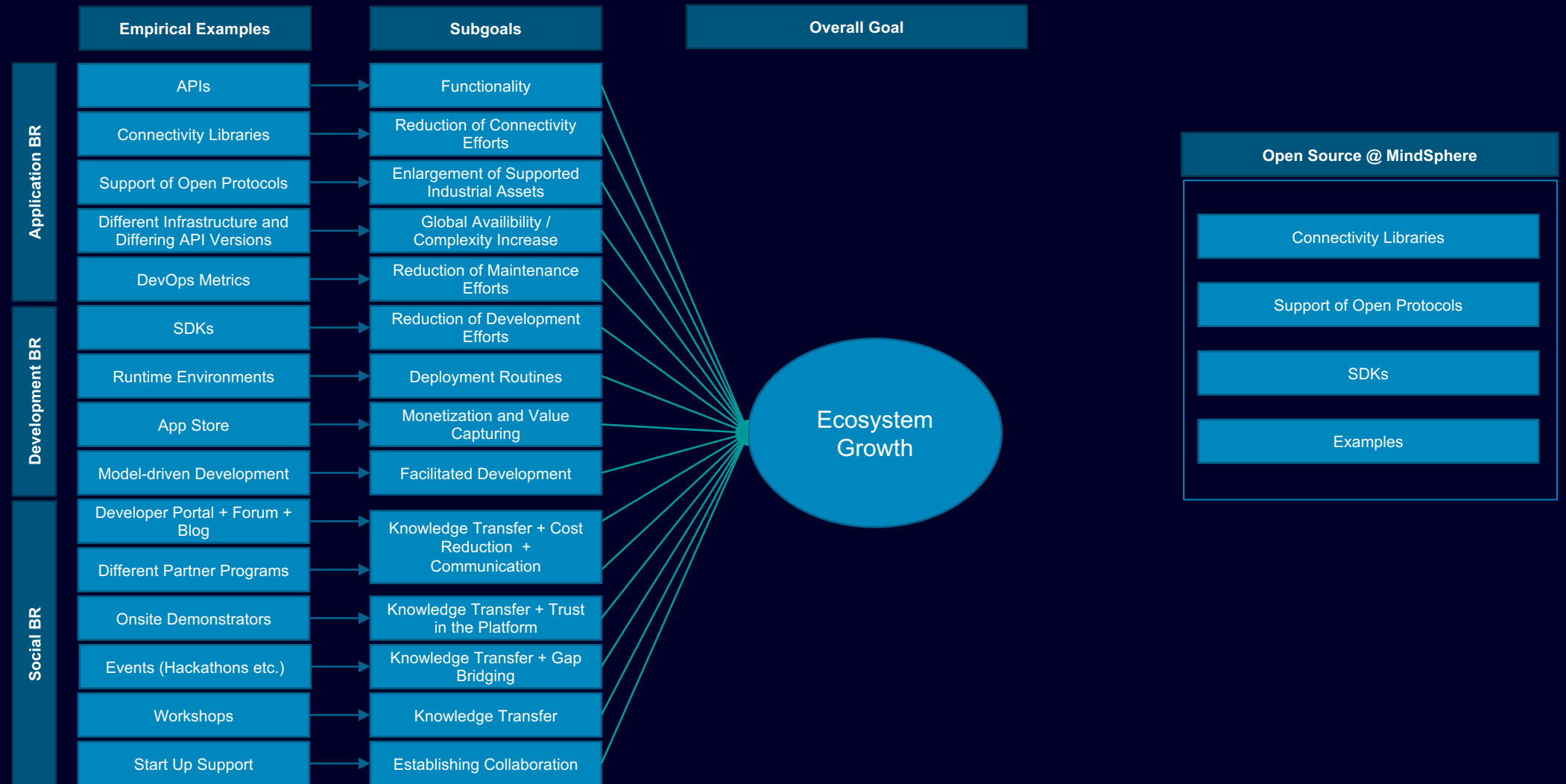


## Interorganizational Level



**Evaluation of available platform resources is critical during the platform selection.**

# Theoretical Background – Ecosystem Building



# MindSphere Open Source Projects

The screenshot shows the GitHub profile for MindSphere. At the top, there is a search bar and navigation links for Pull requests, Issues, Marketplace, and Explore. The profile header includes the MindSphere logo, the name 'MindSphere', and the website URL 'https://opensource.mindsphere.io' with a 'Verified' badge. Below the header is a navigation menu with 'Overview' selected, and other options like 'Repositories' (36), 'Projects', 'Packages', 'Teams' (3), 'People' (31), and 'Settings'. The main content area displays a 'README.md' file with the heading 'Welcome to MindSphere Open Source Projects!'. The text below the heading states: 'MindSphere is part of Siemens Industrial IoT Platform, the most comprehensive industrial Internet of Things solution - from edge to cloud - powering the convergence of IT and OT. Click on the badges below to find more Siemens powered open source projects!'