AUTODESK UNIVERSITY

MFG502117

Autodesk Forge and SAP Bringing Sustainability to Digital Twins

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Learning Objectives

- Learn how to navigate and work with the SAP Data Warehouse Cloud (DWC).
- Learn about integrating data from SAP DWC into Autodesk Forge applications.
- Learn about combining data from Autodesk Forge and SAP DWC to make better, sustainability-driven business decisions.
- Learn about computing carbon footprint based on recommended practices and standards.

Description

Come to this session to learn how you can develop custom solutions with Autodesk Forge and SAP to help your users make better business decisions with respect to carbon footprint. We'll present a simple demo application developed in collaboration with SAP where—by combining digital twins from Autodesk Forge with CO2 data from SAP Data Warehouse Cloud—users can make better-informed, environmentally friendly decisions in a simulated process of purchasing replacement parts.

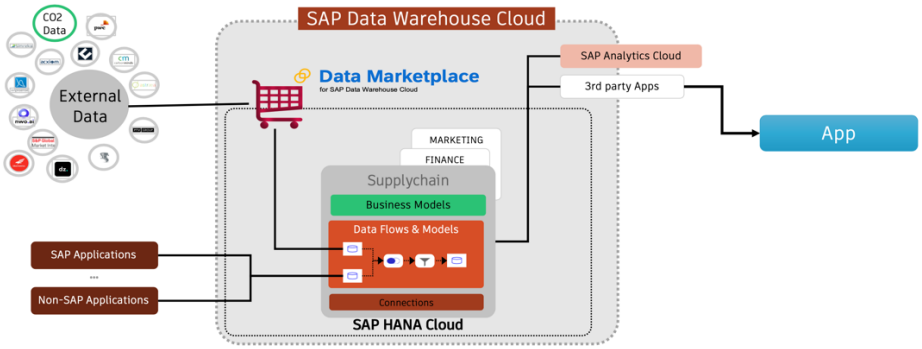
Speaker(s)

Petr Broz is a senior developer advocate at Autodesk. He has been developing some of the company's web applications and services since 2011, and now he aims to help others build amazing, creative solutions using these tools, especially using Autodesk Forge APIs. Petr's technical focus areas include everything around web and cloud, 3D graphics, and all kinds of "non-real reality".

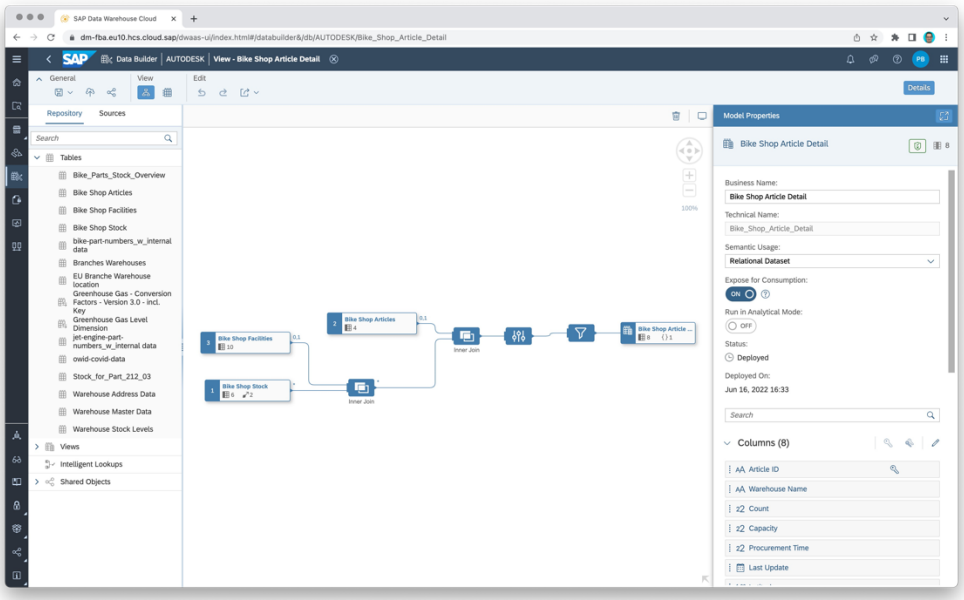
Learning objectives

Learn how to navigate and work with the SAP Data Warehouse Cloud (DWC)

SAP Data Warehouse Cloud is a multi-cloud, multi-source business semantic service for enterprise analytics and planning. It allows you to aggregate and process data from various sources, and add meaning to it.



