

CL₂M with BIM in Infrastructure using Vault, AutoCAD Civil3D & Navisworks

Joschy Rausch

Royal HaskoningDHV, BIM Coordinator - Primary Speaker

@Joschy_Rausch

Class summary

- Practical guide to implement Closed Loop Lifecycle Management in Infrastructural projects with new workflows, e.g. implementing sensor data in Navisworks.

Key learning objectives

At the end of this class, you will be able to:

- Understand the principles of CL₂M and how to use it in various projects.
- Understand the importance of Realtime data in design workflows.
- Use dynamic corridor solids and property data in Autodesk Civil3D.
- Use database tools in Navisworks to link Realtime data from various sources.

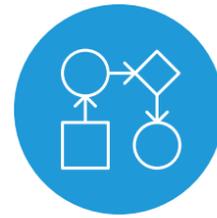
A stylized 3D illustration of a landscape. In the foreground, there's a green field with several trees, some with orange and red foliage. To the left, a factory with two smokestacks is visible, with smoke rising from them. In the background, there are brown mountains with white snow on their peaks. The sky is light blue with a few white clouds. The entire scene is rendered in a soft, painterly style.

Closed Loop Lifecycle Management

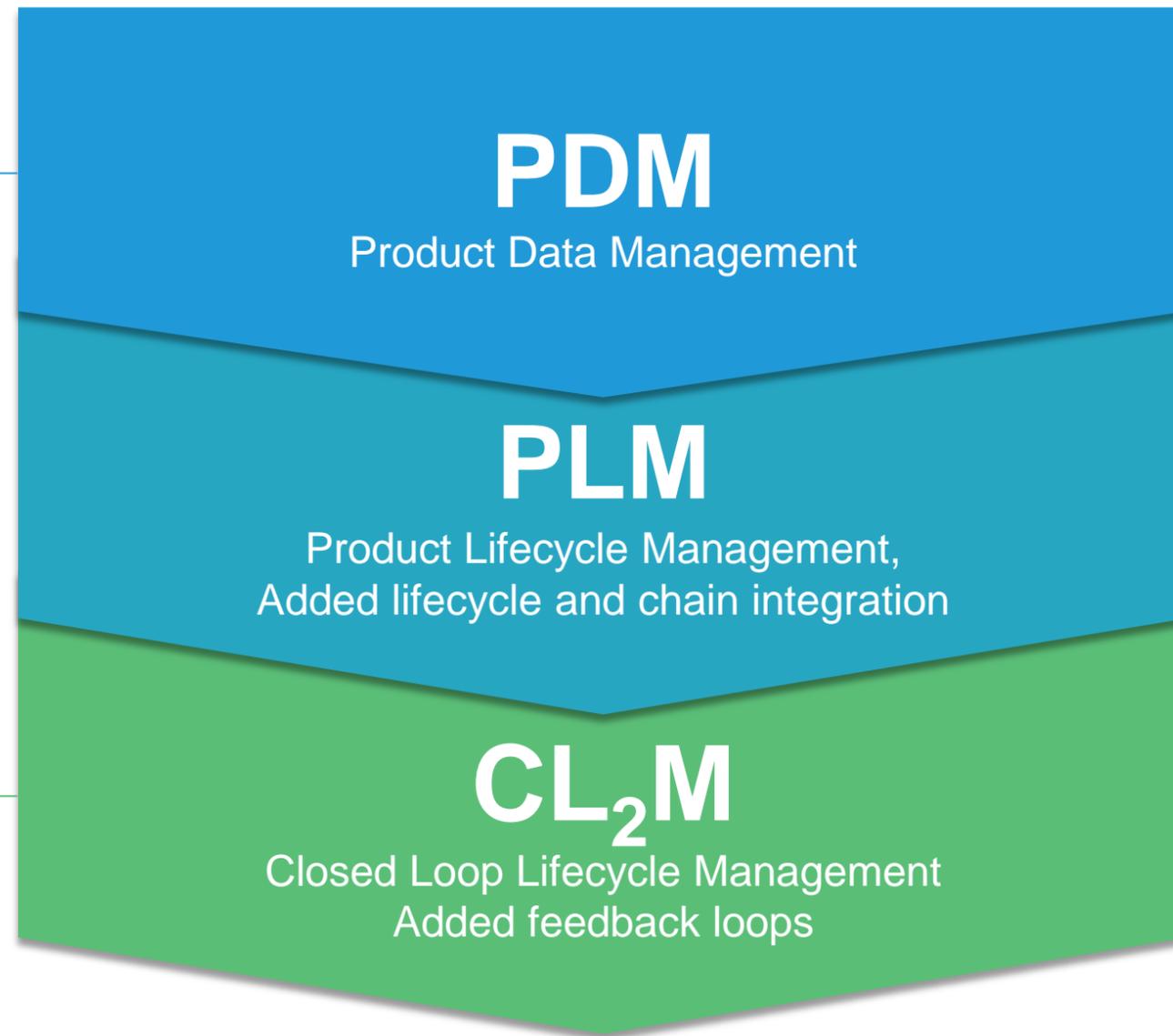
Understand the importance of CL₂M in design workflows

