

MIKS ON HEA HOIDA EHITUSPROJEKTI ANDMEID JA MUDELEID AUTODESKI PILVELAHENDUSTES?

*Autodesk ACC ja Forge API võimaluste ülevaade.
ACC mudeli ja ehitusprojekti andmete visualiseerimine
Power BI-ga ja Excelis.*

DIGITAALEHITUSE KLASTRI POWER BI PILOOTPROJEKT

28.04.2021



Digitaalehituse
Klaster

Kristel Uibo



- Asutatud 1991a.
- 20 spetsialisti ning konsultanti.
 - CAD/BIM ja äritarkvara lahendused;
 - Koolitused ja konsultatsioon;
 - Ehituse- ning tootmise andmete juhtimine ja visualiseerimine;
 - IT tugiteenused.



Specialization
Architecture, Engineering &
Visualization

Value Added Services
Authorized Training Center
Authorized Certification
Center

SISUKORD

AUTODESK CONSTRUCTION CLOUD

<https://construction.autodesk.com/>



28.01.2021 | Lühikoolitused 2021

4



AUTODESKI ACC RAKENDUSED

[Veebilink Autodeski kodulehele](#)



28.01.2021 | Lühikoolitused 2021

6



MUUD ACC RAKENDUSED

<https://forge.autodesk.com/customers>



28.01.2021 | Lühikoolitused 2021

10



AUTODESK FORGE

<https://forge.autodesk.com>



28.01.2021 | Lühikoolitused 2021

17



ACC MUDELID JA PROJEKTID EXCELIS JA POWER BI-S

[Link veebirakendusele](#)



28.01.2021 | Lühikoolitused 2021

23



SOOVITUSED JA ÕPPETUNNID



28.01.2021 | Lühikoolitused 2021

26



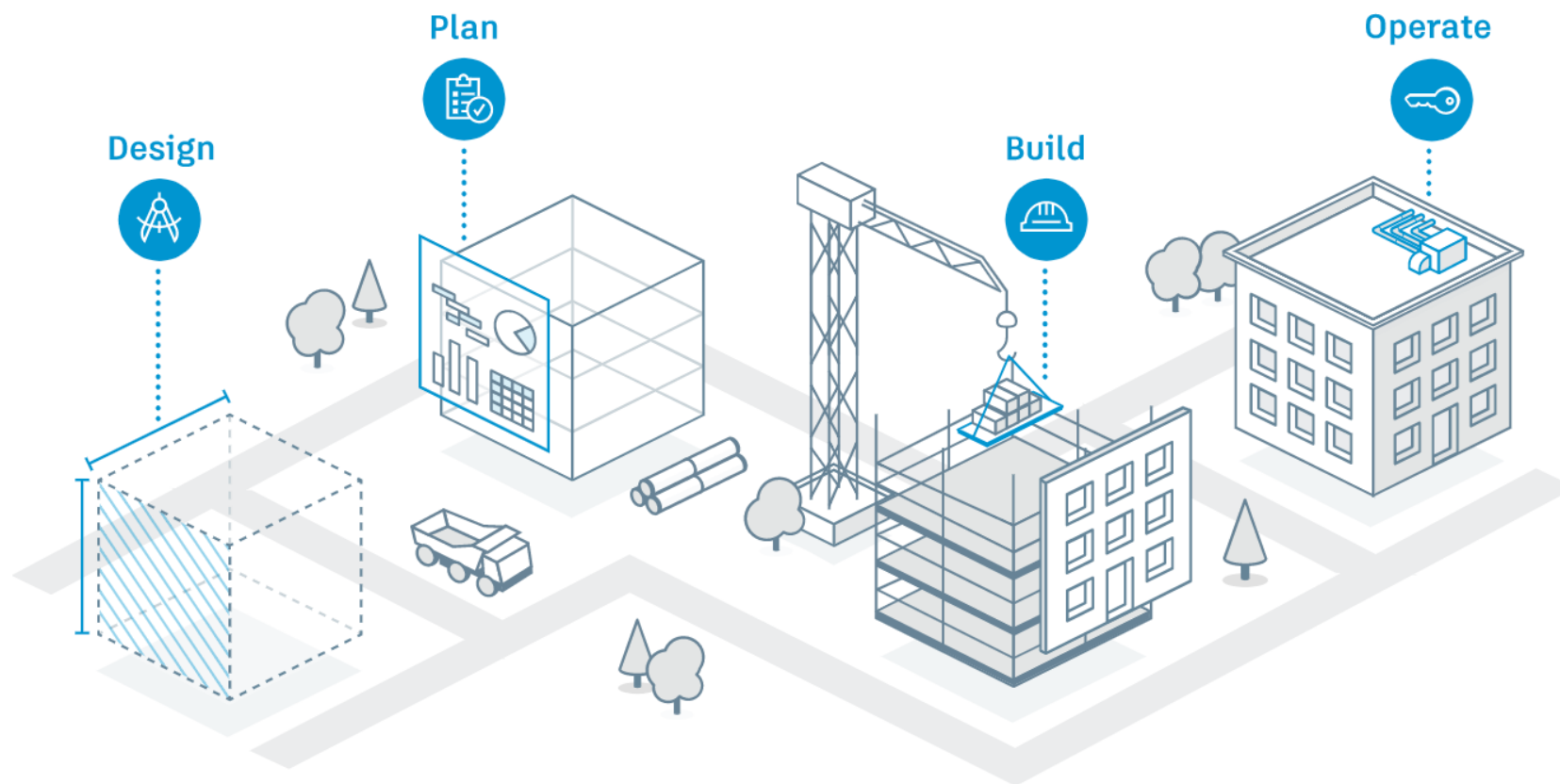
AUTODESK CONSTRUCTION CLOUD

<https://construction.autodesk.com/>



AUTODESK CONSTRUCTION CLOUD

Autodeski
pilvepõhine
lahendus, mis on
mõeldud
spetsiaalselt
ehitussektorile.



[Veebilink Autodeski kodulehele](#)

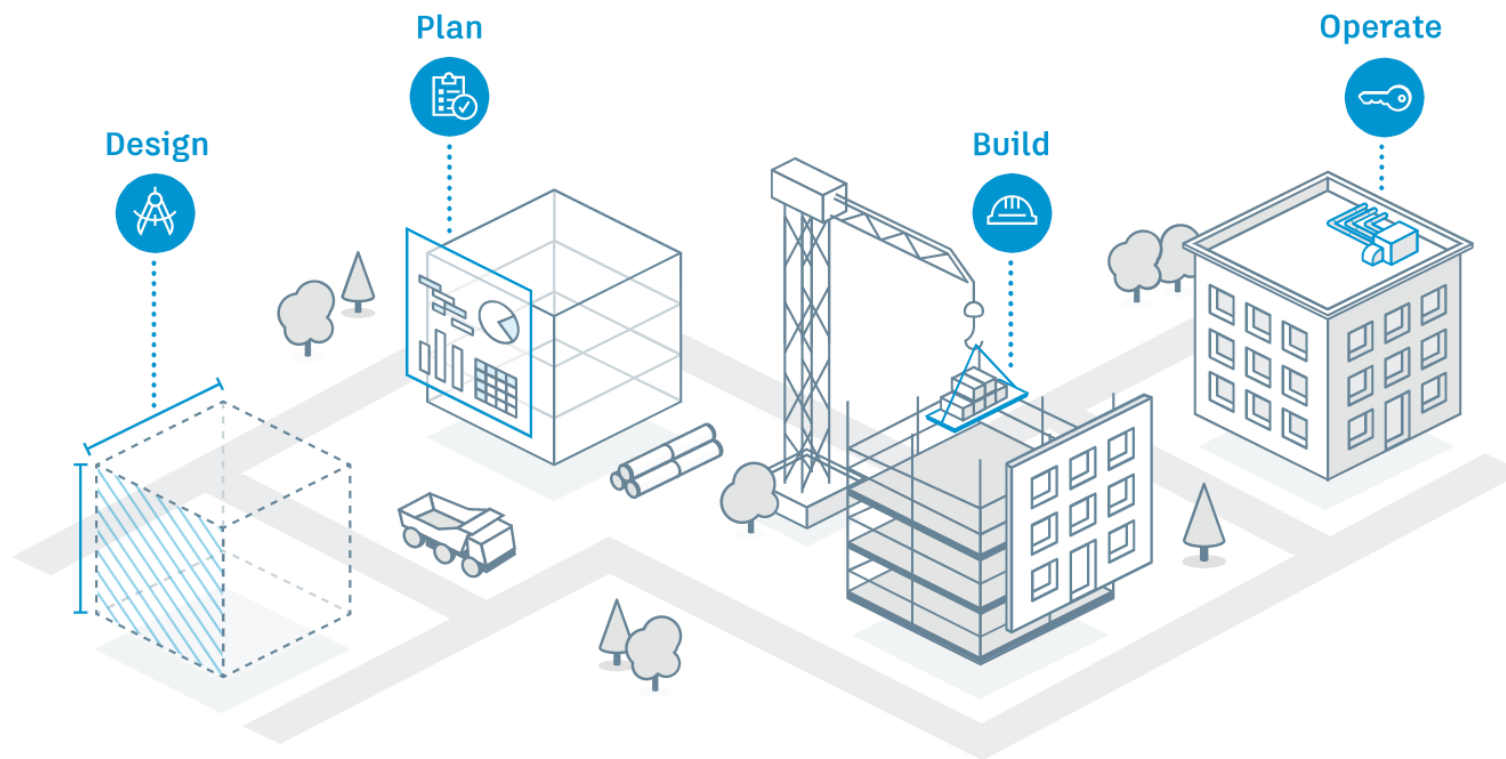
AUTODESKI ACC RAKENDUSED



[Veebilink Autodeski kodulehele](#)

AUTODESK DOCS

Projektipank ehk dokumendihaldussüsteem ehk ühtne infokeskkond ehk Common Data Environment (CDE) lahendus. Igal juhul toimib kui failide talletamise koht ja ka kui kõigi teiste info-voogude kese. Seejuures AEC Collection omanikel on TASUTA komplektiga kaasas.



[Veebilink Autodeski kodulehele](#)
[Mida sisaldab AEC Collection](#)

BIM COLLABORATE JA BIM COLLABORATE PRO

AUTODESK® BIM COLLABORATE

[BIM Collaborate](#) - mõeldud projektis koordineerivale, aga seejuures ehk otseselt ise mitte BIM tarkvarades projekteerivale osapoollele ja [BIM Collaborate Pro](#) - täis-funktsionaalsusega teenus Revit ja Civil 3D professionaalile, kes vajab (distsantsilt) üheaegselt osamudelites koostöö tegemise võimekust.