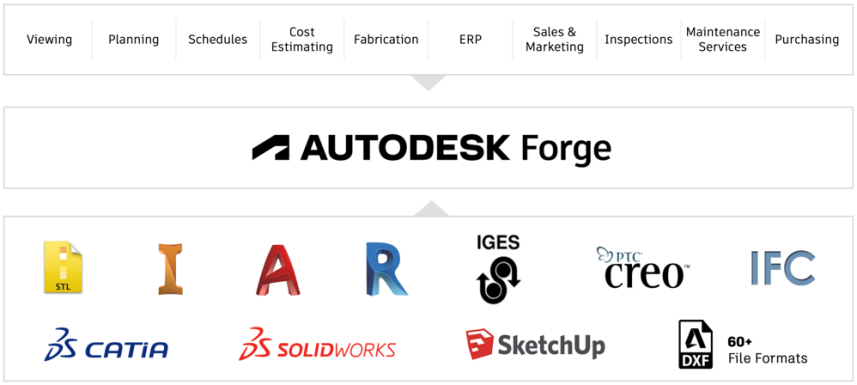
The service includes a Data Builder tool which can be used to model data flows using a simple visual interface.



Structured data from different data sources can then be combined using SQL-like joins and filters, and the resulting data views published for consumption by 3rd party services.

Learn about integrating data from SAP DWC into Autodesk Forge applications

Autodesk Forge is a cloud development platform offering APIs and services that help you access and use your design and engineering data. With Forge you can develop custom user experiences and workflows, placing your design data at the center, and aggregating external data in the context of the design.



The aggregation and linking of external data is enabled through design metadata that Forge can extract from various design file formats. For example, one can retrieve part numbers for individual parts of a manufacturing model, and use the numbers to fetch stock quantity information for each part from an external ERP system.

In order to connect SAP Data Warehouse Cloud data to your designs in Forge, a standard S/4HANA client can be used to retrieve data for a specific SKU using a SQL-like interface. As an example, the following Node.js code snippet is used to query a data view modelled in the Data Builder:

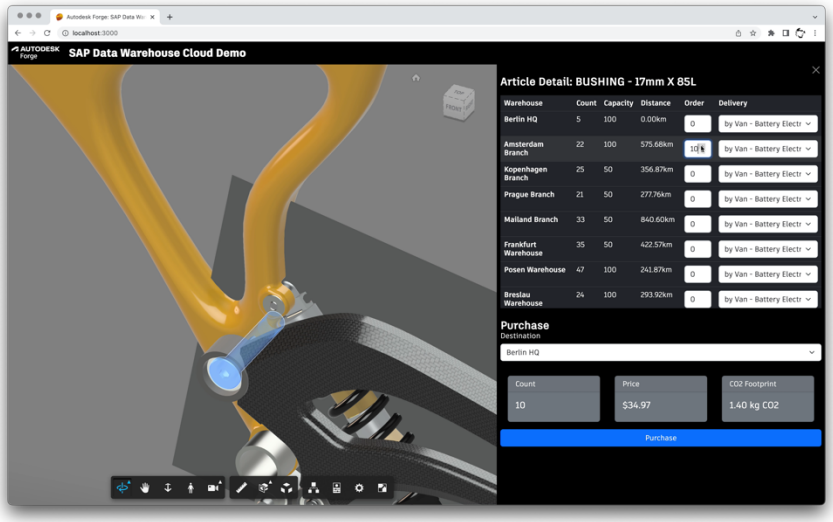
```
const hana = require('@sap/hana-client');
const {
    SAP_HANA_SERVER,
    SAP_HANA_PORT,
    SAP_HANA_SPACE,
    SAP_HANA_USERNAME,
    SAP_HANA_PASSWORD
} = require('../config.js');

const options = {…
};

function getStockOverview() {
    return new Promise(function (resolve, reject) {
        const client = hana.createConnection();
        client.connect(options);
        const stmt = client.prepare(`SELECT * FROM ${SAP_HANA_SPACE}."Bike_Shop_Stock_Overview"`);
        stmt.exec([], function (err, results) {
            stmt.drop();
            client.disconnect();
            if (err) {
                reject(err);
            } else {
                resolve(results);
            }
        });
    });
}
```