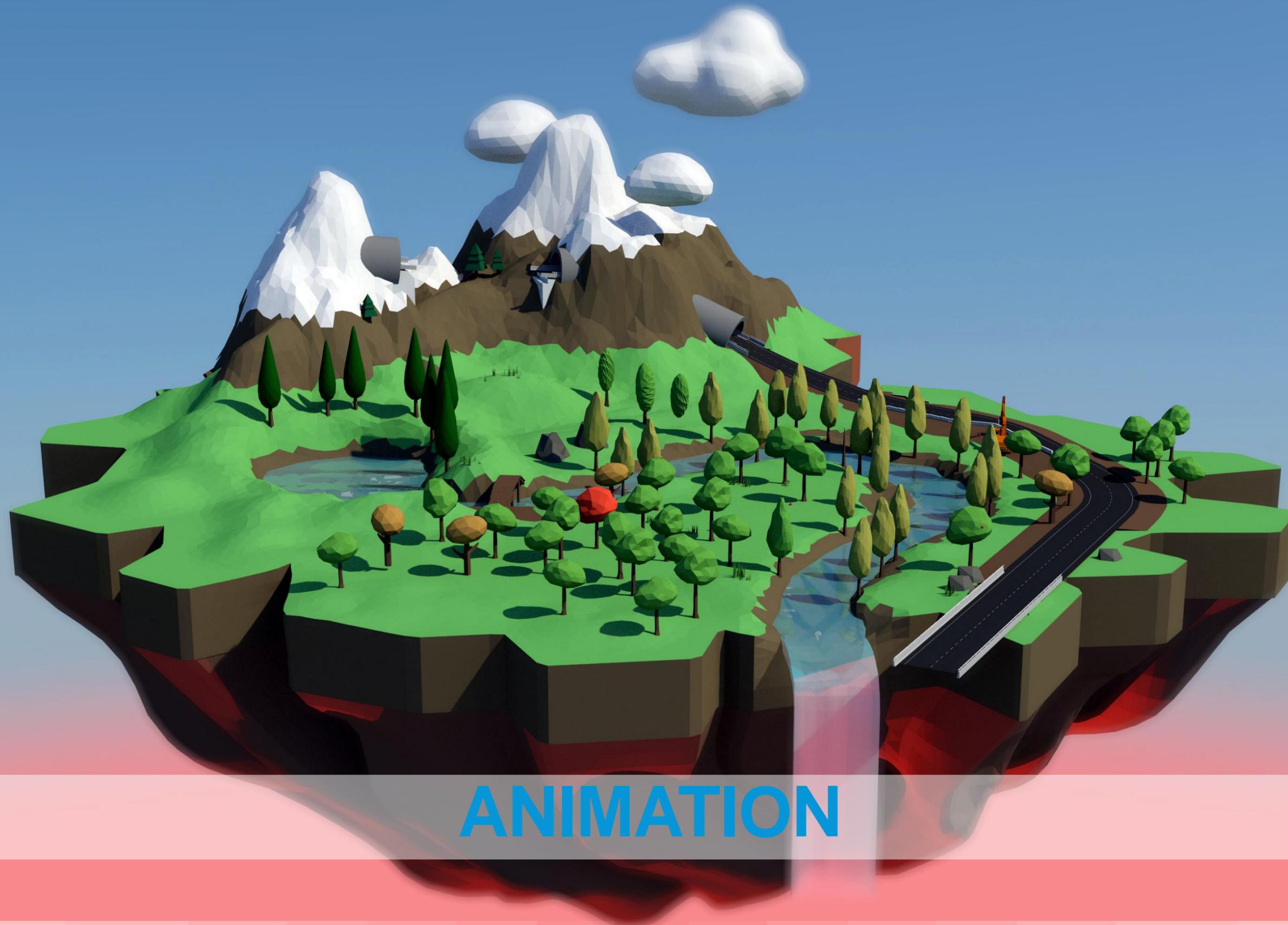
What is Closed Loop Lifecycle Management?

Focus on managing the creation, change and archive of all information related to a **product**