**Docs**

- 50+ avatavat faili-formaati
- Põjalik ligipääsuõiguste haldus
- 2D ja 3D võrdlus
- Veateated ja märkmed otse sisule



**Model Coordination**

- Automaatne ristumiste kontroll
- Ristumiste grupeerimine
- Koordinaatsiooni kohased veateated



**Design Collaboration**

- Sisukomplektide süsteemne publitseerimine
- Ülevaatuste teostamine & projekti jagamine
- Visuaalne versioonivõrdlus
- Projekteerimise veateated ja nende haldus





AUTODESK® BIM COLLABORATE PRO

LISAKS SISALDAB

Revit Cloud Worksharing

- Distsantsilt projektis osalemine
- Pilvepõhiselt projektmeeskonnas üheaegse koosöö teostamine



Collaboration for Civil 3D

- Projektide haldamine pilves
- Loo & kaasa *Data Shortcuts*-e
- Automaatne failide lukustamine



[Linkedin-i artikkel: Autodeski uuendused pilvepõhiseks koostööks projekteerimisel](#)

JA VEEL MITMEID AUTODESKI ENDA RAKENDUSI

The screenshot displays the Autodesk Construction Cloud website. At the top, the header includes the Autodesk logo, the text 'AUTODESK CONSTRUCTION CLOUD™', a phone number '+44 1344 596130', a 'LOG IN' link with a dropdown arrow, and a blue 'TRY NOW >' button. Below the header is a navigation bar with links for 'PRODUCTS', 'SOLUTIONS', 'CUSTOMERS', 'RESOURCES', and 'PRICING'. The main content area is divided into two columns. The left column, with a blue background, is titled 'Featured Products' and lists four products: 'Autodesk Build' (Field and project management software for builders), 'Autodesk BIM Collaborate' (Design collaboration and model coordination software for design and VDC teams), 'Autodesk Takeoff' (2D and 3D Takeoff software for estimators), and 'BuildingConnected' (Bid Management software for owners and builders). At the bottom of this column is a link for 'All Products'. The right column is titled 'Construction Workflows' and is organized into four categories: 'Design' (with a compass icon, listing 'Design Authoring' and 'Design Collaboration'), 'Plan' (with a checklist icon, listing 'Coordination', 'Model Conditioning', 'Quantification', 'Bid Management', and 'Qualification'), 'Build' (with a hard hat icon, listing 'Project Management', 'Cost Management', 'Field Collaboration', 'Quality Management', 'Safety Management', and 'Project Closeout'), and 'Operate' (with a key icon, listing 'Facilities Management'). Below these workflows is a section titled 'Construction Platform' with four sub-links: 'Document Management', 'Administration', 'Insights', and 'Integrations'.

AUTODESK CONSTRUCTION CLOUD™ +44 1344 596130 LOG IN TRY NOW >

PRODUCTS SOLUTIONS CUSTOMERS RESOURCES PRICING

Featured Products

- Autodesk Build**
Field and project management software for builders
- Autodesk BIM Collaborate**
Design collaboration and model coordination software for design and VDC teams
- Autodesk Takeoff**
2D and 3D Takeoff software for estimators
- BuildingConnected**
Bid Management software for owners and builders

[All Products](#)

Construction Workflows

Design	Plan	Build	Operate
Design Authoring Design Collaboration	Coordination Model Conditioning Quantification Bid Management Qualification	Project Management Cost Management Field Collaboration Quality Management Safety Management Project Closeout	Facilities Management

Construction Platform

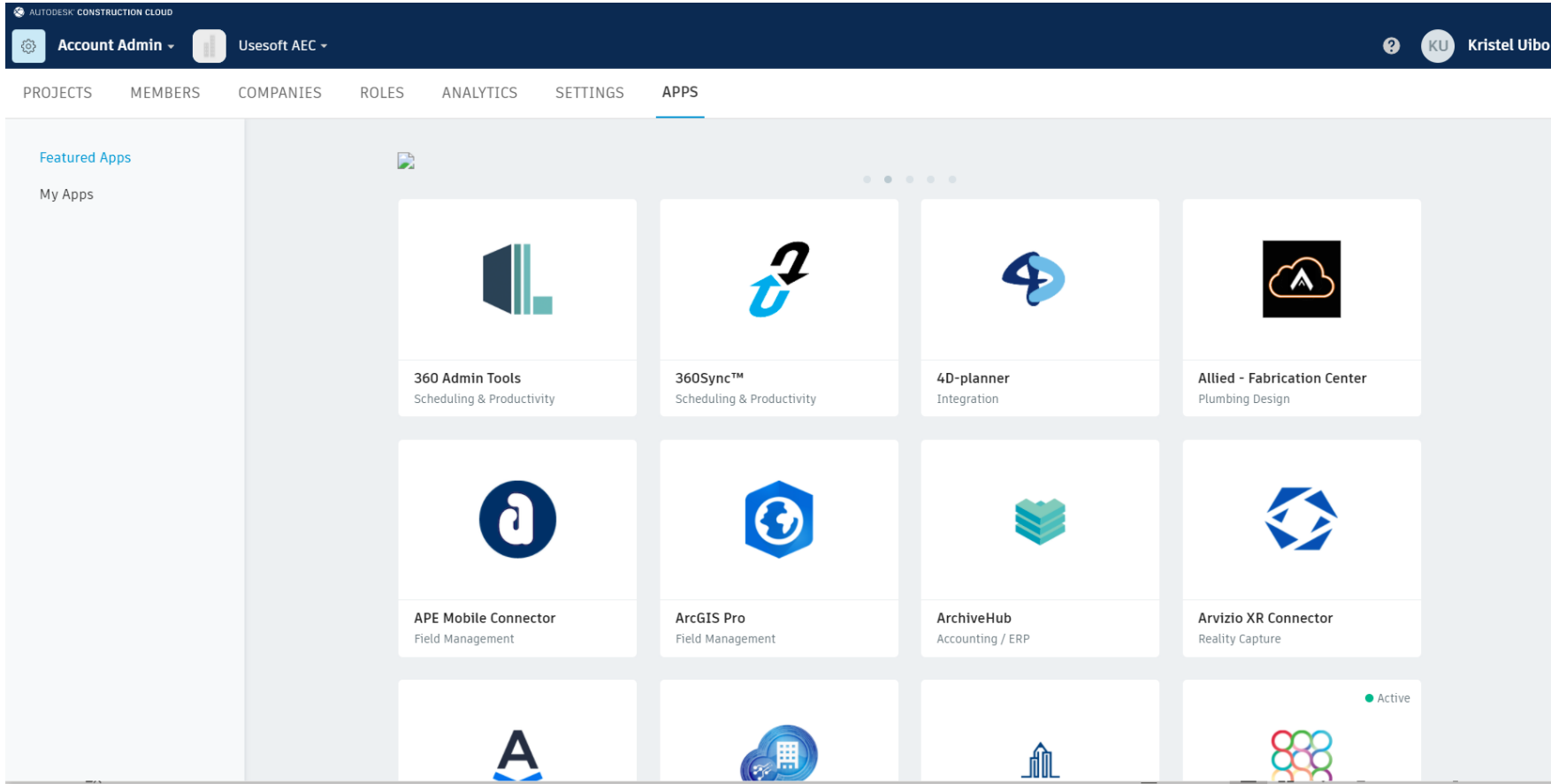
Document Management	Administration	Insights	Integrations
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MUUD ACC RAKENDUSED

<https://forge.autodesk.com/customers>

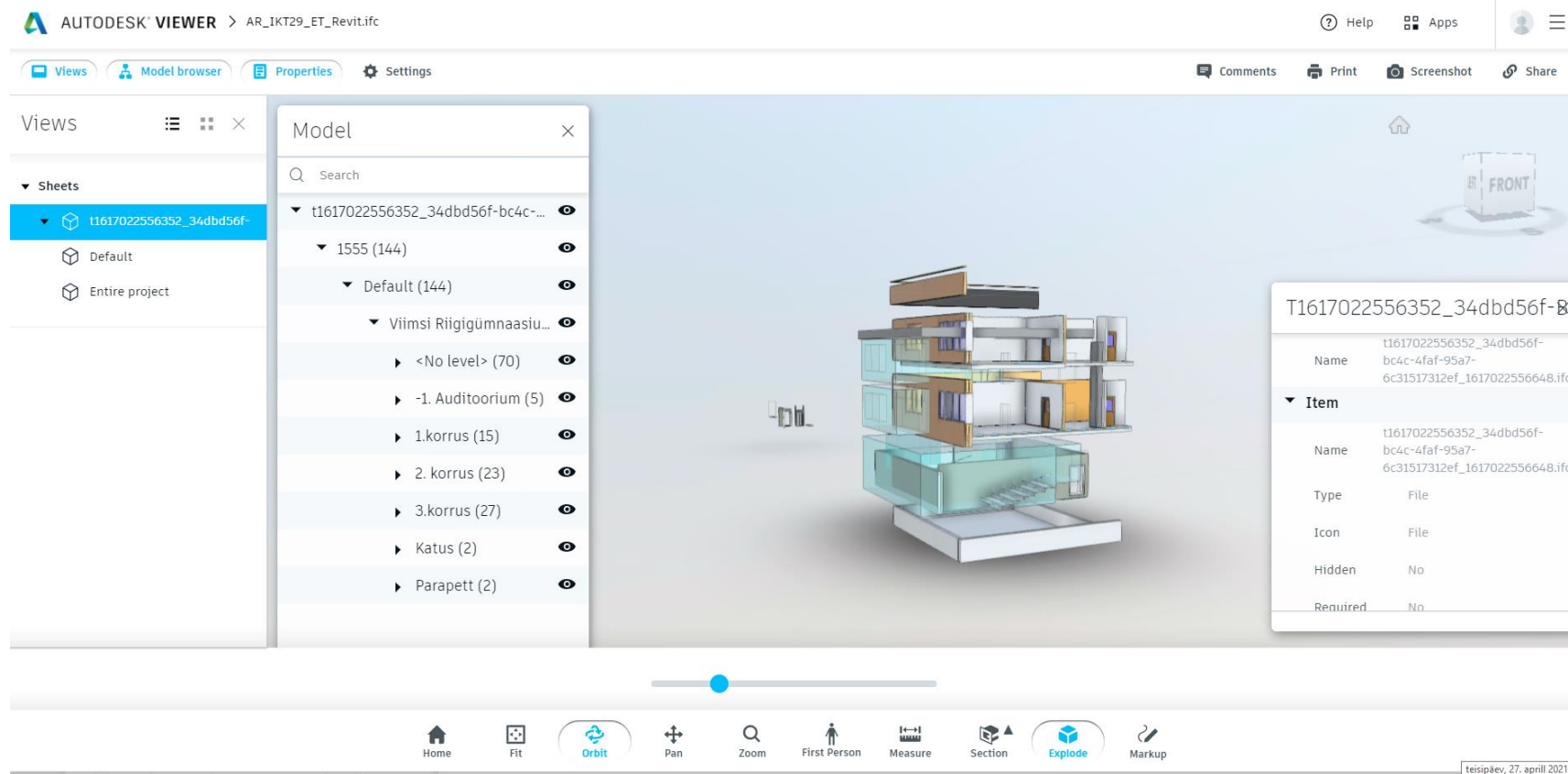


MUUD ACC RAKENDUSED



<https://forge.autodesk.com/customers>
[Forge Partner Talks: BIM Standards & Checking](#)

FORGE VIEWER



<https://viewer.autodesk.com>

https://forge.autodesk.com/en/docs/viewer/v2/developers_guide/overview/

https://forge.autodesk.com/en/docs/viewer/v7/developers_guide/viewer_basics/starting-html

https://forge.autodesk.com/en/docs/model-derivative/v2/developers_guide/supported-translations

NÄITED: V-CAD

Blogic

COMPANY ▾ VCAD ▾ BIM 360® PRICING BLOG LOGIN REGISTER 🔍

You decide how to use Vcad!