. Below this text are several GitHub badges for 'mindsphere', 'industrial edge', 'mendix', 'iot2050', and 'siemens'. At the bottom, there is a 'Pinned' section with two repository cards: 'mindconnect-nodejs' (Public) and 'mindconnect-lib' (Public). The 'mindconnect-nodejs' card includes the text 'NodeJS Library for MindSphere Connectivity - TypeScript SDK for MindSphere - MindSphere Command Line Interface - MindSphere Development Proxy - typescript-sdk is waiting for your contributions!' and shows 58 stars and 20 forks. The 'mindconnect-lib' card includes the text 'MindConnect Library (MCL) - For secure connectivity from an onsite device to MindSphere. By cloning or downloading this repository, you accept the MindSphere Development License Agreement, which yo...' and shows 17 stars and 3 forks.

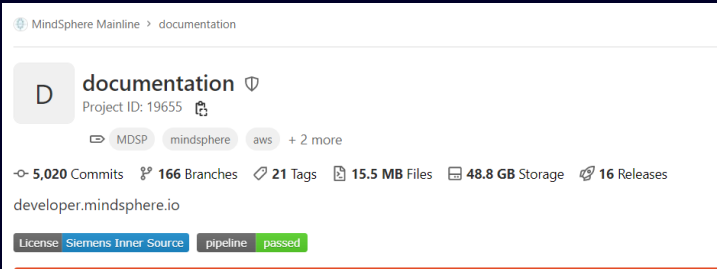
## Content:

- Connectivity Libraries
  - Command Line Interface
  - Development Tools
  - SDKs
  - Examples
- 
- <https://github.com/mindsphere>
  - <https://opensource.mindsphere.io>

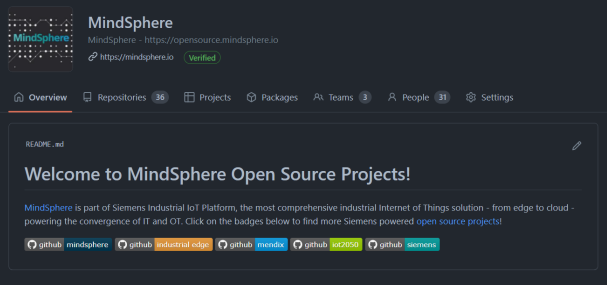


# Our Open Source Journey From Inner Source to Open Source

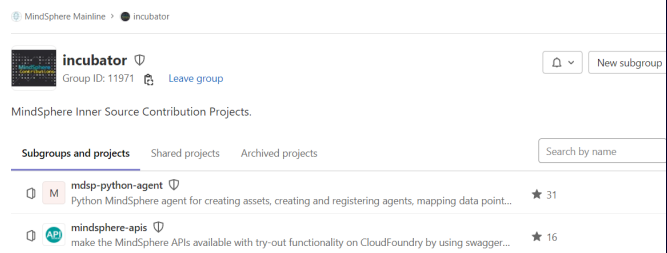
[April 2017] MindSphere  
Documentation – Inner  
Source