Product chain optimization with the use of real time data





ANIMATION

INDUSTRY

EXTRACTION

ANIMATION



DESIGN

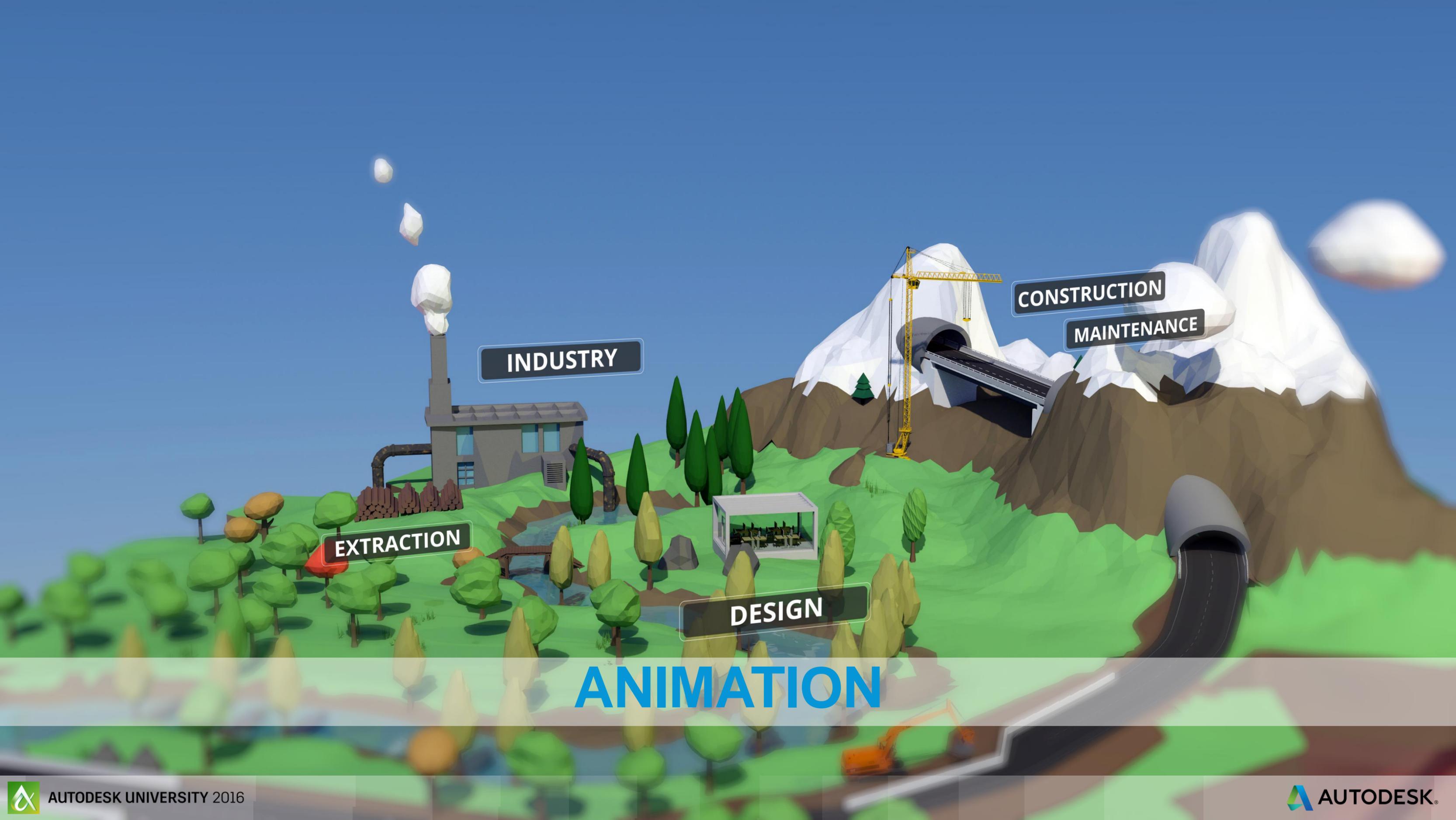
ANIMATION

CONSTRUCTION

ANIMATION



ANIMATION



INDUSTRY

EXTRACTION

DESIGN

CONSTRUCTION

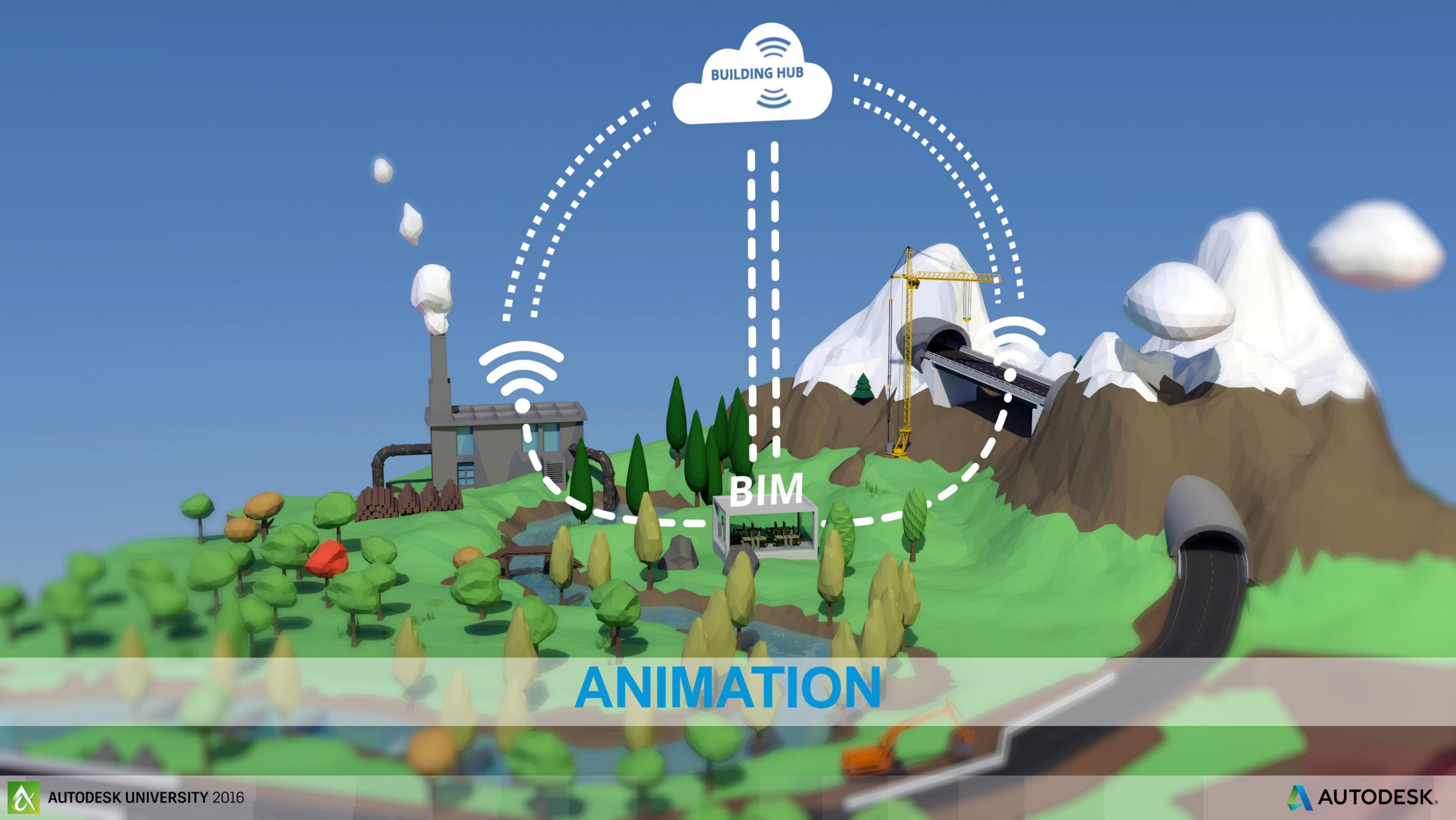
MAINTENANCE

ANIMATION

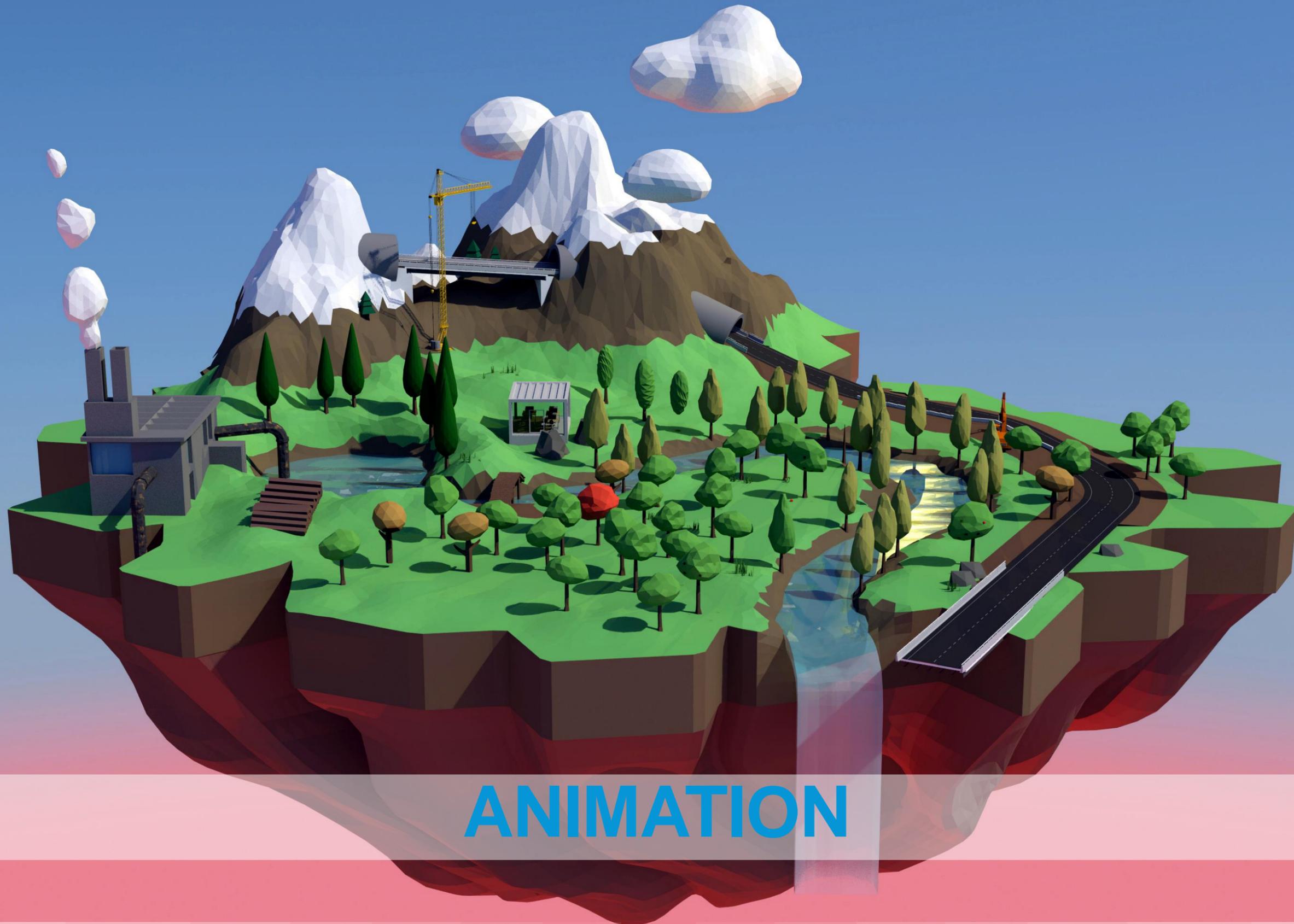


BIM

ANIMATION



ANIMATION



ANIMATION

Why do we need CL₂M?



01 **Manufacture less**
Get specific data on how much resources are needed for projects

02 **Manufacture more specific**
Get specific data what resources are needed in building projects

03 **Pollute less**
Less and more specific resources will change built objects, transportation and lifetime

04 **Create safer environments**
Continually monitor safety values during construction procedures

How do we distribute data in our lifecycle

RFID

Radio frequency identification (RFID) tags are simple, cheap and easy to use. (Limitation: range of sending data)



LoRa