VCAD ROOM ANALYSIS

Color	Type	Count	Area
Instruction	19	1,239,40	
Electrical	9	86,90	
Stair	9	172,90	
Lounge	6	32,120	
Corridor	5	560,20	
Conference	4	180,20	
Men	4	47,00	
Women	4	47,30	
Office	3	55,70	
Computer Lab	3	159,80	
Lobby	3	935,00	
Toilet	3	16,80	
Copy/Print	2	44,00	
Media Review	2	56,70	
Totale	91	4,648,80	

Color	name	Area
Admin 126 [177311]		15,70
Administration 229 [215177]		40,40
Administration 322 [216463]		58,80
Advisors 324 [216487]		50,20
Cafeteria 224 [215167]		34,90
Cafeteria 121 [177305]		147,00
Totale		4,648,80

Master View

Room Type Color

Entry Level

02 - Floor

03 - Floor

4,65K
Selected Area

91
Selected Rooms

4,65K
Total Area

91
Count of Rooms

SPACES ANALYSIS

Full extraction of all spaces and information on areas and volumes.

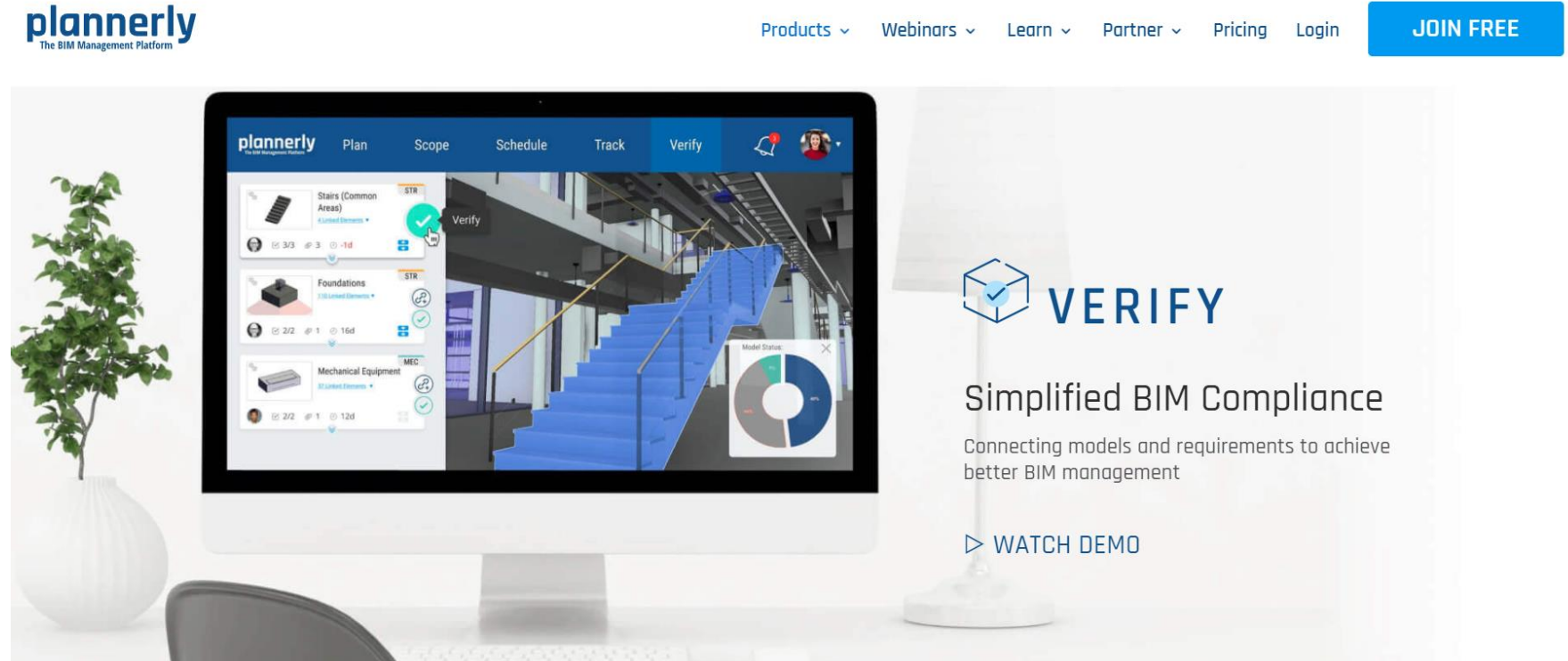
Power BI

AUTODESK® FORGE

<https://www.bimservices.it>

NÄITED: PLANNERLY VERIFY

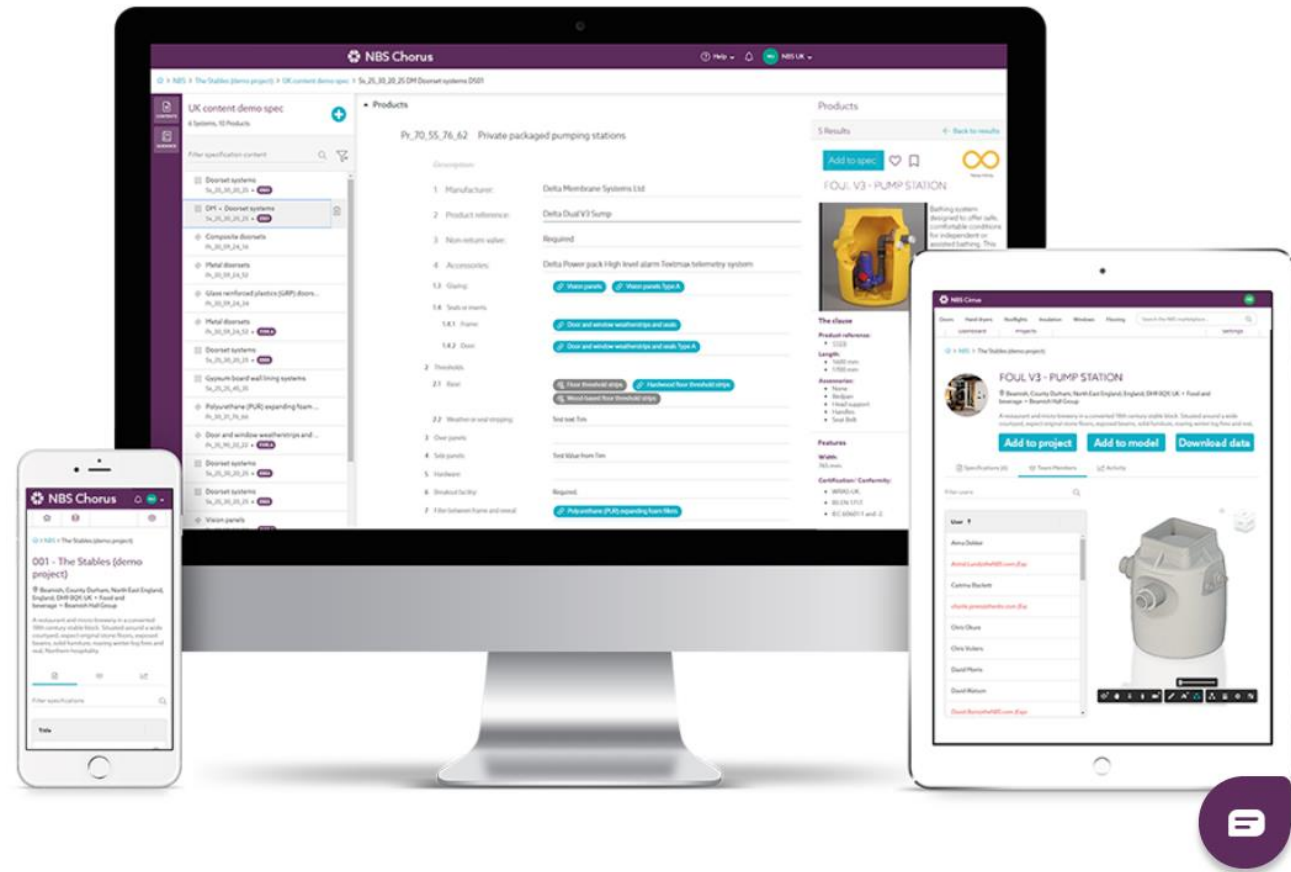
Aitab
visualiseerida
infonõudeid
mudeli konteksti.



<https://www.plannerly.com/verify>

NÄITED: NBS CHORUS

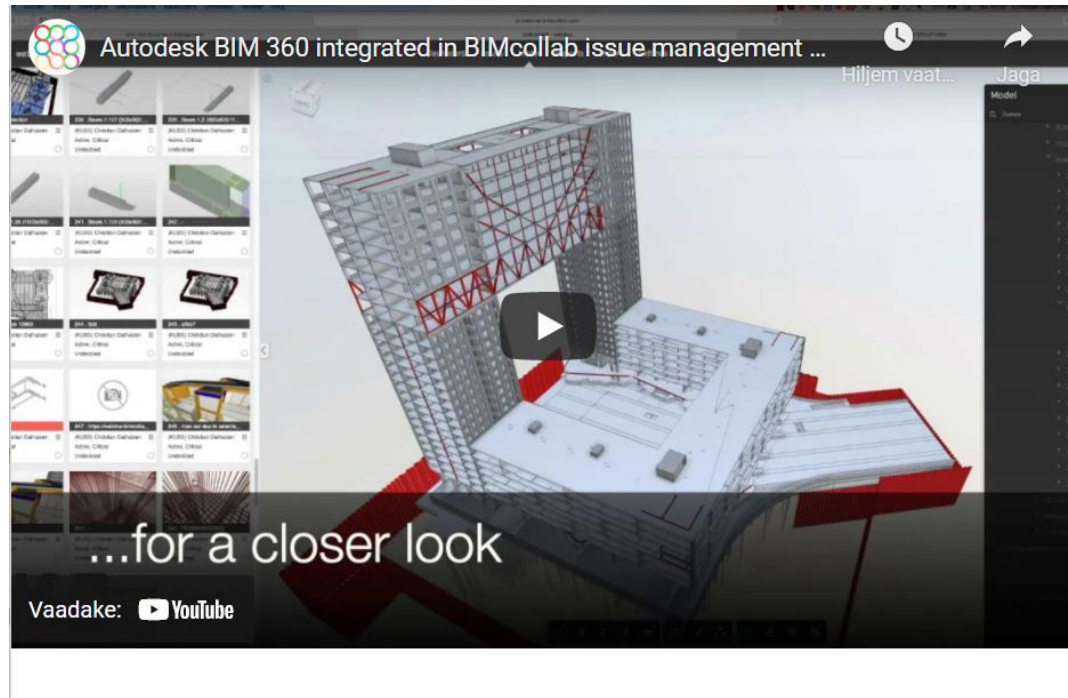
Aitab
spetsifikatsioonide
(eg seletuskirja)
sidumisel otse native
mudeliga (Forge)



<https://www.thenbs.com/nbs-chorus>

NÄITED: BIM COLLAB CLOUD

Desktop tarkvara veebiversioon



Connecting BIM teams

The Autodesk BIM360 integration provides BIM teams access to models stored in BIM 360 Docs, directly from the BIMcollab web application. Team members can review the federated model, create issues or review existing issues without the need for uploading files to a secondary repository or installing a model viewer.