[May 2019]  
Selected Projects  
moved to Open Source  
github.com/opensource



[June 2017]  
MindSphere  
Incubator 20 Inner  
Source Projects



[May 2022]  
31 Members and 9  
Outside Collaborators  
20 Public Repositories  
Contributions from  
Community Members

# MindConnect Node-RED Node

The screenshot shows a Node-RED playground interface. The browser address bar displays 'playground.mindconnect.rocks/#flow/b49f7b47.d5ff08'. The interface includes a left sidebar with 'filter nodes' and 'common' categories. The main workspace contains a flow starting with an 'inject' node, followed by a 'timestamp' node, a function node labeled 'inject random values between 40 and 160 to all demo pump variables', and a 'MindConnect Node-RED Agent' node. Below the flow, a 'msg.payload' node is visible. The bottom of the workspace contains a series of instructional steps:

- Step 0 - Create an asset of type core.mclib in MindSphere (also called an Agent)
- Step 1: Get the initial agent configuration from Mindsphere Asset Manager
- Step 2: Copy the agent onboarding information to the node and deploy the flow
- Step 3 - Press the agent configuration button and select the DemoPump asset
- Step 4 - Press the agent information button and copy the timeseries input template to clipboard
- Step 5 - Paste the template to a function node and change the template values
- Step 6 - Deploy the flow again and start injecting the data by clicking on inject button

A status message at the bottom of the workspace reads: 'Parallel requests status: 1 finished with 0 errors at Mon Mar 15 2021 17:45:29 GMT+0000 (Coordinated Universal Time)'.

License: MIT

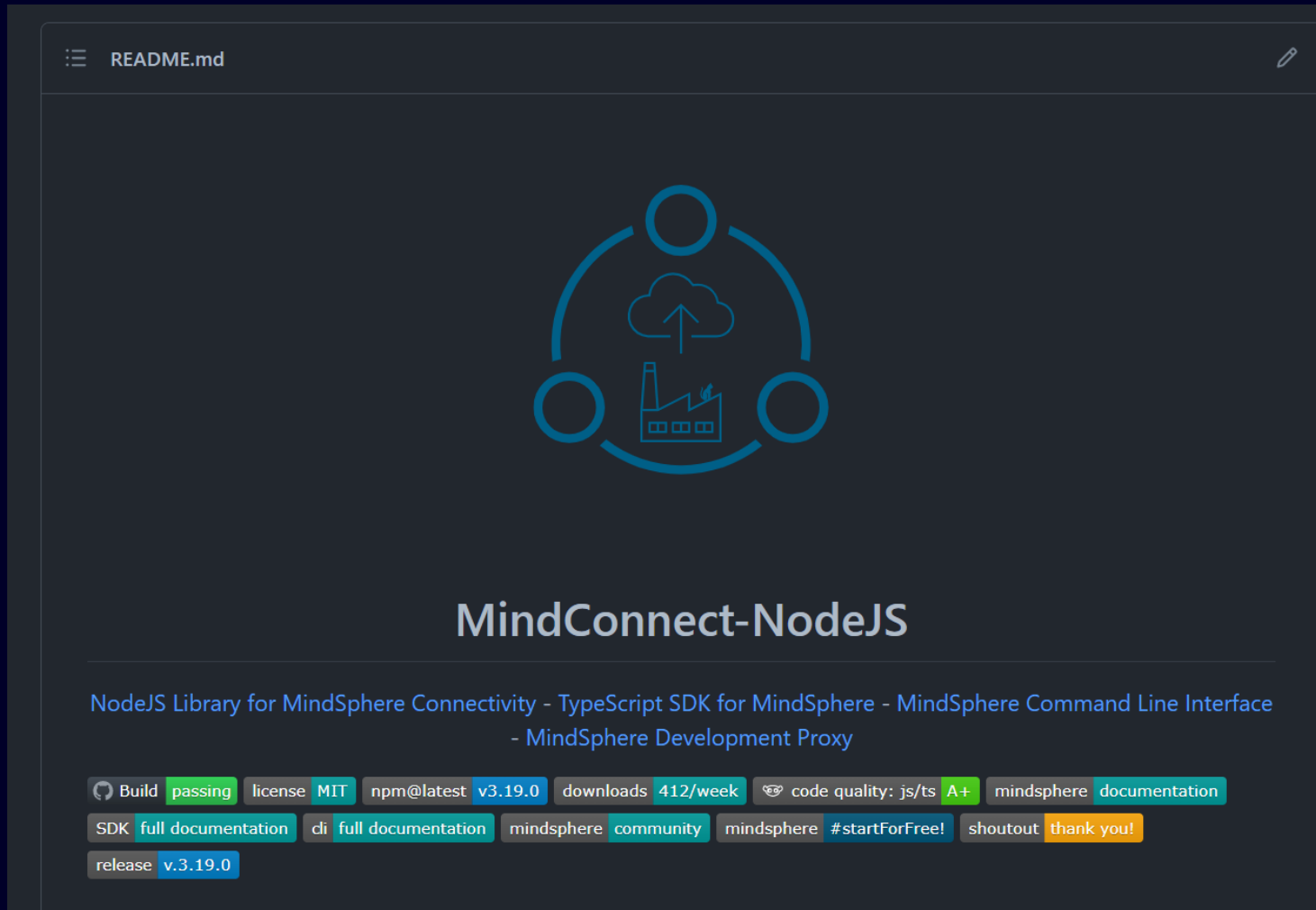
Runs on:

- Industrial Edge
- Simatic IoT 2040/2050
- 3<sup>rd</sup> party devices
- In docker containers
- and anywhere else where node-red runs 😊


Capabilities:

- Automatic Configuration and Mapping
- TimeSeries /Bulk Timeseries
- File-Upload
- Events
- Integrated Data-Lake
- <https://flows.nodered.org/node/@mindconnect/node-red-contrib-mindconnect>
- <https://playground.mindconnect.rocks>

# mindconnect-nodejs – connectivity library, typescript SDK and CLI



README.md



## MindConnect-NodeJS

NodeJS Library for MindSphere Connectivity - TypeScript SDK for MindSphere - MindSphere Command Line Interface  
- MindSphere Development Proxy

Build **passing** license **MIT** npm@latest **v3.19.0** downloads **412/week** code quality: js/ts **A+** mindsphere **documentation**

SDK **full documentation** di **full documentation** mindsphere **community** mindsphere **#startForFree!** shoutout **thank you!**

release **v.3.19.0**

License: MIT

- JavaScript/TypeScript Connectivity Library for Custom Agent Development
- MindSphere TypeScript SDK
- MindSphere CLI
- MindSphere Development Proxy

# MCL – MindConnect Library C

```
☰ README.md ✎
```

## MindConnect Library (MCL) 4.x.x

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### Document Content

This is the introductory document for MindConnect Library, abbreviated as MCL. Please check MCL reference documentation for details. MCL reference documentation can be accessed online or a local copy can be generated when building MCL (see MCL Build Options).

### Introduction

MindConnect Library (MCL), is a cross-platform C library wrapping MindSphere API to which clients, or agents in MindSphere terms, are allowed to access. The connection to MindSphere platform is secured using TLS v1.2.

MindConnect Library is distributed as source code. The source code is organized as a core component and extensions to the core component.