Lora is Long Range Low Power LPWAN; this technology can exchange small amounts of data between objects and systems with ultra-low power consumption.



Database

We can use all sorts of SQL databases, or easier to use databases like Access or Excel



Cloud Solution

There are many solutions to host a IoT Hub, with these we can easily distribute our data everywhere we want!



What sensors can we use in the construction maintenance phase?
Concrete embeddable sensors (health), load and strain sensors, acceleration sensors (seismic+wind), pressure and load transducers, displacement sensors (joints), the list goes on and on...

Why it's important to start in early design stages

01



Framework

We need a framework to distribute all our lifecycle metadata

02



Define where to improve

In the design we can focus on new adaptations of to be build objects

03



Learn from used cases

Already obtained data needs to lead to new developments

04



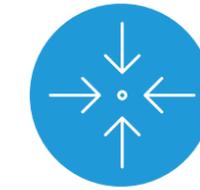
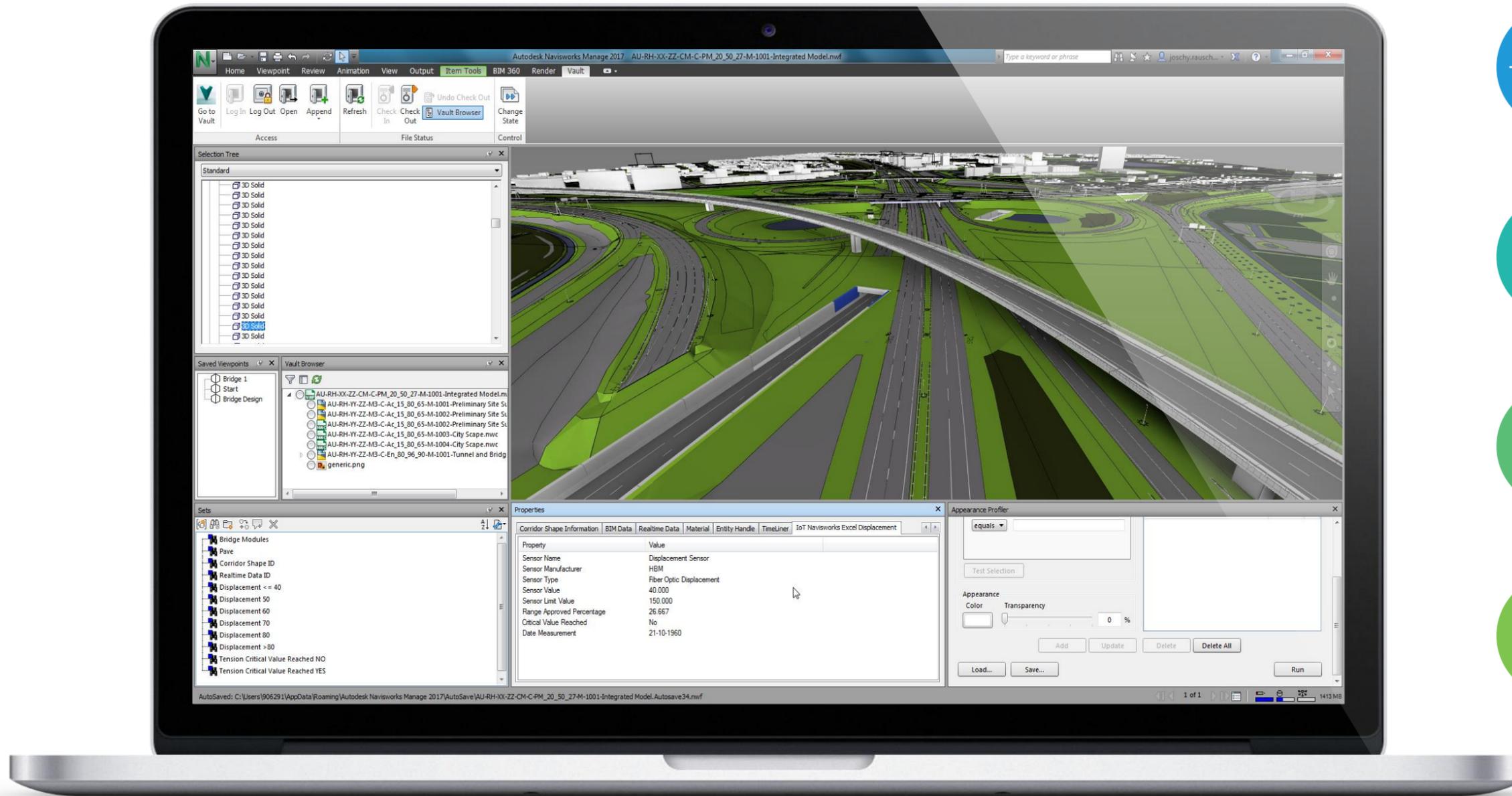
IDs, IDs, IDs

