

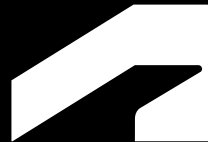


Streamlining OpenBOM's Integration With Autodesk Fusion Using Manufacturing Data Model APIs

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About me:



Oleg Shilovitsky
CEO, co-founder

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20+ years of working for large software vendors and startups in CAD, PDM, and PLM

Experience with enterprise industrial companies (e.g. Volvo, Boeing, Nokia) as well as with many SMEs

Started a professional blog - [Beyond PLM](#), which became the leading PLM blog online, published ~4000 articles for the last 14 years

VOLVO

BOEING

NOKIA

DS DASSAULT
SYSTEMES

 **AUTODESK**

OpenBOM Intro and Company Overview



[OpenBOM](#) is a Boston-based company focusing on cloud-based solutions for Bill of Materials (BOM) and product lifecycle management. Co-founded by CEO [Oleg Shilovitsky](#), it offers tools to streamline engineering and manufacturing processes, improve collaboration, and enhance efficiency in new product development. Serving diverse industries, OpenBOM has partnerships and integrations with CAD, PLM, and ERP vendors, maintains an active user community, and continually updates its platform based on customer feedback and industry trends.

Learn more about OpenBOM - openbom.com



[For the second year in a row, OpenBOM Earns Spot on G2's 2024 Best Awards for CAD and PLM Software](#)

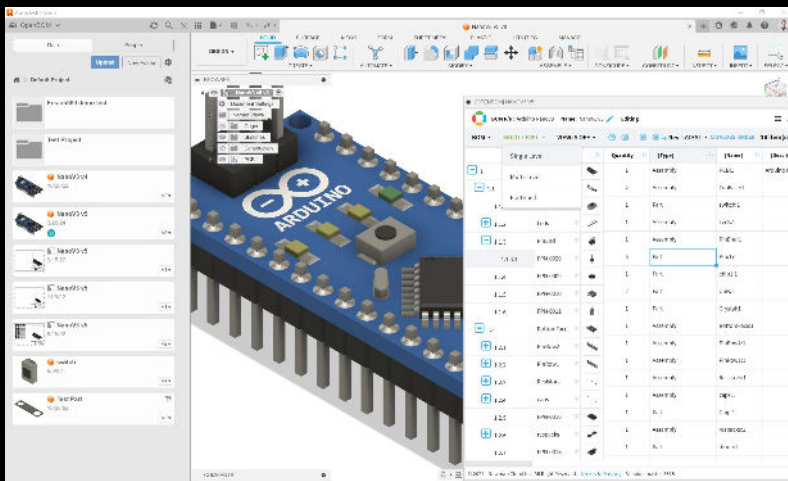
Customer [reviews](#) and [stories](#)

7 Challenges of Traditional BOM Management



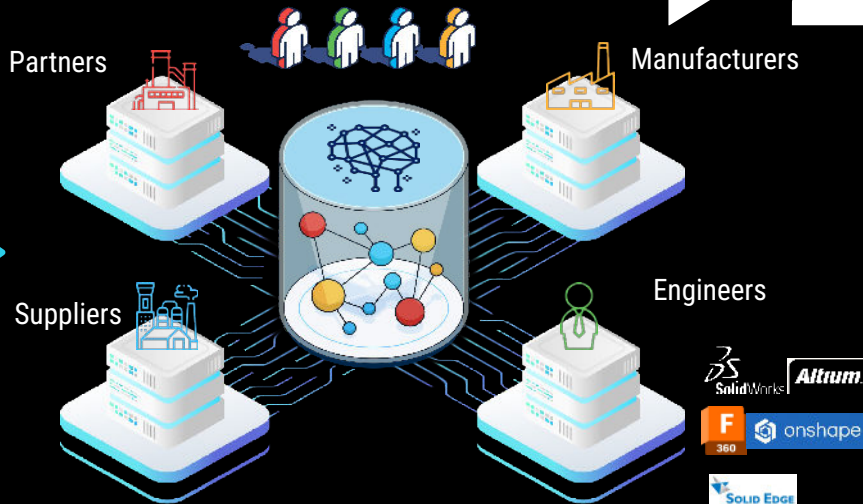
- Eliminating mistakes and inefficiency in managing complex product data for engineering, manufacturing, supply chain
- Lack of single source of truth and real-time updates between multiple people and orgs (engineering, procurement, manufacturing)
- Difficulty in handling large projects and configuration-specific BOMs
- Difficulty in BOM Comparison and revision traceability
- Complexity and time consuming of BOM Export with STEP, PDF, DXF, and other files
- Managing procurement, purchased assemblies and inventory for prototyping and small batches
- Seamless integration with MRP/ERP/Finance