Issues can be looked up or created in the context of the 3D model, wherever you work. They can be retrieved, resolved, created and commented on.

This integration is part of our *Connected Plan* and *Enterprise plan*.

[More about our Connected Plan](#)

<https://www.bimcollab.com/en/products/bimcollab-cloud/software-connected/bim-360-docs-integration>

AUTODESK FORGE

<https://forge.autodesk.com>



MIS ON AUTODESK FORGE

Autodesk FORGE on API-d, mis aitavad kasutada erinevates rakendustes mudelite ja ehitusinfo andmeid.

On leidnud rakendust näiteks:

- andmete analüüsil ja visualiseerimisel;
- digitaalse teisiku loomisel;
- liit- ja virtuaalse reaalsuse rakendustes;
- SaaS liidestamisel;
- erinevate kataloogide;
- Konfiguraatorite;
- disaini automatiseerimise;
- ja fotode 3D-ks viimisel.

<https://forge.autodesk.com>

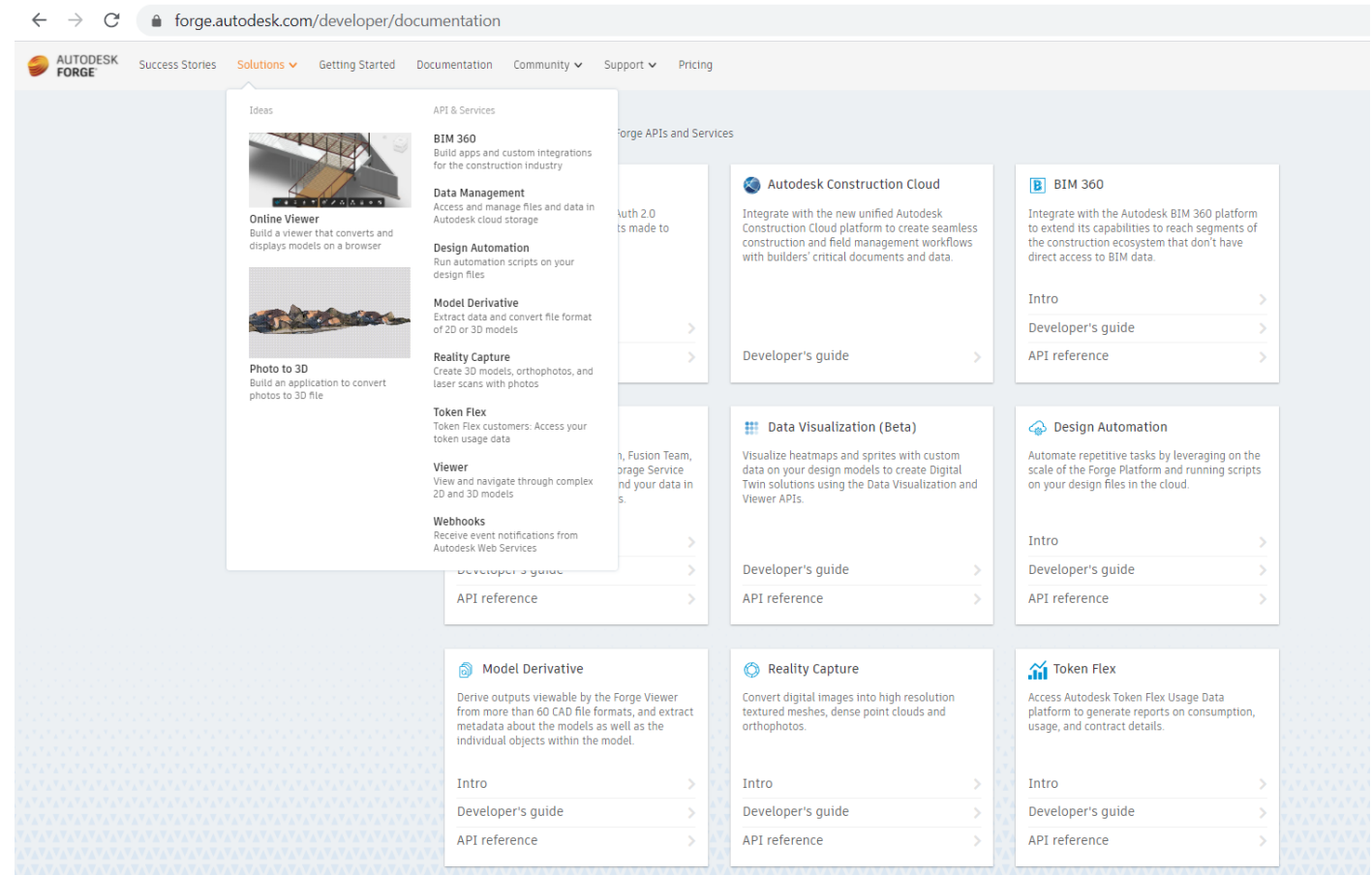


AUTODESK FORGE®

AUTODESK FORGE API-D

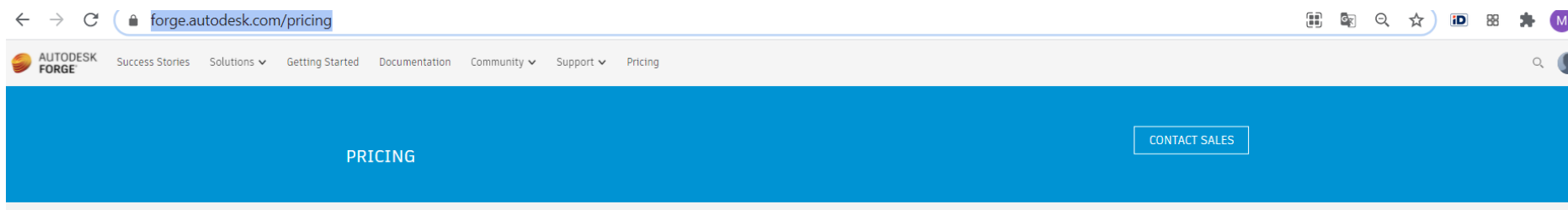
- Authentication;
- Autodesk Construction Cloud;
- BIM 360;
- Data Management;
- Data Visualization;
- Design Automation;
- Model Derivative,
- Reality Capture;
- Token Flex;
- Viewer;
- Webhooks.

<https://forge.autodesk.com/developer/documentation>



AUTODESK FORGE HINNASTUS

100 USD aastas
+ Cloud Credits



Forge APIs and Cloud Credits

APIs and services	Costs	Info
BIM 360 APIs	No additional cost	With trial or subscription
Data Management API	No additional cost	With trial or subscription
Viewer	No additional cost	With trial or subscription
Webhooks API	No additional cost	With trial or subscription
Design Automation API	4.0 6.0	Cloud Credits / processing hour (AutoCAD) Cloud Credits / processing hour (non-AutoCAD)*
Model Derivative API	1.5 0.2	Cloud Credits / complex jobs Cloud Credits / simple job
Reality Capture API	3.5	Cloud Credits per gigapixel processed
TokenFlex API**	No additional cost	With trial or subscription

*Cloud credits expire after 12 months.

**TokenFlex API is usable by enterprise customers only

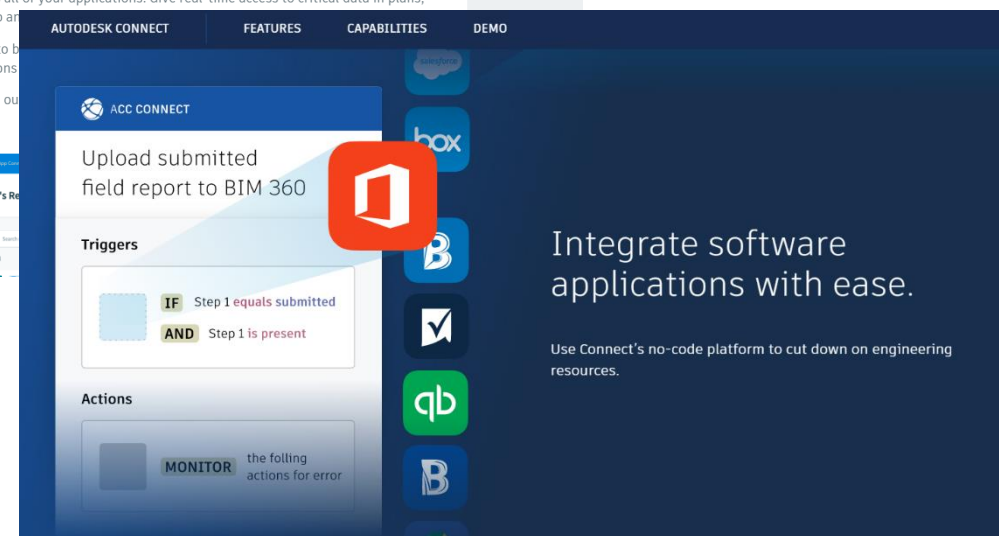
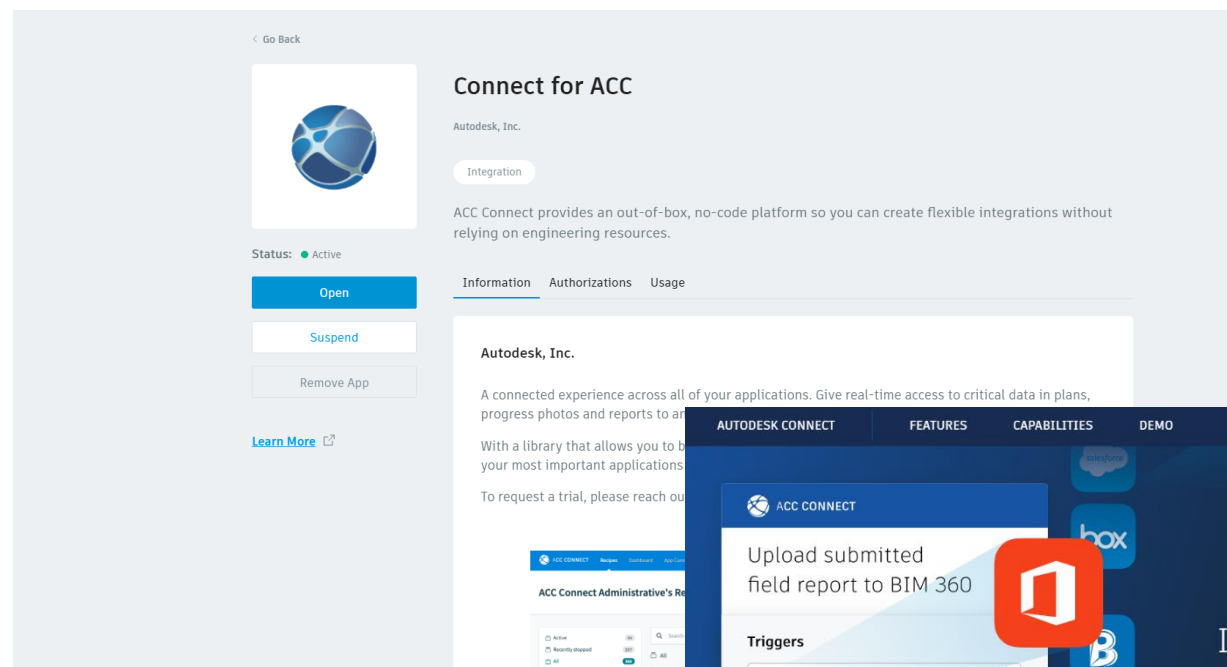
All prices shown in US dollars. Forge trial and cloud credits are available worldwide, subject to the [terms of service](#).