Here we start to set our IDs for the whole lifecycle

What's important

Is to remember that we define all to be build objects in the design phase.
Here we can make the difference in today's challenges

What do we want to do with our BIM model



Allocate items
We want to state and see where our sensors are



Sort and Separate
We want to see different data, and find our most valuable cases



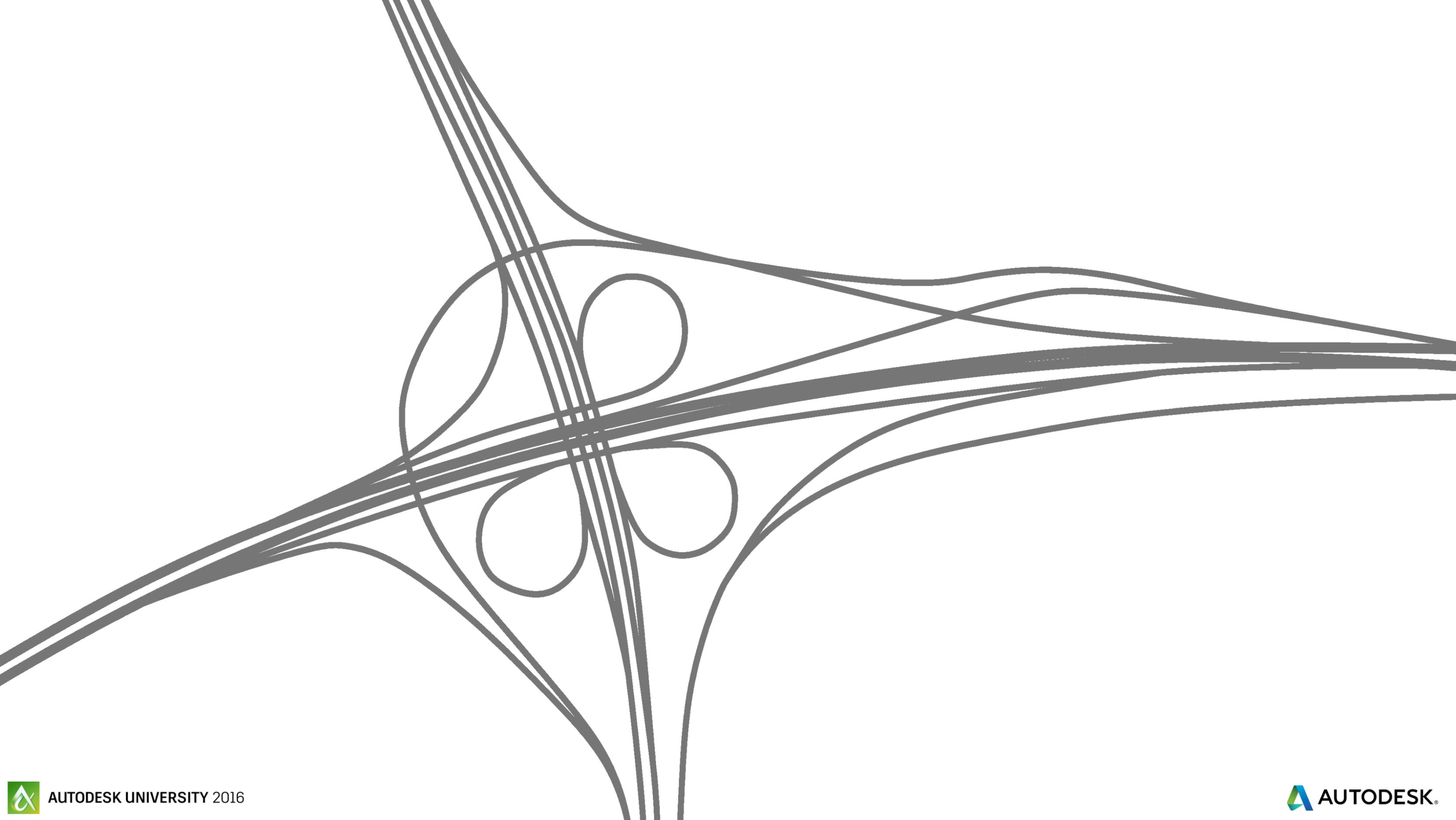
See Realtime Data
We want to see changes in data in real life.