OpenBOM combines the power of Autodesk Cloud Platform and Autodesk Fusion with the demand of interconnected and data-driven environment to enable real-time collaboration, centralizing data, and providing a holistic view of the product life cycle.



<https://youtu.be/WGBNLWY2B1M>

Why OpenBOM - Enabling Digital Workflow



● Spreadsheets ● Legacy DBs ● Old PDM ● Solidworks ● Altium

● Online Data ● BOM ● Product Structure ● Costing ● Collaboration

OpenBOM™ Values:

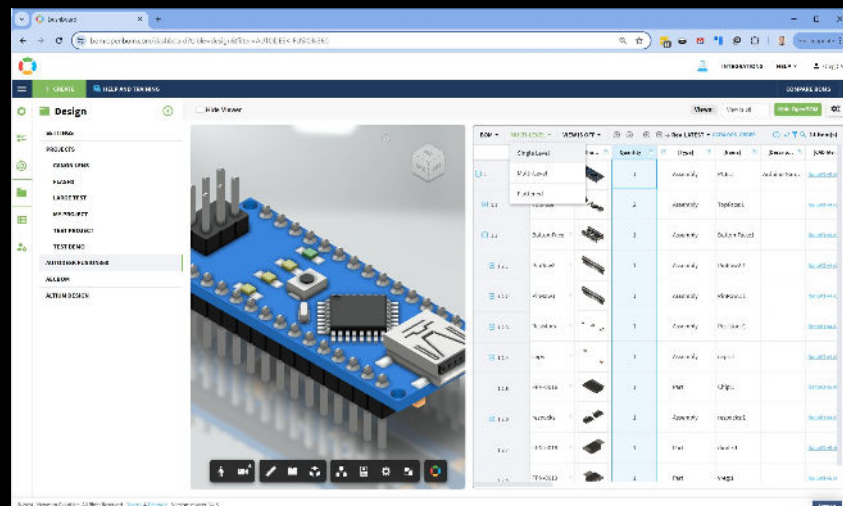
1. Remove the pain of inefficient data management and integrations
2. Unmatched collaboration for manufacturing companies & supply chain
3. Decision support using graph data science and AI