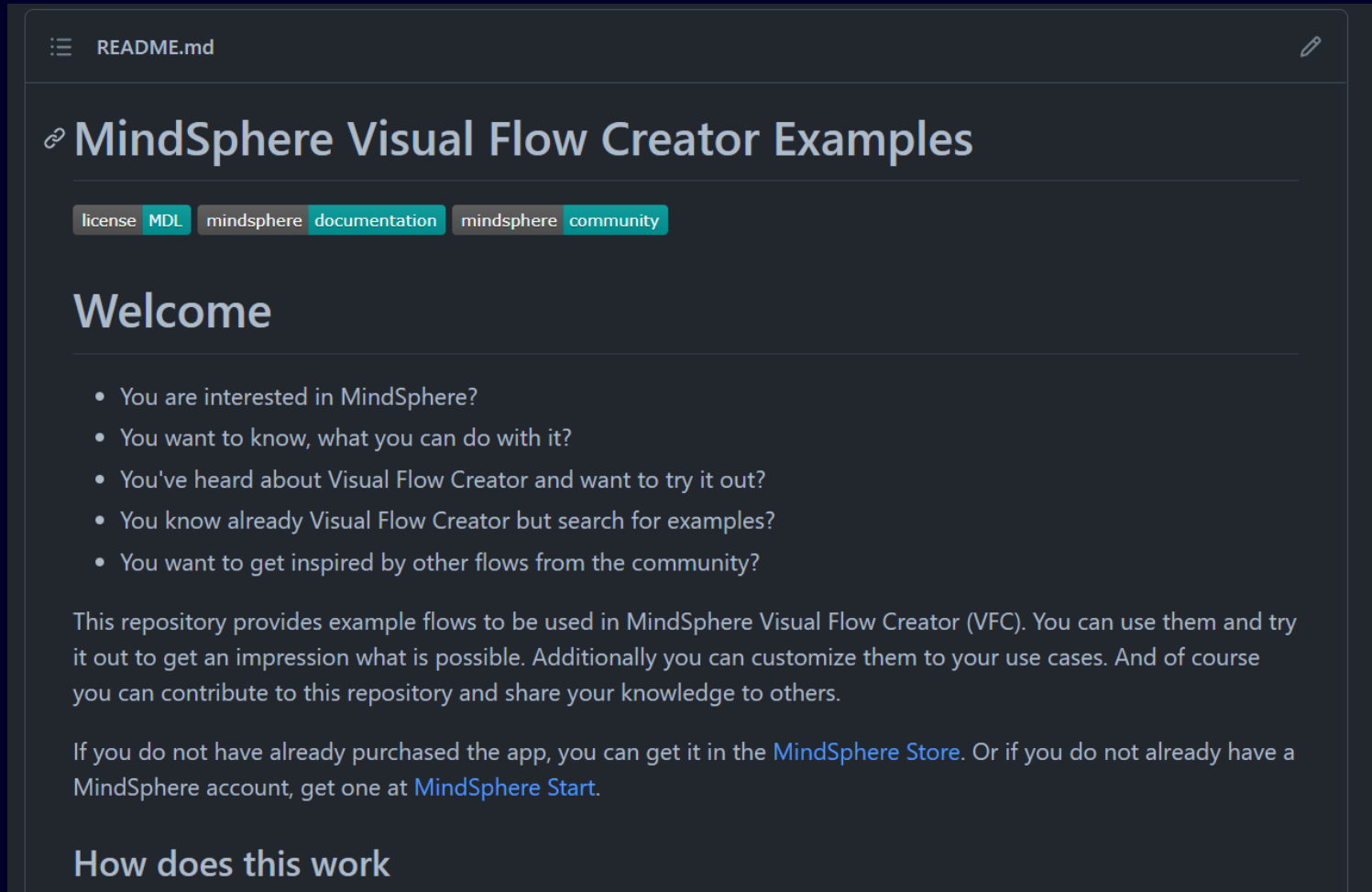
Onboarding, key rotation and access token retrieval functionalities will be available to agents with the **Core** component. Including `mcl_core.h` in agent source code will enable all core component functionality.