Visualize Data
We want to see what our obtained data does to our Model in real life

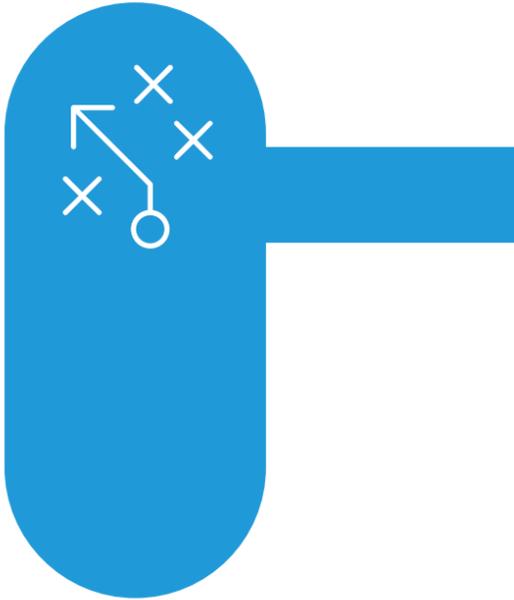
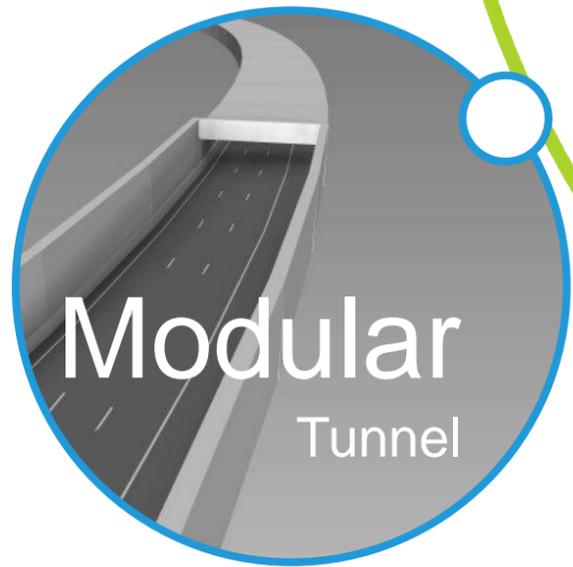
Civil3D and Realtime data in the design phase





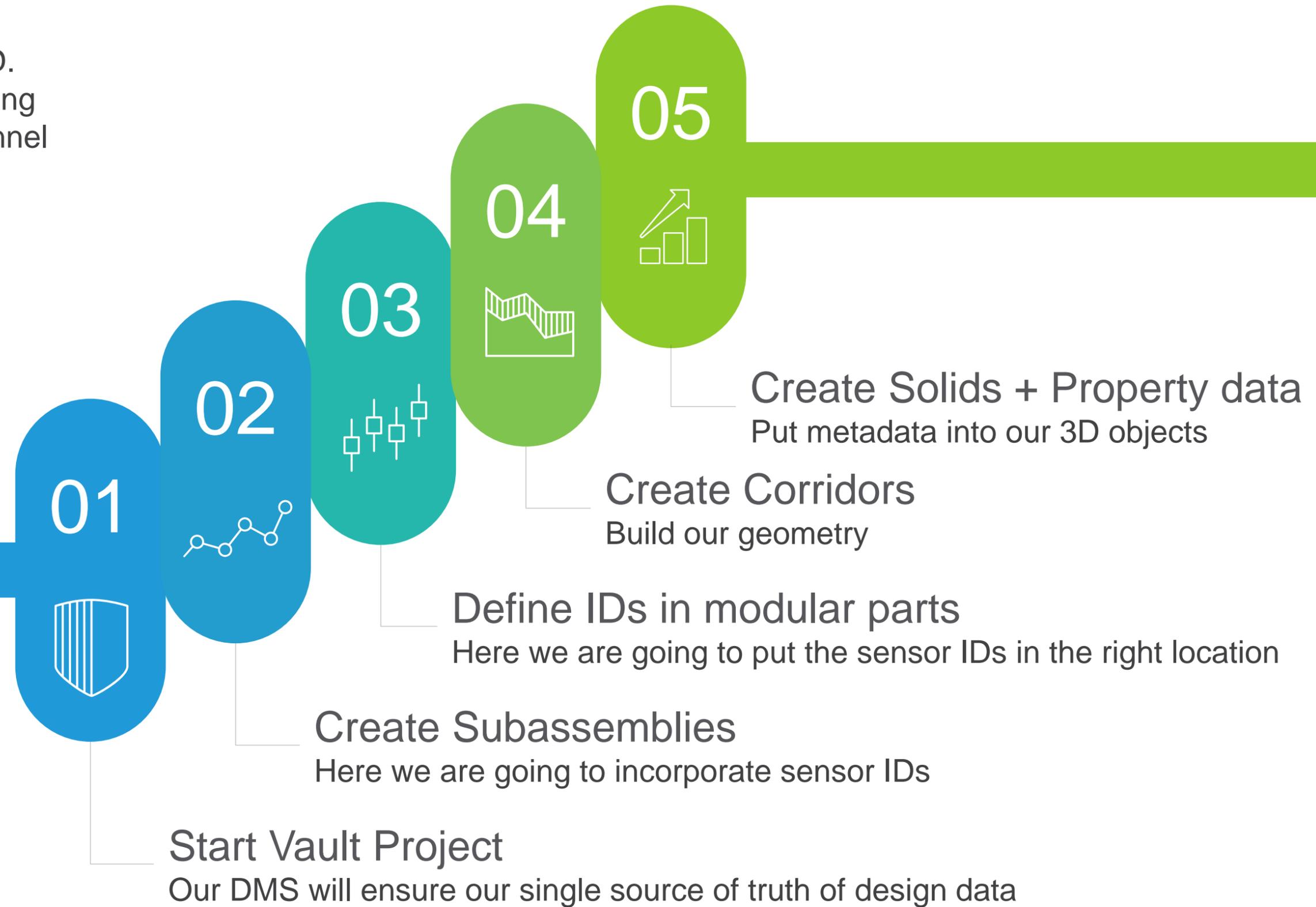


Modular
Bridge



Autocad Civil3D Steps

Our start point of this project is Civil3D.
Here we are going to design our building blocks. In these building blocks we funnel our sensor data to good use.