Product Overview, Features and Capabilities

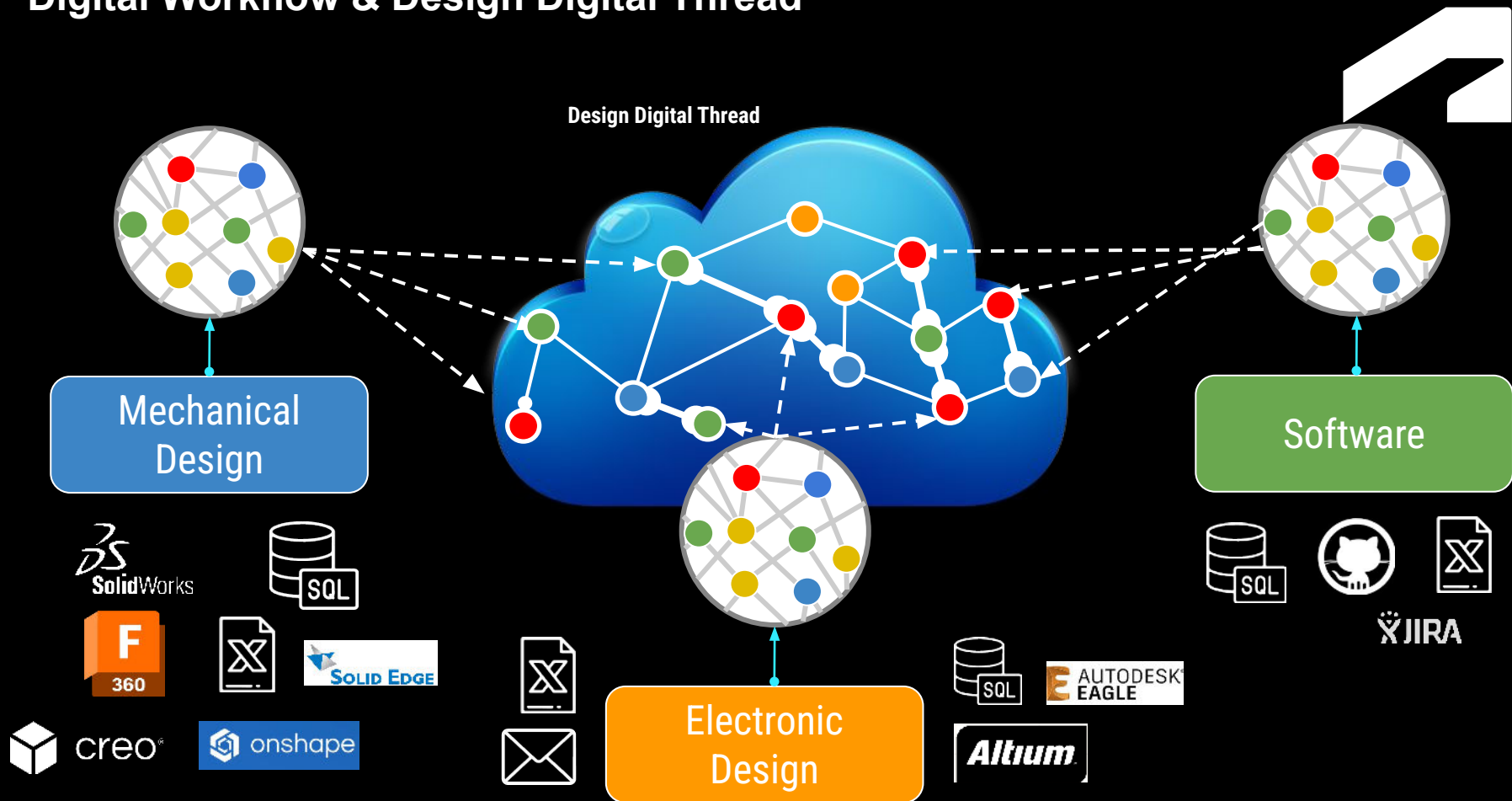


- Manage **multi-disciplinary product dataset** including mechanical, electronics, and software with all meta-data, revisions, and associated files (specs, CAD, drawings, etc.)
- **One Click BOM for Autodesk Fusion and APS** fully integrated and tuned to capture all information about the product
- **Automatic Part Number generation** to support unique identification for EBOM, MBOM, etc
- Create **BOMs for complex products** with multiple assemblies with automatic flattened BOM and Quantity Rollup
- Intuitive **rollup formulas** for cost, weight, carbon footprint and other automatic calculations
- Automatic **real-time data and file sharing** and ZIP export functions

OpenBOM combines the power of Autodesk Platform Service with demands of interconnected and data-driven environment to enable real-time collaboration, centralizing data, and providing a holistic view of the product life cycle.