Autodesk will provide Forge API usage equivalent to the number of cloud credits specified above. All cloud credits purchased for or applicable to Forge are currently nontransferable and redeemable for Forge APIs only. Currently, no other Autodesk cloud credits may be used for Forge APIs.

<https://forge.autodesk.com/pricing>

AUTODESK FORGE CONNECT

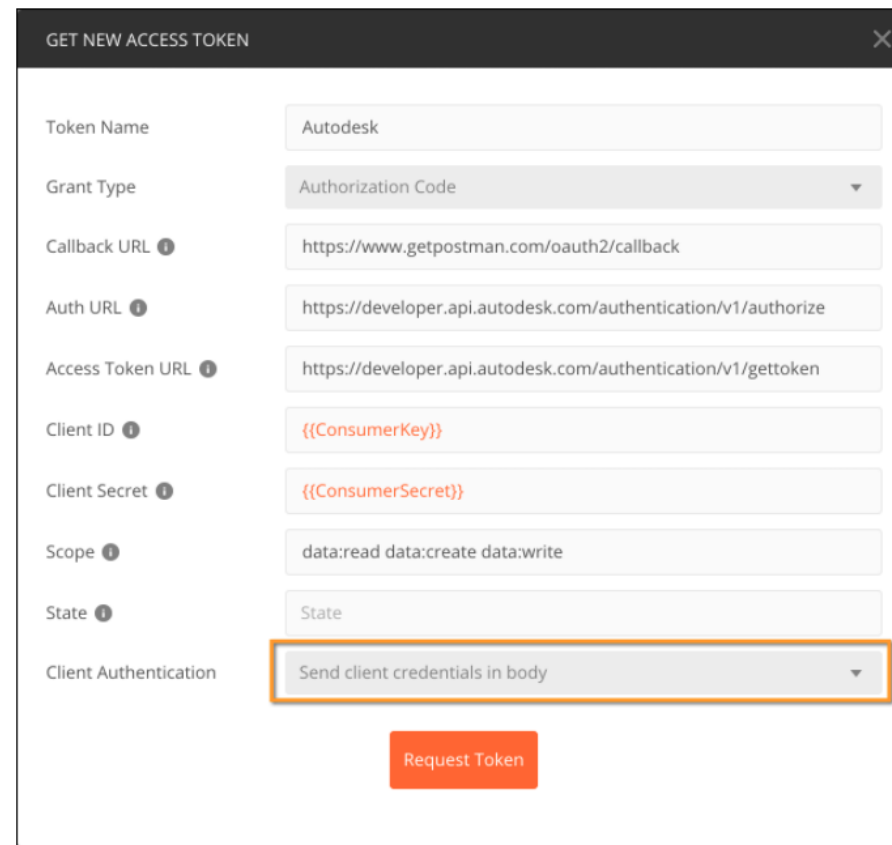
Tasuline lihtsustatud
töövahend ACC pilves
asuvate andmete, mudelite
jne liigutamiseks muudesse
rakendustesse



<https://construction.autodesk.com/products/autodesk-connect>

AUTODESK FORGE TESTI ISE

Testi ise kasutades nt API
kliendi nagu Insomnia või
Postman



GET NEW ACCESS TOKEN

Token Name: Autodesk

Grant Type: Authorization Code

Callback URL: https://www.getpostman.com/oauth2/callback

Auth URL: https://developer.api.autodesk.com/authentication/v1/authorize

Access Token URL: https://developer.api.autodesk.com/authentication/v1/gettoken

Client ID: {{ConsumerKey}}

Client Secret: {{ConsumerSecret}}

Scope: data:read data:create data:write

State: State

Client Authentication: Send client credentials in body

Request Token

<https://insomnia.rest>

[AutodeskForge Tutorial: Using Postman with 3-Legged OAuth for Prototyping](#)

https://forge.autodesk.com/cloud_and_mobile/2016/06/using-3-legged-oauth-for-forge-apis-with-postman.html

ACC MUDELID JA PROJEKTID

EXCELIS JA POWER BI-S

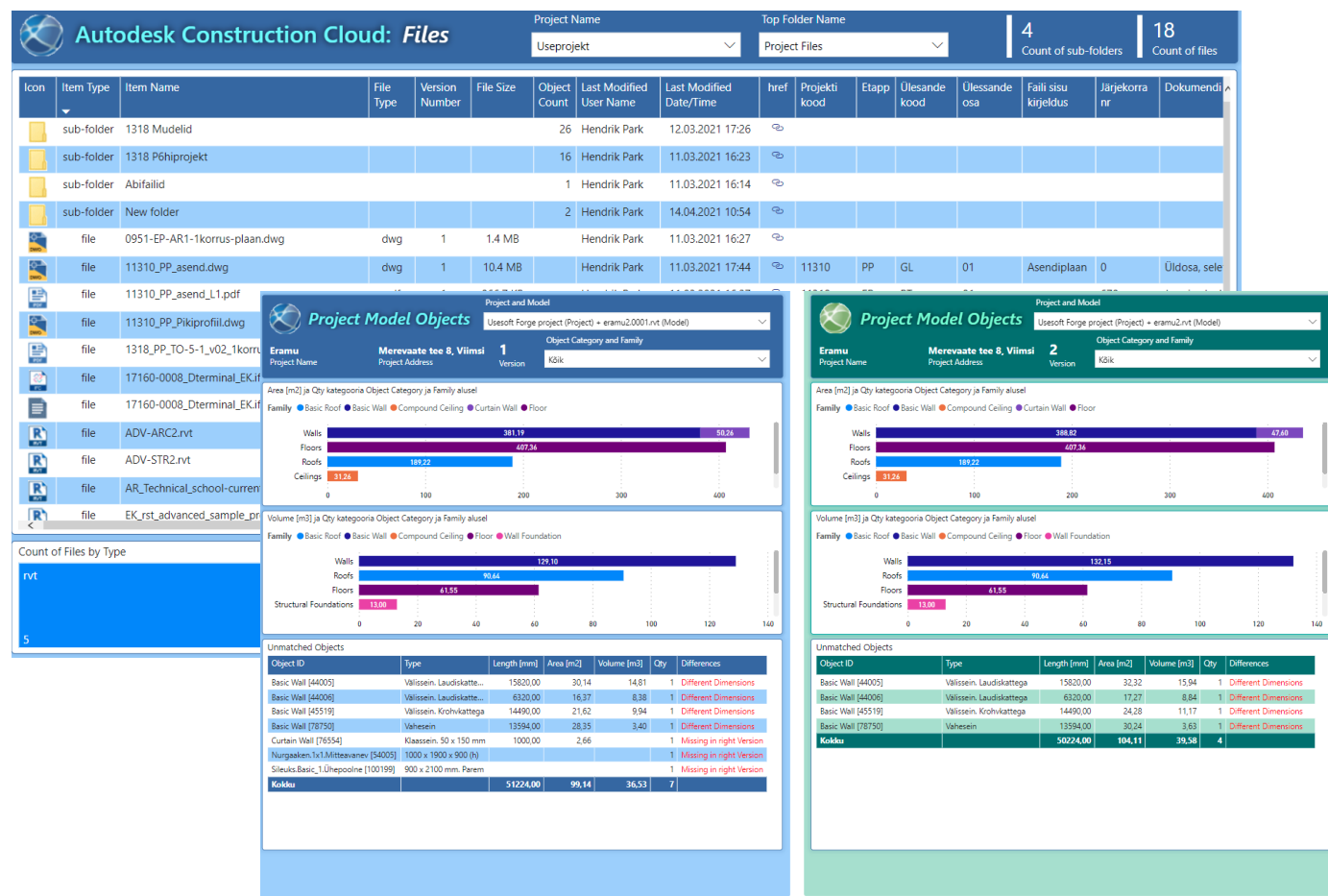


[Link veebirakendusele](#)

ACC MUDELID JA PROJEKTID POWER BI-S

Testisime:

- ACC-s asuvate failide ja folderite ja nendega seotud info kättesaadavust;
- Reviti mudelite andmete ja versioonide kättesaadavust.