Data exchange and data point mapping functionalities will be available to agents with **Connectivity** component which is an extension to **Core** component. Including `mcl_connectivity.h` in agent source code will enable all connectivity

License: MindSphere Developer License

- Cross-Platform C Library for device connectivity

# MindSphere Examples



The screenshot shows a README file titled "MindSphere Visual Flow Creator Examples". It features a navigation bar with links for "license MDL", "mindsphere documentation", and "mindsphere community". The main content includes a "Welcome" section with a bulleted list of reasons to explore the repository, a paragraph explaining the repository's purpose, and a link to purchase the app or create an account. The "How does this work" section is partially visible at the bottom.

☰ README.md

## 🔗 MindSphere Visual Flow Creator Examples

license MDL mindsphere documentation mindsphere community

### Welcome

- You are interested in MindSphere?
- You want to know, what you can do with it?
- You've heard about Visual Flow Creator and want to try it out?
- You know already Visual Flow Creator but search for examples?
- You want to get inspired by other flows from the community?

This repository provides example flows to be used in MindSphere Visual Flow Creator (VFC). You can use them and try it out to get an impression what is possible. Additionally you can customize them to your use cases. And of course you can contribute to this repository and share your knowledge to others.

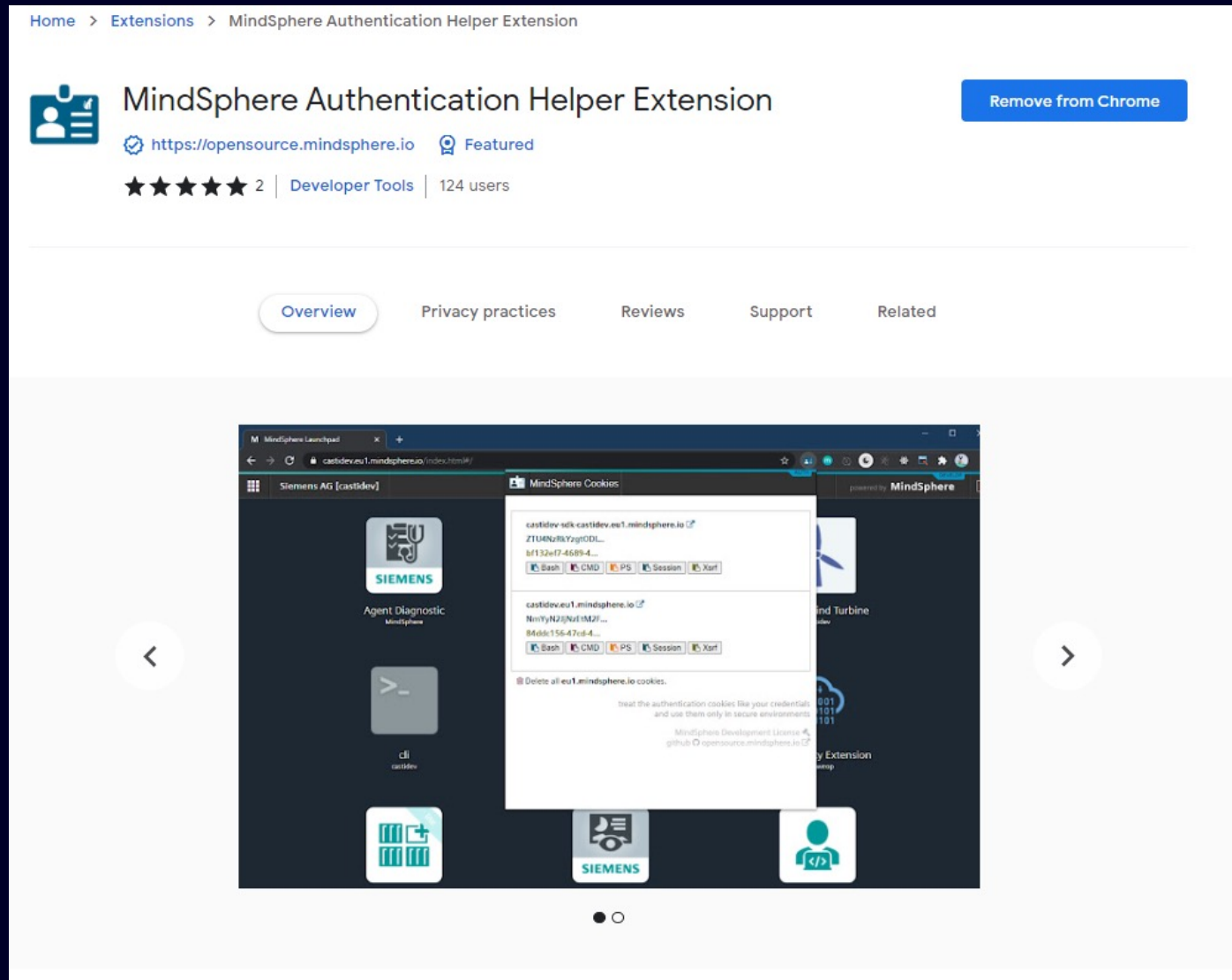
If you do not have already purchased the app, you can get it in the [MindSphere Store](#). Or if you do not already have a MindSphere account, get one at [MindSphere Start](#).