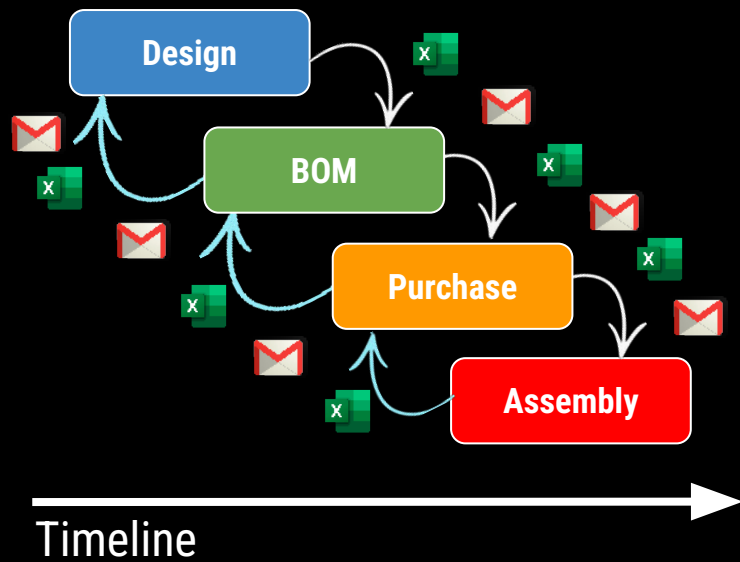
Digital Workflow & Design Digital Thread



Agile New Product Development

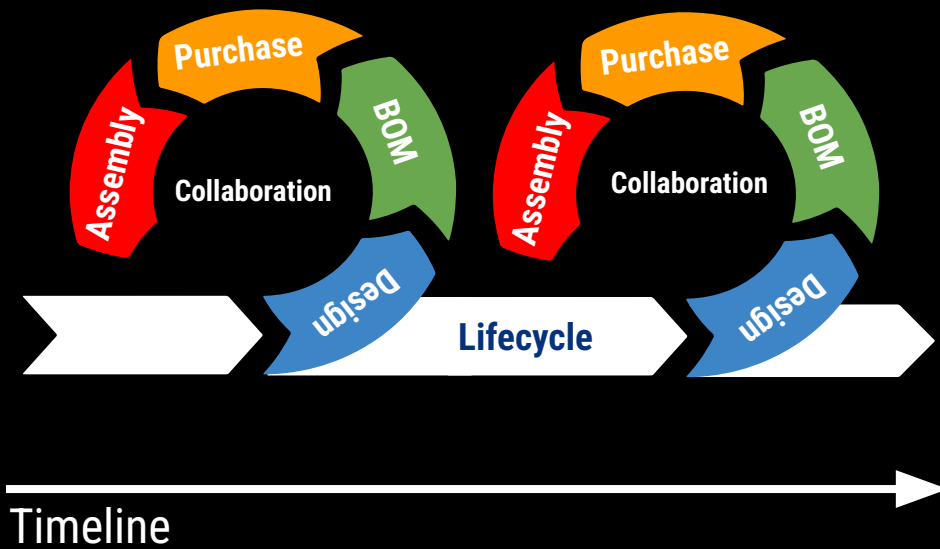


Waterfall Process



VS.

Agile Process



OpenBOM Autodesk Fusion 360 Integration Journey



OpenBOM Add-In For
Fusion360

- Integrated in Autodesk Fusion user interface and toolbar
- Using Python script and Autodesk Fusion Client side API
- Integrating OpenBOM UX using embedded browser functionality
- Bi-directional data exchange and control

