Digital Twin Registry

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This performance specification outlines the scope of the features of the Digital Twin Registry application (hereinafter referred to as "**Application**" or "**DTR**") by Robert Bosch Manufacturing Solutions GmbH, BCI – Bosch Connected Industry (hereinafter referred to as "**Bosch**" or "**Provider**"). It applies in conjunction with a quotation allowing the customer to use the Application and the "SaaS Terms and Conditions" of Robert Bosch Manufacturing Solutions GmbH, Bosch Connected Industry product area (available at: https://www.bosch-connected-industry.com/de/media/en/agb/bci_saas_nutzungsbedingungen.pdf). The customer and Provider are hereinafter also referred to as the "**Parties**" and, individually, the "**Party**."

1 Definitions

a. The term "**service**" refers to the temporary provision of the Digital Twin Registry software application by the Provider to the customer on the basis of "Software as a Service."
b. The term "**Application Programming Interface**" or "**API**" means a programming interface that can be used (consumed) by one piece of software to communicate with another piece of software.
c. The term "**digital twin**" refers to the virtual identifiable representation of an element of the real world in an IT system (e.g. the digital twin of a product or machine). In the context of the DTR, the digital twin forms a shell for the aspects that contain information about the element.
d. The term "**aspect**" refers to a separate data interface made available by either the Provider or the customer that forms an information bundle. Aspects are associated with a digital twin. The structured description of the information bundle for an aspect is created using an aspect model. New aspects are created by the customer as part of solution development.
e. The term "**aspect model**" refers to a structured form of information description for complex data, which allows this data to be placed in a technical context and provided with meta-information describing its meaning. Aspect models can be created by the customer based on the open modeling standard Aspect Meta Model (BAMM) of the Open Manufacturing Platform (OMP).
f. The term "**aspect endpoint**" refers to the address information (e.g. an IP address or a URL) that a piece of software requires in order to call up specific data relating to an aspect via API.
g. The term "**client**" refers to the highest structuring entity for customers of an access-restricted IT system. The client is a unit within the system that is closed from a data technology and organization perspective and is used to map companies or related groups of users.
h. The term **Asset Administration Shell (AAS)** refers to the standardized digital display of an asset (Asset Administration Shell and Administration Shell are used synonymously) [SOURCE: IEC 63278-1]. It consists of one or more submodels. The Asset Administration Shell will hereinafter be shortened to **"Shell"**.
i. The **Asset Administration Shell descriptor** refers to the object containing the identification and endpoint information for an Asset Administration Shell and its submodel descriptors.
j. The term **submodel** refers to the provision of information for certain technical content that is relevant for one or more use cases.

k. The term **submodel descriptor** refers to the object containing the identification and endpoint information for the submodel.
l. A **submodel template** supports the creation of submodels.

2 Service

The Digital Twin Registry application is a software application used to manage digital twins and their aspects or Asset Administration Shells. Software applications that use digital twins or Asset Administration Shells use the DTR to find out information about digital twins and their aspects. A more detailed description of the functions can be found in section 3.

2.1 Provision of and Access to the Service

a. The Application is a software application that Bosch provides to the customer for a limited period of time on the basis of "Software as a Service" (hereinafter referred to as "**SaaS**"), based on the contractual term and contractual scope defined in the quotation. The software is provided at the Internet nodes of the data center operated by the cloud provider commissioned by Bosch.
b. Access to the DTR requires valid authentication by the user Software (access restriction). The necessary access information is provided to the customer prior to provision of the service by the Provider.
c. If the customer wishes to receive personalized advice from Bosch on the use of the functions of digital twins, aspects and their management in the DTR, this requires the conclusion of a separate agreement on the basis of a quotation from Bosch. Personalized advice does not form part of the service. This additional service is subject to a charge.

2.2 User Documentation and Language Versions

During the term of the agreement, Bosch will provide the customer with the latest version of the user documentation for the DTR. The user documentation will be provided in English only. The user documentation can be accessed at the following URL https://docs.bosch-semantic-stack.com. The documentation includes a description of the concepts of the DTR plus a description of the APIs, including examples of usage.
If the customer requires a translation of the user documentation or an alternative language version of the user interface (e.g. due to legal requirements), a corresponding agreement must be reached with Bosch.

3 Functions of the Application

The latest version of the DTR is divided into two different APIs in respect of use and functionality: the Bosch Digital Twin API and the Catena-X Asset Administration Shell API. The APIs implement analogous technical concepts but differ specifically in the data models used — Digital Twin and aspects compared to Asset Administration Shells (hereinafter referred to as Shells) and submodels. An automatic or implicit migration to runtime between the data models and APIs is therefore not possible.

The Application has the following functions:

- Registration of digital twins and aspects or shells and submodels
- Location of digital twins and aspects or shells and submodels
- Changing and supplementing of digital twins and aspects or shells and submodels
- Deregistration of digital twins and aspects or shells and submodels
- Ensuring access restrictions for the interfaces of the DTR

The description of data is standardized and unified for the customer as a result of using aspect models, aspects and digital twins or submodel templates, submodels and shells.