### How does this work

License: MindSphere Developer License

- Visual Flow Creator Examples
- Java SDK Examples
- NodeJS SDK Examples
- Analytics Examples

# MindSphere Authentication Helper



License: MindSphere Developer License

- Chrome Extension which Supports Local Development
- Copy MindSphere Authentication Cookies locally and use them in your development tools

# Catena-X MindSphere Data Lake Adapter for Eclipse Data Space Connector

The screenshot displays the Eclipse Foundation website for the Eclipse Dataspace Connector project. At the top, the Eclipse Foundation logo is on the left, and navigation links for 'Projects', 'Working Groups', 'Members', and 'More' are in the center. A 'Download' button is on the right. Below the navigation, a breadcrumb trail reads 'Home / Projects / Eclipse Technology / Eclipse Dataspace Connector / Eclipse Dataspace Connector'. A light blue notification banner states: 'This proposal has been approved and the Eclipse Dataspace Connector project has been created. Visit the project page for the latest information and development.' with a 'Go to Project' button. The main heading is 'Eclipse Dataspace Connector'. Under the 'Basics' section, it says: 'This proposal is in the Project Proposal Phase (as defined in the Eclipse Development Process) and is written to declare its intent and scope. We solicit additional participation and input from the community. Please login and add your feedback in the comments section.' The 'Parent Project:' is listed as 'Eclipse Technology'. A 'Background:' section begins with: 'This proposal has been approved and the Eclipse Dataspace Connector project has been created. For information about the project and access to the source code, builds, and more, click here.' The text continues: 'The data economy is a strong driver for new business models and creativity. Portability, interoperability, sovereignty, and transparency are all issues that must be addressed. Various projects, such as GAIA-X and the International Data Space (IDS), have taken on the task of establishing a uniform standard for data sharing (IDS) and infrastructure (GAIA-X) in the form of architecture models and anchoring the issue of data sovereignty in response to this need. Data Spaces is a concept that defines the interaction of different technological components in order to promote cross-company data sharing while adhering to data sovereignty principles.' On the right side, there is an 'ECLIPSE INCUBATION' logo featuring a stylized plant and a crescent moon. Below it, a 'RELATED PROJECTS' section shows a 'Project Hierarchy:' with links to 'Eclipse Technology' and 'Eclipse Dataspace Connector'.