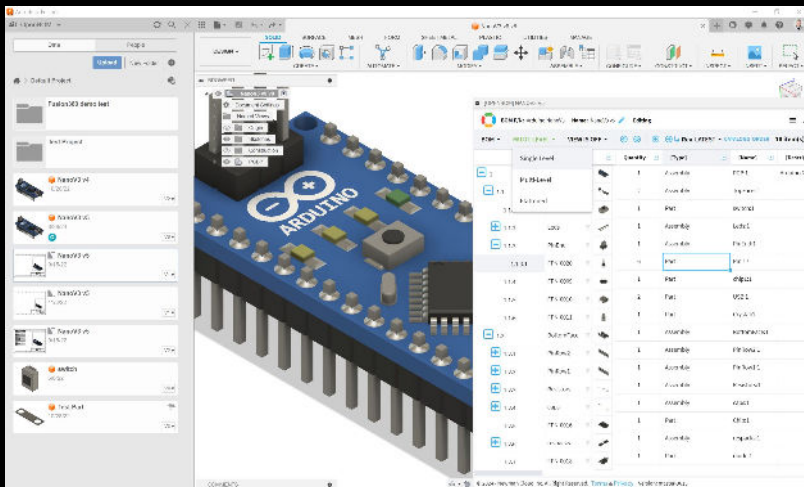
OpenBOM Add-In For
Hybrid Integration

- Replacing some of the functions (eg. image) with APS based APIs
- Create a failover between client side scripts and APS based function
- APS based functions
 - Sizes
 - Images
 - Derivative files

OpenBOM Web-based
Integration using APS

- Migrating to Web-based integration (browser)
- Embedded Autodesk login, and browser viewer
- APS based data extraction using Manufacturing Data API
- Support for non-Fusion data Revit, Solidworks (tbd)
- Viewer support (coming)

OpenBOM Autodesk Fusion Integration



Key pains:

1. Image support
2. Derivative file support
3. Scale

Developed using Python, integrated via Autodesk Fusion API and directly accessing CAD data

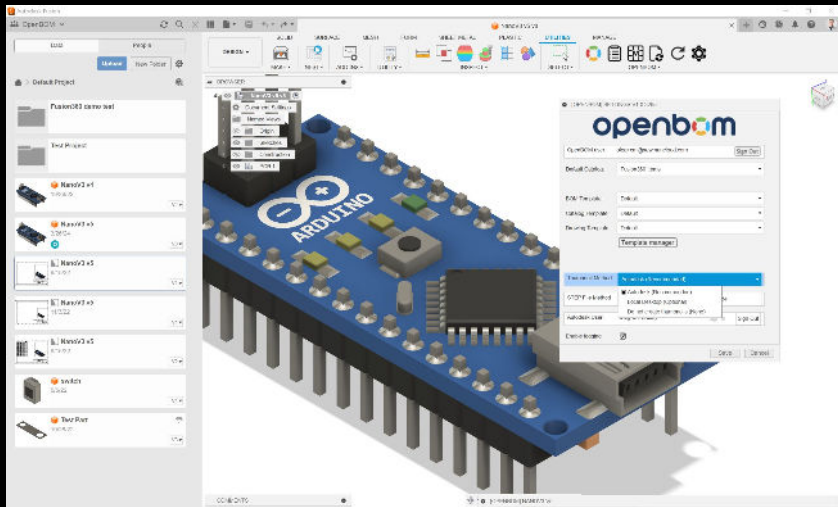
Advantages of OpenBOM Desktop Add-in:

1. Deep integration in Autodesk Fusion client
2. Rich Autodesk Fusion API allows to perform complex tasks
3. Local execution and speed

Disadvantages of Autodesk Fusion Desktop Add-in:

1. Platform dependencies (Win/Mac dependent)
2. Issues with scalability (eg. capturing complex assembly data is time consuming), generation of images takes time and resources
3. Version compatibility and need to update with the new Autodesk Fusion installs.
4. Limited access to cloud services and workflows

Autodesk Fusion Hybrid Integration Using APS



Used APS APIs

1. Authentication API
2. Manufacturing Data Model API v1

“Hybrid” means to combine Autodesk Fusion client add-in and use some APS APIs directly from the client side add-in.