3.1 Registration of Digital Twins and Aspects or Shells and Submodels

Once a digital twin or an aspect or shell or submodel is created, the customer's software application registers it in the DTR. The DTR provides APIs for this registration. A digital twin or shell can be registered without any aspects or submodels. Upon registration, the DTR assigns the digital twin or shell a unique identifier to be used subsequently and to serve as a reference in consuming software applications.

3.2 Location of Digital Twins and Aspects or Shells and Submodels

During the lifetime of a digital twin or shell, the digital twin or shell and the associated aspects or submodels of customer software applications can be found using the DTR based on its characteristics.

3.3 Changing and Supplementing of Digital Twins and Aspects or Shells and Submodels

During the lifetime of a digital twin, modifiable attributes (for digital twins such as "Twintype," "Twincategory" and "Description") can be modified via DTR APIs.
Aspects or submodels can also be added to and removed from digital twins or shells. Aspects or submodels must be added or removed with their endpoints.
The DTR supports two types of endpoint for aspects of digital twins, i.e. data transport via http or mqtt. At least one http (read) endpoint must be registered for each aspect; a maximum of four http endpoints and one mqtt endpoint are possible per aspect.
Endpoints contain the necessary information that allows consuming software to access the real data of a connected data source according to the aspect models or submodel templates. Consuming software and the software for creating the aspect models or submodel templates are not subject to the Digital Twin Registry.

3.4 Deregistration of Digital Twins and Aspects or Shells and Submodels

At any time, a digital twin or shell along with its aspects or submodels and customer-specific identifiers, or an individual aspect, can be removed from the DTR and will thus no longer be available to the customer's software applications.

3.5 Ensuring Access Restrictions for the Interfaces

In principle, all calls to the DTR APIs are access restricted and require explicit authentication/authorization.
The interfaces of the Asset Administration Shell also implement the access rules defined by Catena-X.

4 Restrictions on Use

4.1 Spatial Restriction

The Application may only be used and installed in Germany, Poland, Netherlands, Romania and Czech Republic.

4.2 Technical Restrictions

a. The Application does not allow downstream software artifacts (such as interface descriptions or class and object models) to be generated from aspect models or submodel templates.
b. The Application does not allow the creation of aspects or aspect models or submodels and submodel templates.
c. Aspects and aspect models or submodels and submodel templates are implemented on a solution-specific basis and are not part of the service.
d. The Application does not allow manual management of digital twins or shells or endpoint registrations.

4.3 Restriction by Intended Use

a. The Application is not suitable for all intended uses, as there are special regulations for using software, for example in the field of medical technology, pharmacology, critical infrastructure, mobility outside of productions and in the energy sector, which means that it must be agreed in each individual case whether the Application is suitable for the planned intended use.
b. Use of the Application for military purposes is also not permitted. Use of the Application to administer digital twins of people is not permitted. Use for private purposes is not permitted.

5 System Requirements

In order to use the Software, the customer must ensure that the requirements applicable to the system environment (hereinafter referred to as "**System Requirements**") are met prior to installation and during operation of the Software.

a. To reach the APIs, the Application requires an Internet connection with at least 4 Mb/s download and 4 Mb/s upload, 20 ms round-trip time (RTT).
b. The Application is used via a web browser (version 120 or later of Microsoft Edge browser; version 120.0.6099.199/200 or later of Google Chrome; or version 121.0.1 or later of Mozilla Firefox).

If system requirements change over time (e.g. due to the release of new third-party software), Bosch will provide the customer with an updated version of this performance specification.

6 Hosting

The Application is hosted in the European Union.

7 Services, Support and Remote Access

If the customer requires installation services, software development services and consulting services for the Application that are not part of the documented scope of service, a separate order from Bosch is required on the basis of a quotation.

If the customer wishes to use any additional software in conjunction with the DTR, we recommend that the customer agrees this with Bosch.

Warranty support requests can be directed to Customer Service at support.semantic-stack@de.bosch.com. Requests for all other support services can be directed to the Provider. They are not part of the scope of service and the provision of support services requires a separate agreement between the Provider and the customer. If it is determined that there is no warranty case when processing an Application incident reported by the customer as a warranty case, the Provider is entitled to charge the customer for the expense incurred. The Provider reserves the right to decide freely whether support will be provided for such support requests and can charge the customer the costs incurred according to the time and outlay involved.

If and to the extent that the Provider would need to access the Application in the event of a customer support request, we would point out that the Provider does not offer remote access to the Application as part of the standard service. This is therefore not part of the scope of service.
Such remote access to the Application requires a separate agreement with the Provider and, if necessary, the conclusion of an order processing agreement ("OPA").

The Provider also offers the customer training on the Application on the basis of a separate quotation and against payment of a fee.

8 OSS Components

The OSS components used in the Application can be accessed in the Application.

9 Customer Obligations

The customer is responsible for the operation of the customer's computer, including backups, as well as for the infrastructure for any software that consumes the Provider's offering. This Application may be used only by customers who comply with all of the terms and conditions set out in this document.