30%

New tooling
(inside already used software)

60%

Already used tools

Development of using tools in and communicating with Civil3D and Navisworks

30% New tooling
Most of the steps for CL2M
modelling are already used by
Civil3D users.



Realtime
ID links

Metadata of
objects

Cloud
connection

LIVE CIVIL3D

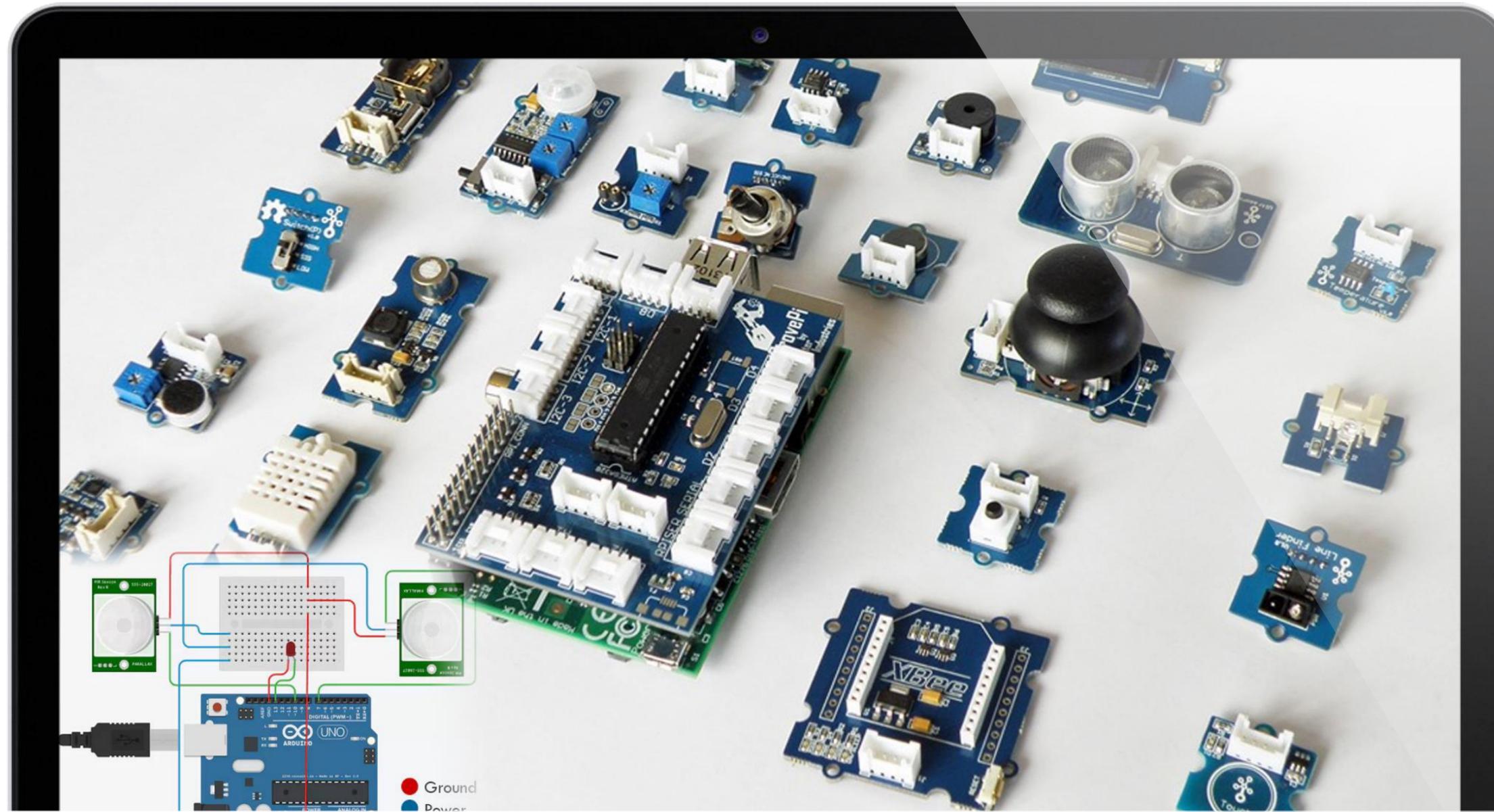


Linking real-time data in Navisworks

Using IoT services or good old Excel!