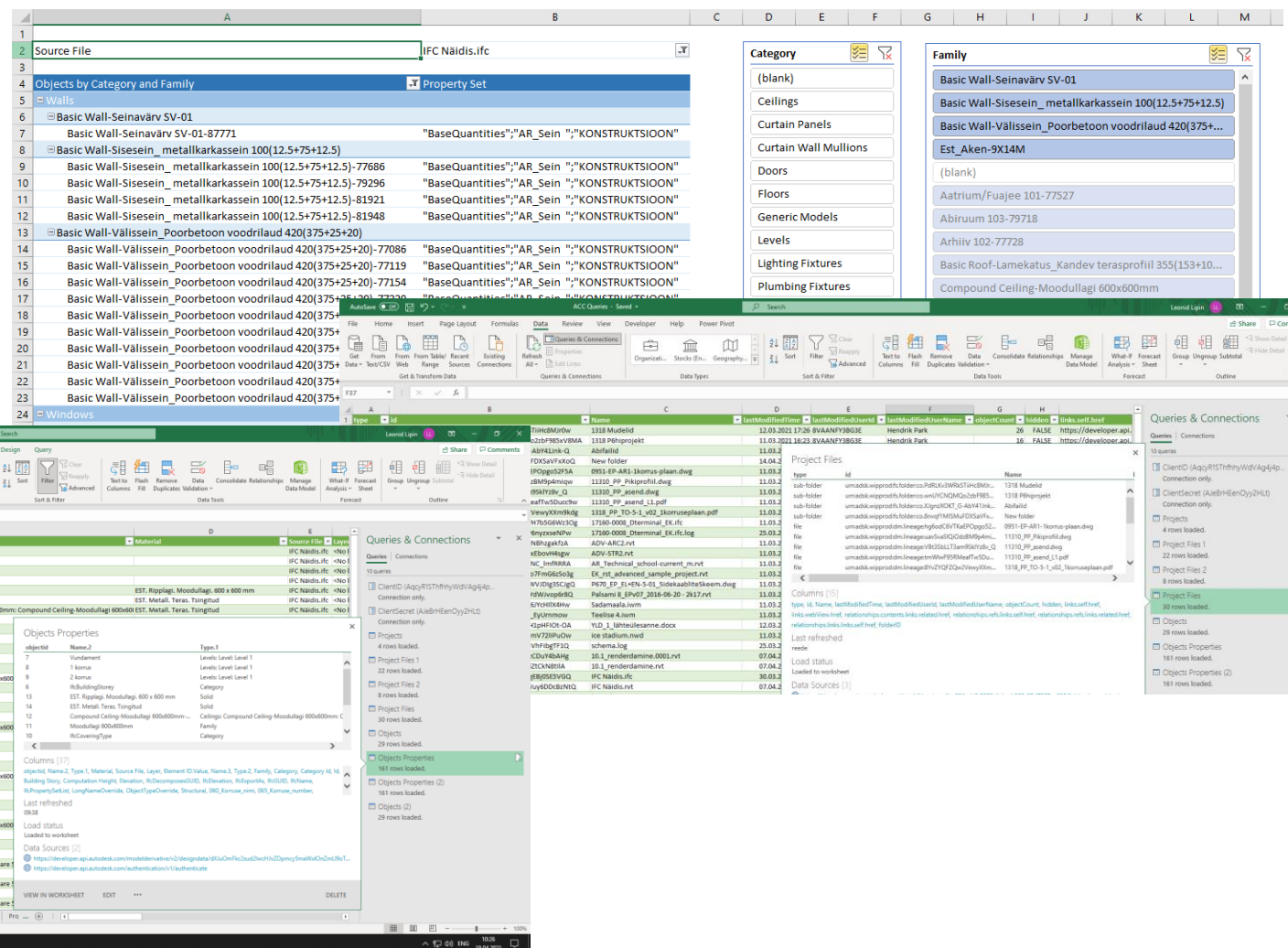


[Link veebirakendusele](#)

ACC MUDELID JA PROJEKTID EXCELIS

Testisime:

- ACC-s asuvate failide ja folderite ja nendega seotud info kättesaadavust;
- IFC ja Reviti mudelite andmete kättesaadavust.



SOOVITUSED JA ÕPPETUNNID

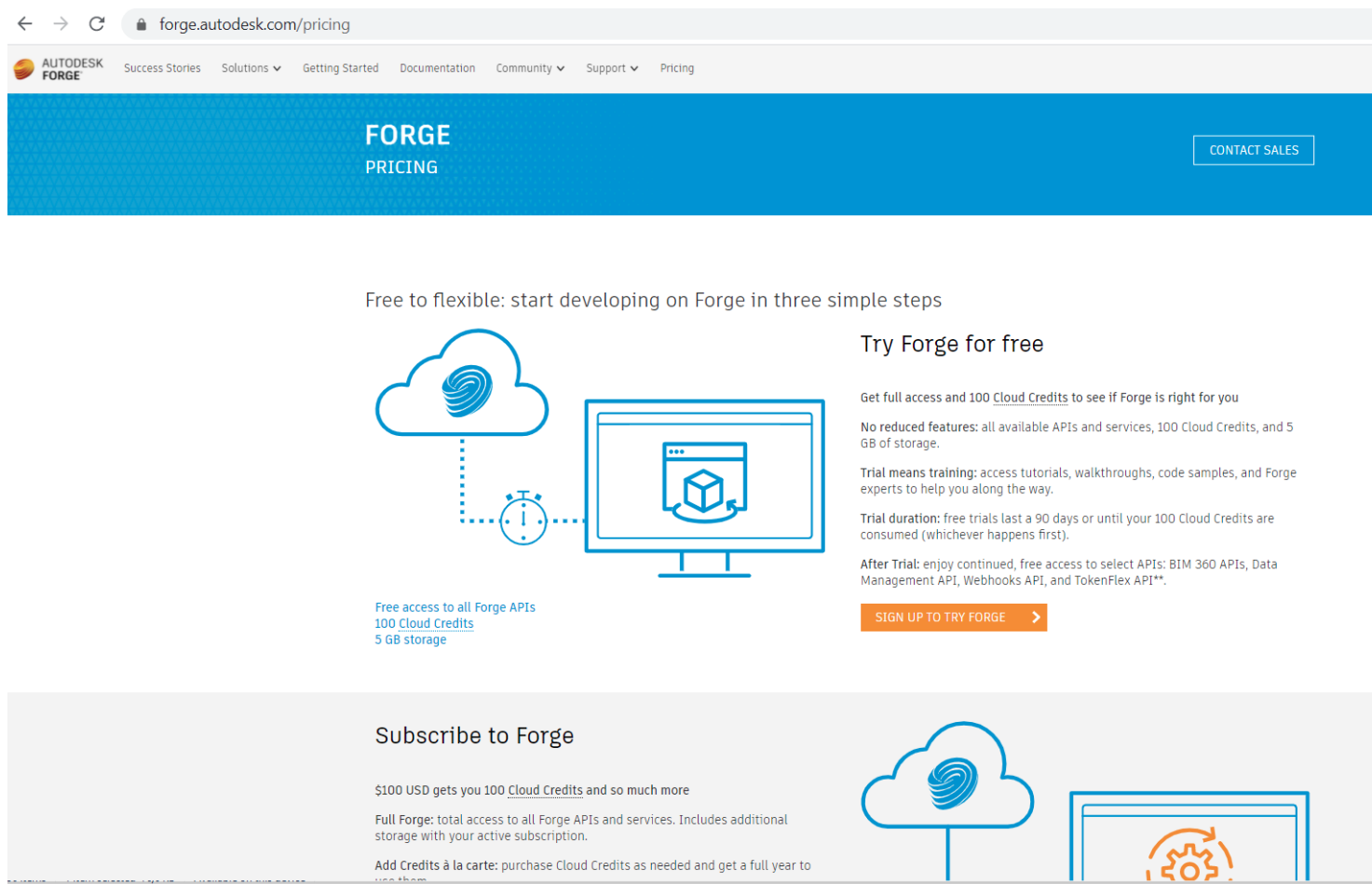


TÖÖVOO SAMMUD



1. Tee Autodesk Forge Trial konto;
2. Loo rakendus ja kinnita see kindlasti oma ACC konto külge;
3. Uuri millist Forge API-d tahad kasutada;
4. Sisesta Power BI desktop/service rakendusse API request/veebilehe URL;
5. Sisesta Client ID and Client Secret;
6. Loo andmemudel ja muuda andmed visualiseeritavaks (Power Query Editor)

AUTODESK FORGE TRIAL KONTO



The screenshot shows the Autodesk Forge Pricing page. At the top, the URL is forge.autodesk.com/pricing. The navigation bar includes links for Success Stories, Solutions, Getting Started, Documentation, Community, Support, and Pricing. The main header features the 'FORGE PRICING' text and a 'CONTACT SALES' button. The content area is divided into two main sections: 'Free to flexible: start developing on Forge in three simple steps' and 'Subscribe to Forge'.

Free to flexible: start developing on Forge in three simple steps

Try Forge for free

Get full access and 100 [Cloud Credits](#) to see if Forge is right for you

No reduced features: all available APIs and services, 100 Cloud Credits, and 5 GB of storage.

Trial means training: access tutorials, walkthroughs, code samples, and Forge experts to help you along the way.

Trial duration: free trials last a 90 days or until your 100 Cloud Credits are consumed (whichever happens first).

After Trial: enjoy continued, free access to select APIs: BIM 360 APIs, Data Management API, Webhooks API, and TokenFlex API**.

[SIGN UP TO TRY FORGE](#)

Free access to all Forge APIs
100 [Cloud Credits](#)
5 GB storage

Subscribe to Forge

\$100 USD gets you 100 [Cloud Credits](#) and so much more

Full Forge: total access to all Forge APIs and services. Includes additional storage with your active subscription.

Add Credits à la carte: purchase Cloud Credits as needed and get a full year to use them