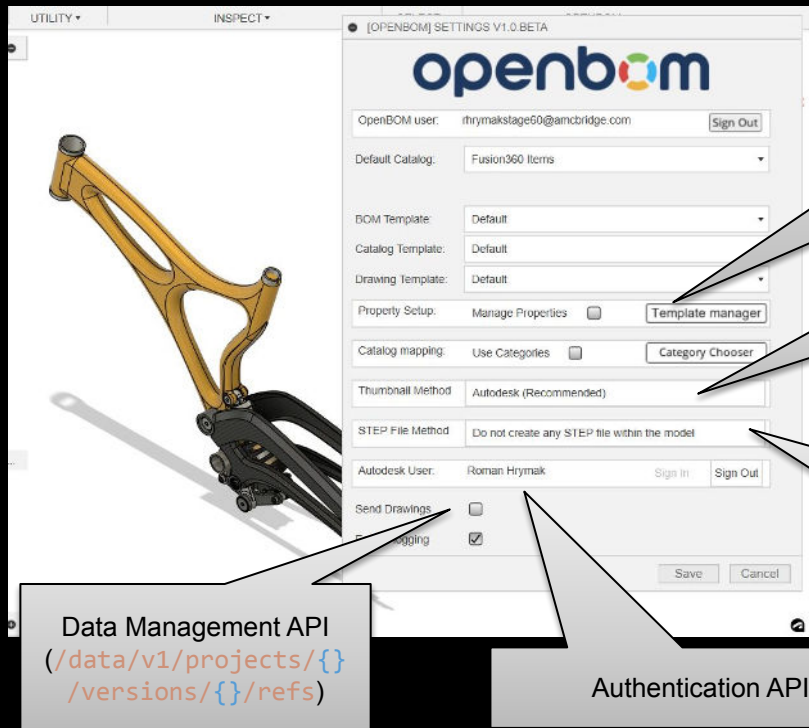
Advantages:

1. Cloud functional gaps (thumbnails and CAD files)
2. Scalability (don't need to run locally operations)
3. Ensure data centralization and failures
4. Data is up to date always

Disadvantages:

1. Internet connection dependency
2. More complexity and sometimes user confusion
3. Latency (compared to local operation)
4. Version compatibility (between Autodesk Fusion local + APS)

Using Manufacturing Data Model API from OpenBOM Add-in



Manufacturing Data Model API V1
(`getDesignFileItem` with `manage`)

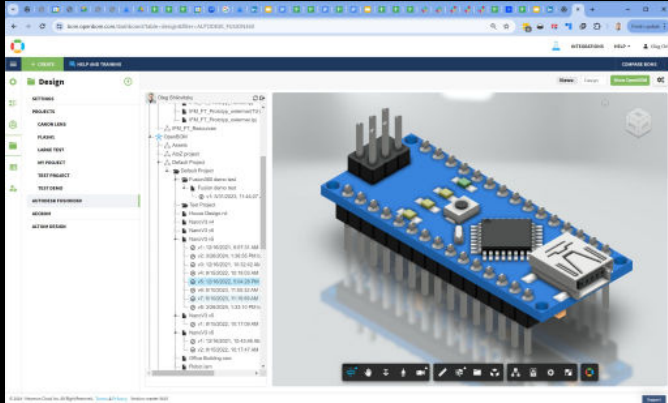
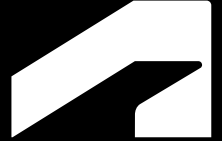
Manufacturing Data Model API V1
(`GetComponentVersion`
with `thumbnail`)

Manufacturing Data Model API V1
(`GetComponentVersion`
with `derivatives`)

Data Management API
(`/data/v1/projects/{}/versions/{}/refs`)

Authentication API V2

Autodesk Fusion Browser Based Integration Using APS



Browser based application (in OpenBOM) utilizing Autodesk Platform Services and seamlessly connecting Autodesk Fusion data to OpenBOM. Utilizes APS services via ExpressJS server.