- Catena-X Automotive Network
- Standardized data information flows along the automotive value chain
- Data exchange based on data sovereignty in accordance with the standards of the European Union (Gaia-X)
- MindSphere Data Lake Connection to Catena-X Data Space





# Siemens Industrial IoT Stack

## Low-code platform

Build apps faster for cloud, on-premise or hybrid infrastructure

## IIoT as a service

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## Edge computing

Decentral compute and storage with device runtime, apps and management

## Field/control

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 /mendix

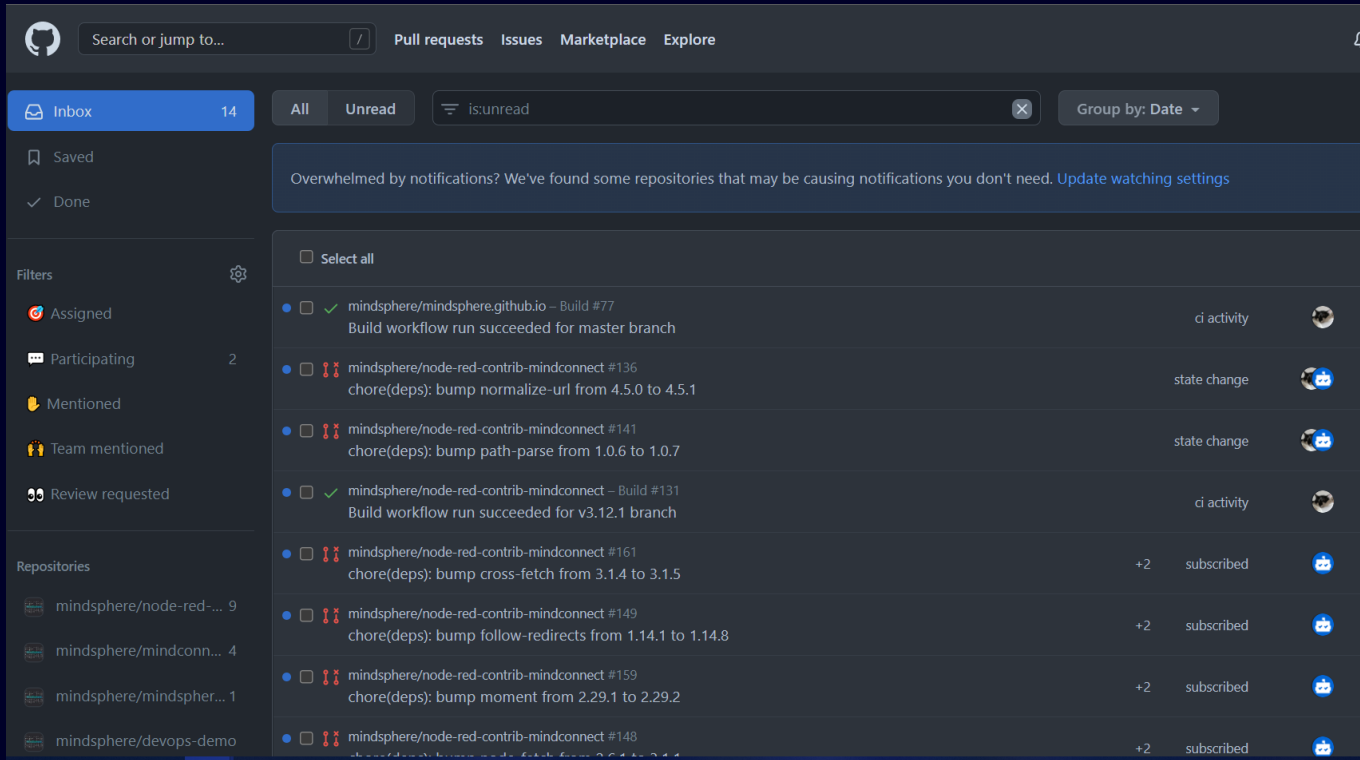
 /MindSphere

 /Industrial-Edge

 /SimaticMeetsLinux

 /Siemens

# Managing Open Source Projects



Automate everything  
Github Actions for automatic deployment  
and publishing  
Dependency License Checking  
in Build Process  
Automated Security Checks in the Build  
Process  
Let bots do work for you  
Work with the community

# | DEMO

# | Contact

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