<https://forge.autodesk.com/developer/start-now/signup>

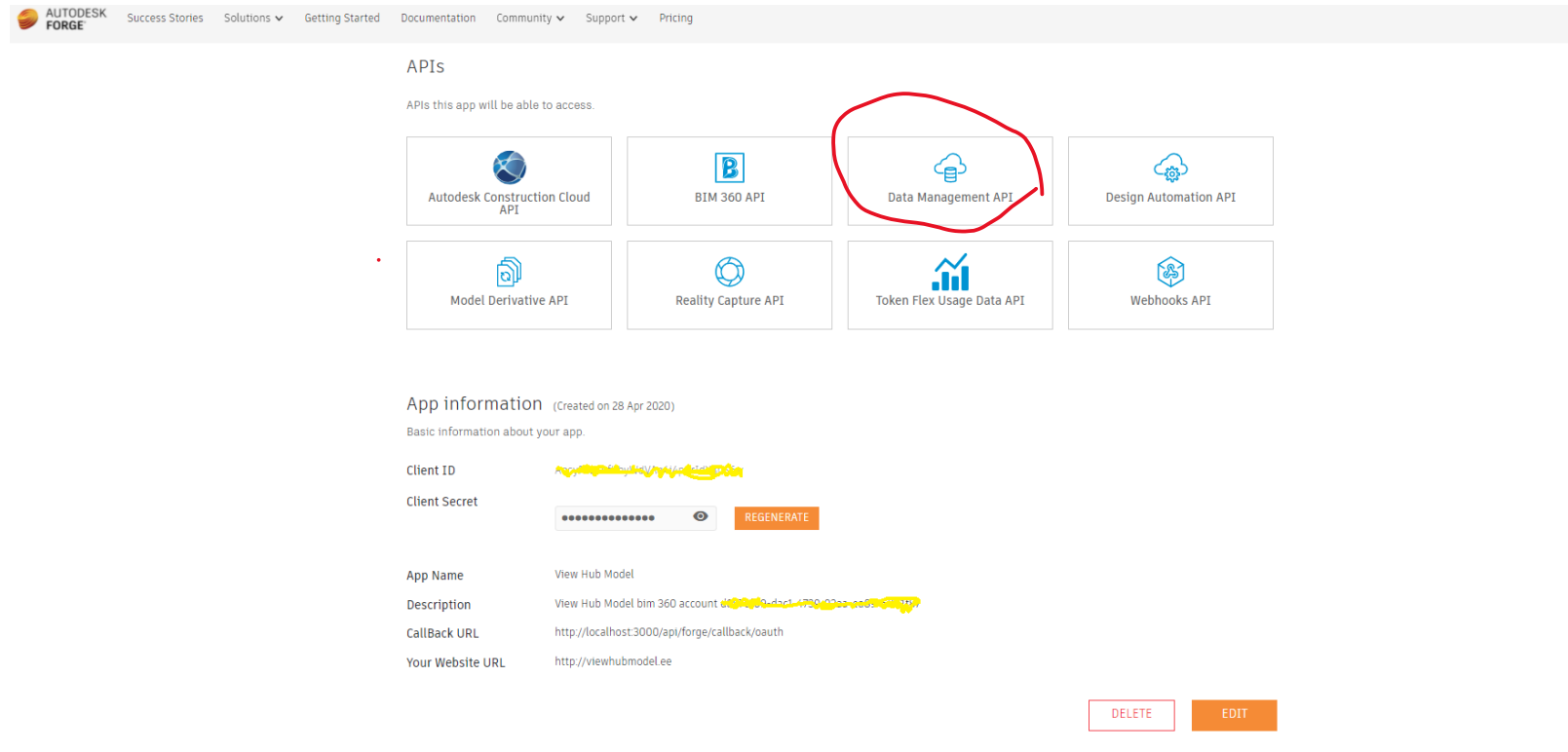
LOO OMA APP JA KINNITA SEE ACC KONTO KÜLGE

The screenshot displays the Autodesk Forge developer portal interface. At the top, the navigation bar includes links for Success Stories, Solutions, Getting Started, Documentation, Community, Support, and Pricing. The main header area features the 'My Apps' title and a 'CREATE APP' button. Below this, two app cards are visible: 'ProdMaster test' (created 27 May 2020) and 'View Hub Model' (created 28 Apr 2020). The 'View Hub Model' card shows a client ID and a client secret. To the right, the 'APIs' section lists available APIs: Autodesk Construction Cloud API, BIM 360 API, Data Management API, Design Automation API, Model Derivative API, and Reality Capture API. The 'App information' section provides details for the 'View Hub Model' app, including its name, description, callback URL, and website URL. A modal window titled 'AUTODESK CONSTRUCTION CLOUD' is open, showing the 'Account Admin' and 'Usesoft AS' tabs. The modal also displays the 'View Hub Model' app card with a 'Details' button and an 'Active' status indicator. The bottom of the modal features an 'Add Custom Integration' button.

<https://forge.autodesk.com/developer/start-now/signup>

UURI MILLIST API-D KASUTADA

Näiteks selleks, et leida kõik ACC kontrol leiduvad projektid:



Selleks on kasuta Data management API meetodit:

https://developer.api.autodesk.com/project/v1/hubs/:hub_id/projects

https://forge.autodesk.com/en/docs/data/v2/reference/http/hubs-hub_id-projects-GET/

SISESTA API REQUEST/VEEBILEHE URL + CLIENT ID AND CLIENT SECRET

Power BI ACC

Power Query – Loo ühendus andmeallikaga

Veebi API Muu

Ühenduse sätted

URL

Ühenduse identimisteave

Kohapealne andmelüüs (pole)

Autentimisliik Anonüümne

APIs

APIs this app will be able to access.

Autodesk Construction Cloud API, BIM 360 API, Data Management API, Design Automation API, Model Derivative API, Reality Capture API, Token Flex Usage Data API, Webhooks API

App information (Created on 28 Apr 2020)

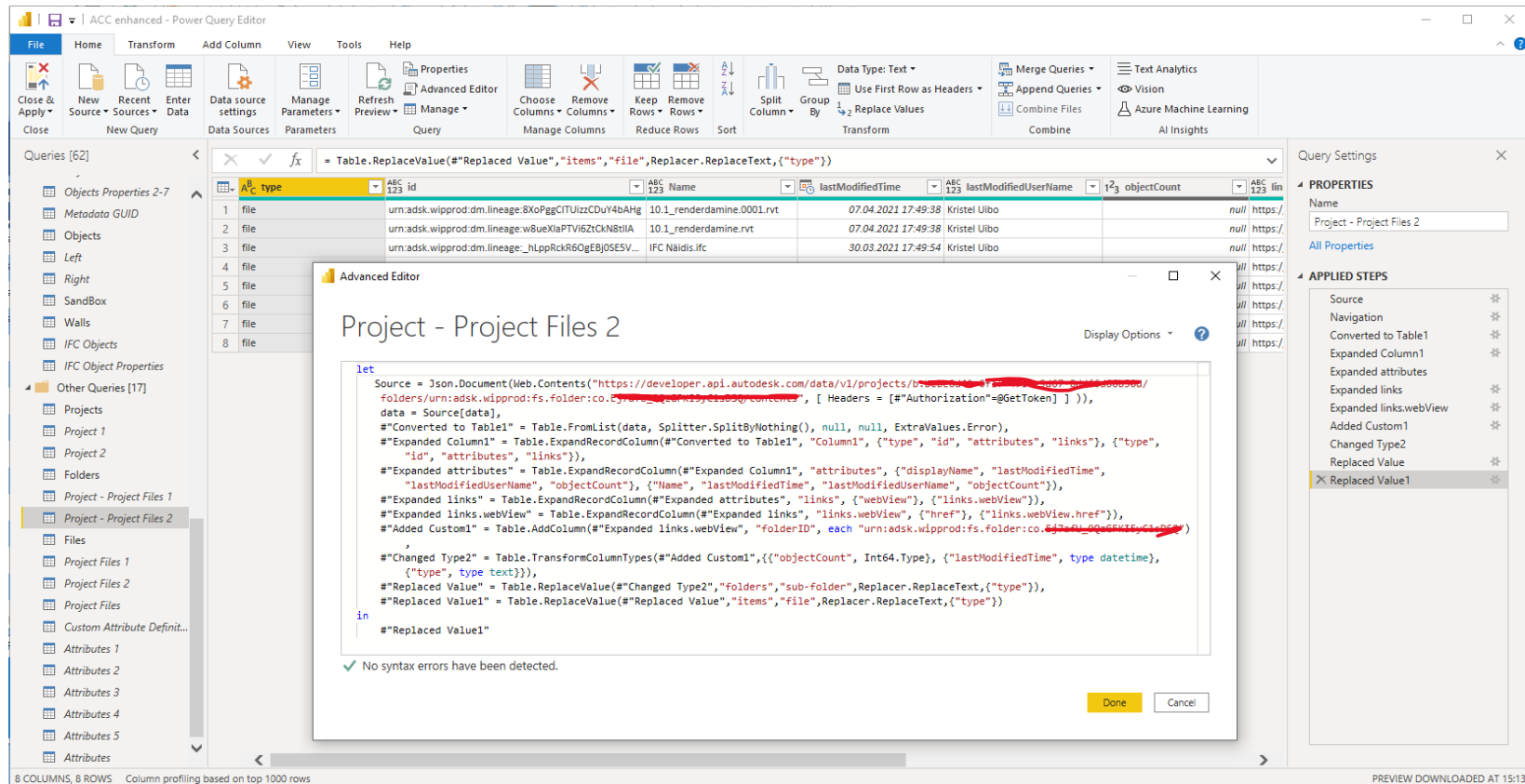
Basic information about your app.

Client ID, Client Secret, App Name, Description, Callback URL, Your Website URL

<https://dev.applicationinsights.io/documentation/Using-the-API/Power-BI>

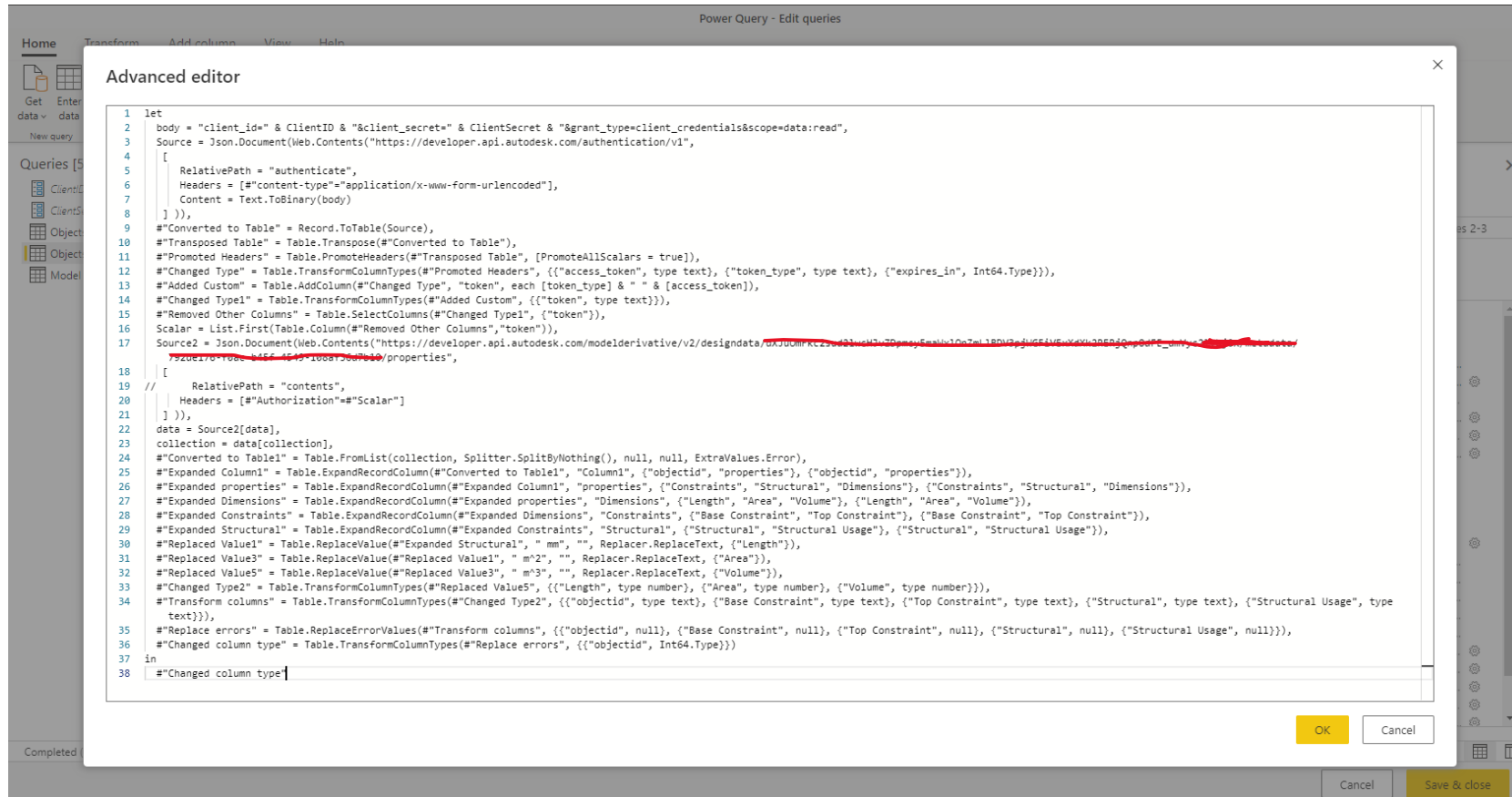
https://forge.autodesk.com/en/docs/data/v2/developers_guide/basics