Advantages:

1. Cross platform (no need to install maintain platforms)
2. Real time (always connected to the data, no sync)
3. Enhanced scalability via ExpressJS server
4. Easy data conversion with improved visualization
5. Detailed data access via Manufacturing Data API



Disadvantages:

1. Some APIs are not available (eg. Drawing PDF save)
2. Access to Autodesk Fusion client is not possible
3. Possible performance bottlenecks.

API used: Authentication API, Data Management, Model Derivative, Manufacturing Data Model v1 and Manufacturing Data Model v2 apis.



Settings (Bike Frame Model 1)

Property Setup: ☒ Get Manage Properties ☐ Save Revision as CAD Revision

STEP method: Generate cloud files for model parts

STL method: Generate cloud files for model assemblies

Property name: Property value

| No ... | Property Name | Property Value |
|--------|----------------|----------------|
| 1 | Supplier Name | Autodesk |
| 2 | Component Cost | \$1.00 dollars |

Cancel Deactivate Beta Features Save

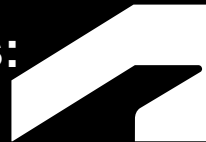
Data Management API

Manufacturing Data Model API V2
(`GetItem` with `manage`)

Manufacturing Data Model API V2
(`GetComponentVersion` with `derivatives`)

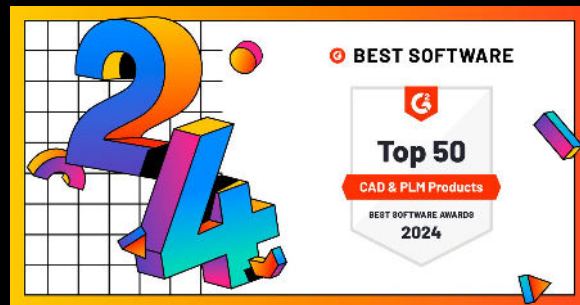
Manufacturing Data Model API V2:
`Mutation LinkPropertyDefinitionCollection`
`Query hub (getDefinitionCollectionsByHubId)`
`Query app (getPropertyDefinitions)`
`Mutation CreateDynamicPropertyDefinition`
`Mutation SetDynamicProperties`
`Mutation ClearProperties`

OpenBOM Differentiators and Value of Autodesk Platform Services:

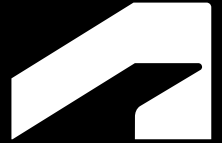


- SaaS, simple, instant registration and trial
- Seamless integration with Autodesk Fusion data
- Scale, web based and connected data
- Intuitive and unique UI/UX (a-la Google Sheet)
- Real-time data share and simultaneous updates
- A unique blend of PDM, PLM and ERP functions
- Open REST API, integrations w/ CAD and ERP

[OpenBOM is Leading G2 Momentum Grid Scoring for PLM and PDM software](#)



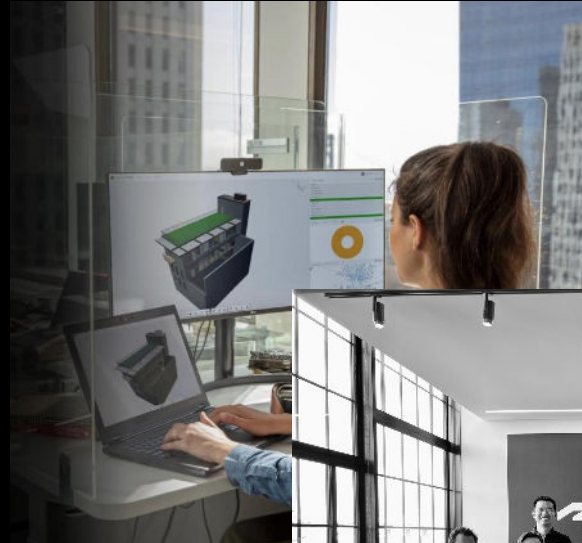
Autodesk Beta Program, Private Beta, Bootcamp, Support

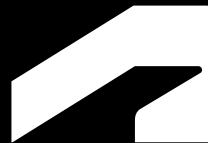


We explored and used Multiple channels of work with Autodesk APS Team:

- Online support
- Boot camp sessions
- AU classes

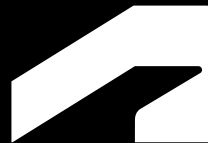
Autodesk team is amazingly responsive and set the highest standards in the industry.