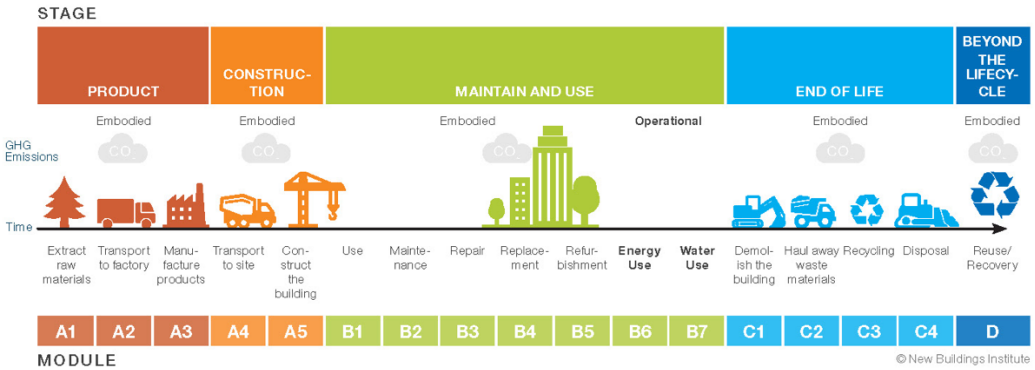
Learn about combining data from Autodesk Forge and SAP DWC to make better, sustainability-driven business decisions

The aggregation and linking of data discussed in the previous objective can then be expanded into complex systems where, for example, by combining individual part metadata in Forge (incl. part number, unit weight, volume, etc.) with warehouse and shipping data in SAP (incl. warehouse locations and CO2 footprint for different types of transport) we can provide estimates of cost, time, carbon footprint, and we can let our users make better-informed decisions.



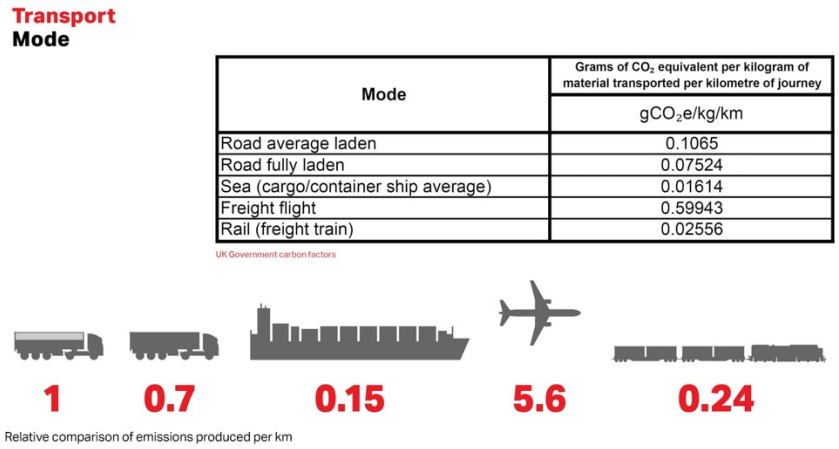
Learn about computing carbon footprint based on recommended practices and standards

Embodied carbon – especially in construction – is tracked through so-called modules mapped to individual phases of a construction lifecycle. For example, modules A1 through A3 track GHG (greenhouse gas) emissions accumulated during the extraction of raw materials, transport of materials to factories, and the actual process of manufacturing components and products.



SOURCE: HTTPS://NEWBUILDINGS.ORG/CODE_POLICY/EMBODIED-CARBON

The amount of carbon footprint is then defined differently for each module. For example, in stage A4 (transportation of components/products to their destination), the embodied carbon is often measured in $gCO_2e/kg/km$, i.e., grams of carbon dioxide equivalent per kilogram of material transported and per kilometer of journey travelled.



SOURCE: HTTPS://WWW.MAKEARCHITECTS.COM/THINKING/EMBODIED-CARBON-OF-TRANSPORTATION

Useful links

- SAP Data Warehouse Cloud
- Autodesk Forge
- Autodesk Forge tutorials
- Embodied carbon overview
- Embodied carbon of transportation