LOO ANDMEMUDEL JA MUUDA ANDMED VISUALISEERITAVAKS (POWER QUERY EDITOR)



ACC kasutas olevate failide leidmine

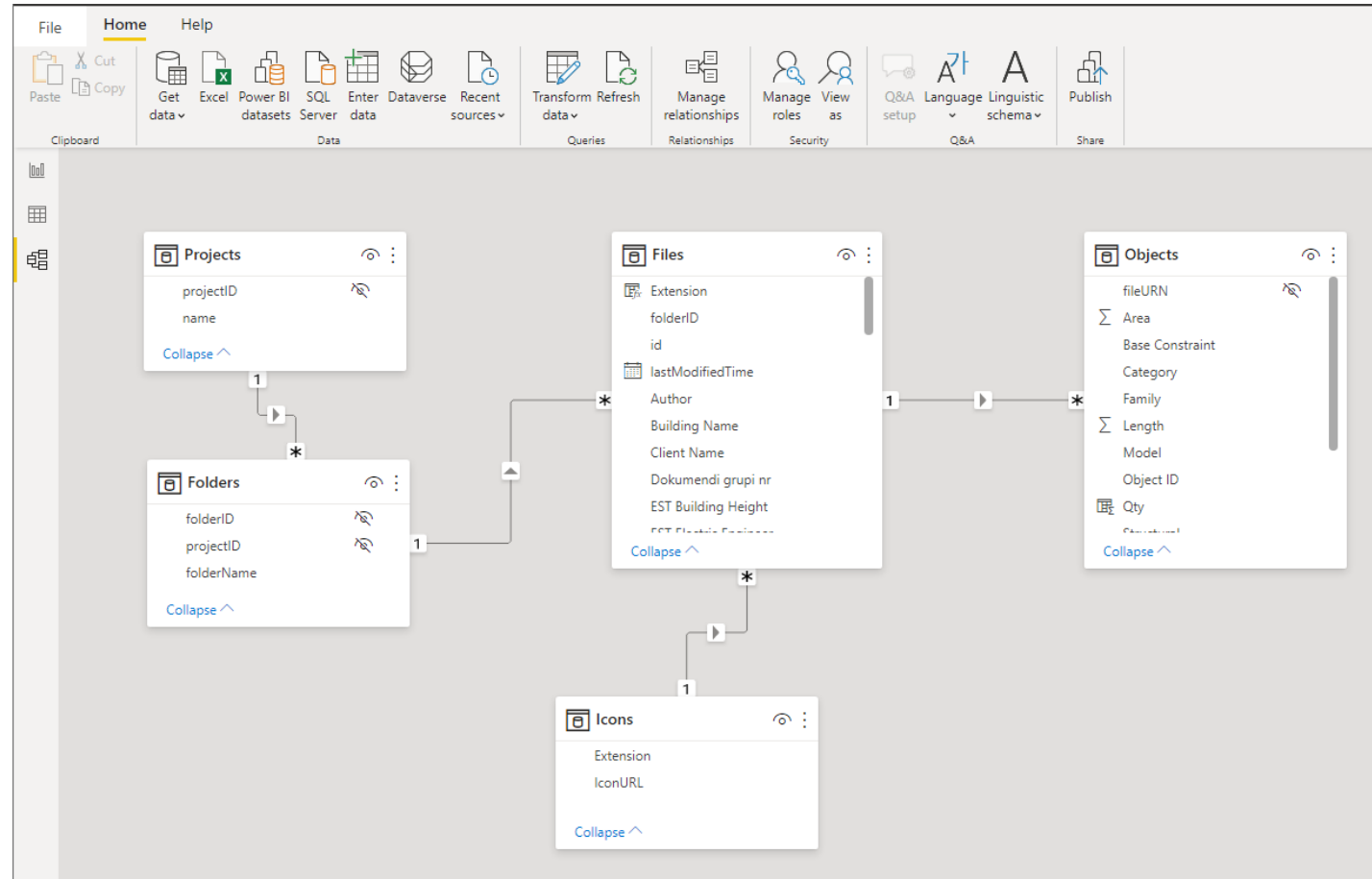
LOO ANDMEMUDEL JA MUUDA ANDMED VISUALISEERITAVAKS (POWER QUERY EDITOR)



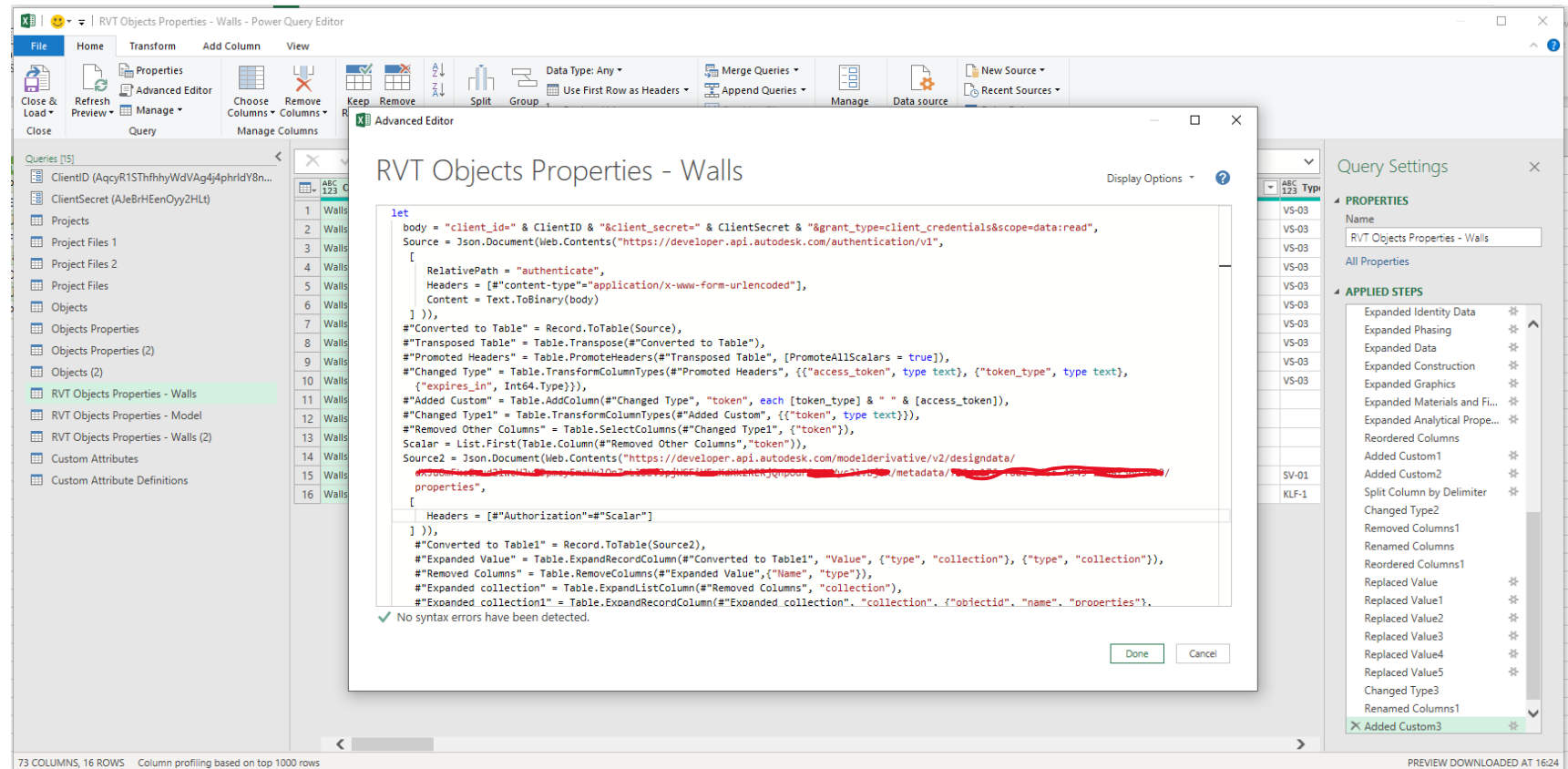
Elementide omaduste leidmine

LOO ANDMEMUDEL JA MUUDA ANDMED VISUALISEERITAVAKS (POWER QUERY EDITOR)

Data Model



LOO ANDMEMUDEL JA MUUDA ANDMED VISUALISEERITAVAKS (POWER QUERY EDITOR)



Elementide omaduste leidmine (MS Excel Power Query Editor)

ÕPPETUNNID



1. Forge app-iga on hea siduda kõik API-d/teenused, iial ei tea mida vajad;
2. Enamus API-sid on loodud BIM 360/Fusion Teams HUB-ile, aga kõik töötavad ka ACC-ga ja ACC Docs on AEC komplekti omanikele tasuta. Loodud rakendus tuleb seostada ACC ja/või BIM 360 kontoga;
3. Hub ID, projekt ID erinevate API-de puhul erinev;
<https://forge.autodesk.com/en/docs/data/v2/reference/http/hubs-GET/>
4. ACC/BIM 360/Fusion Team HUB-i laaditud mudeleid ei pea enam uuesti tõlkima

SEONDUVAD KOOLITUSED

Ehitusprojektis pilvepõhise koostöö korraldamine

<https://usesoft.ee/tooted/koolitustuubid/klassikoolitused/ehitusprojektis-pilvepohise-koostoo-korraldamine/>

BIM mudeli andmete töötuba

<https://usesoft.ee/tooted/koolitused/revit/bim-mudeli-andmete-tootuba>

Digipädevuse kompletkursused

<https://usesoft.ee/digipadevuse-kompletkursused-2021/>

TÄNUD KUULAMAST!

Kui saame andmetega aidata:

kristel@usesoft.ee

+372 50 25 369