Thank you!

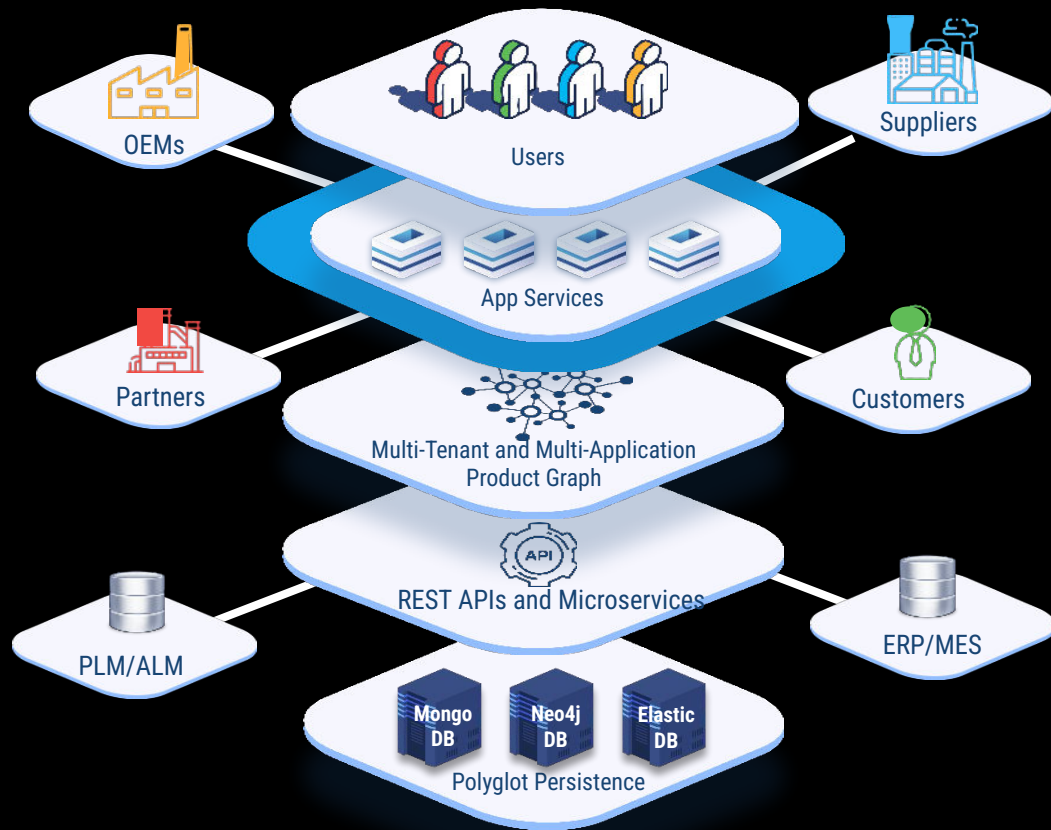




Backup Slides



OpenBOM Platform Architecture & Technology Highlights



- SaaS, public, private (AWS)
- Multi-tenant flexible data model
- Patented real-time collaboration
- Simultaneous Collaborative Editing
- Role-based instant data sharing
- Graph & Data Science support
- Generative AI / LLM support in research

Gartner

By 2025, graph technologies will be used in 80% of data and analytics innovations, up from 10% in 2021, facilitating rapid decision making across the organization



Key Differentiators Of OpenBOM™ Platform



PARTNERS



OEM1



TIER1 n SUPPLIERS



CUSTOMERS