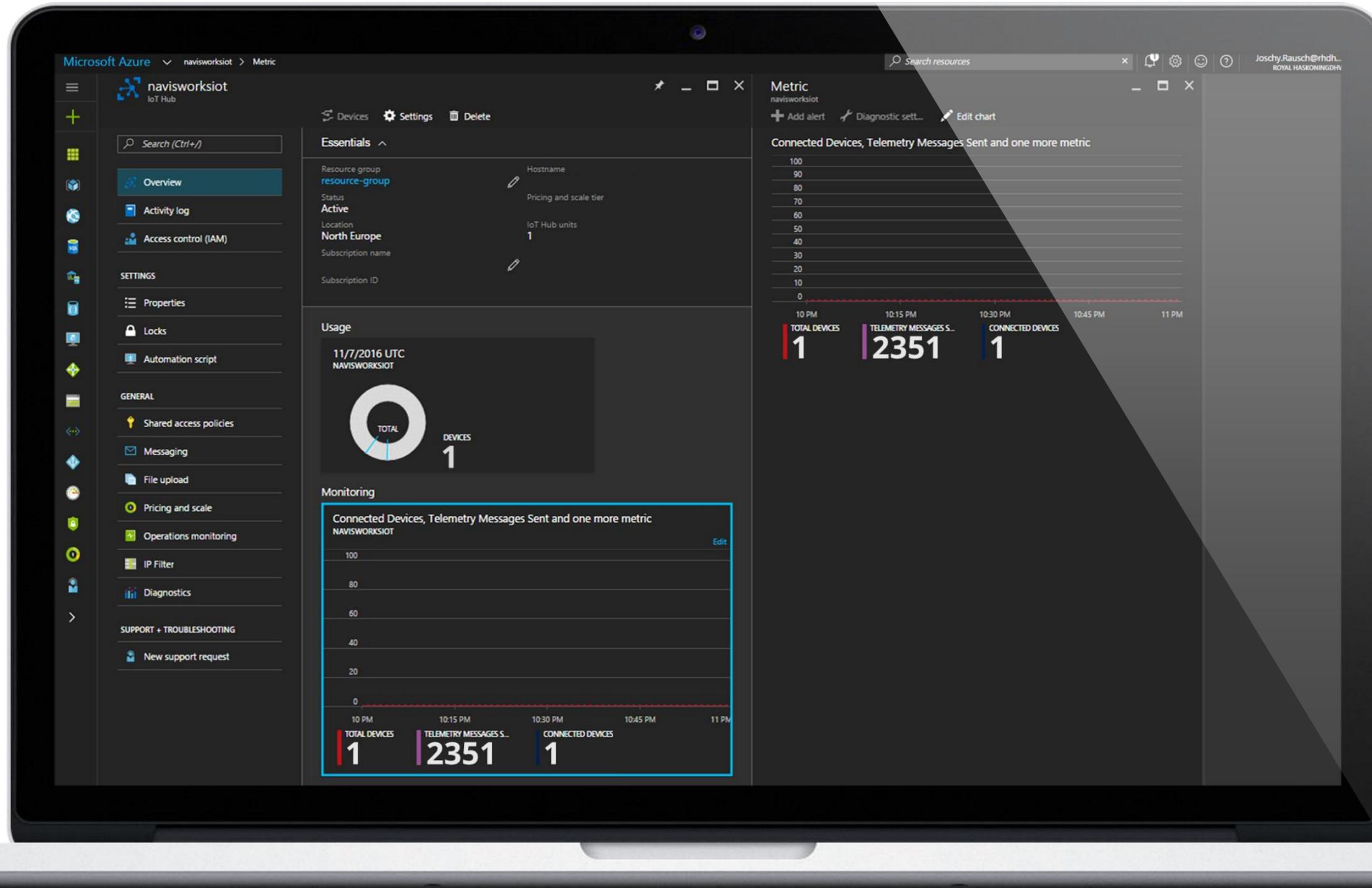


Building your own IoT device / sensor

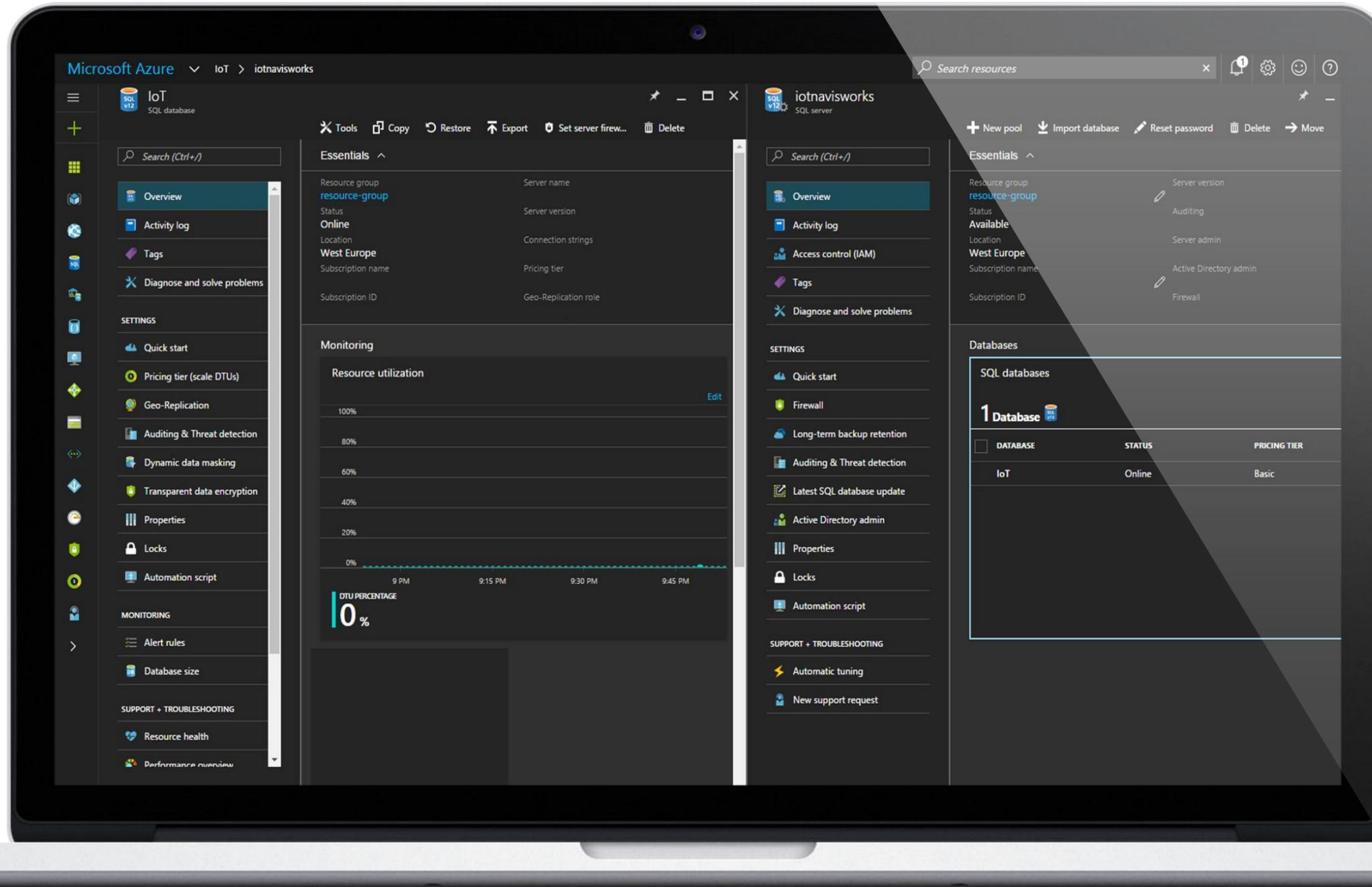


Geek out at [Hackster.io](https://hackster.io) Internet of things

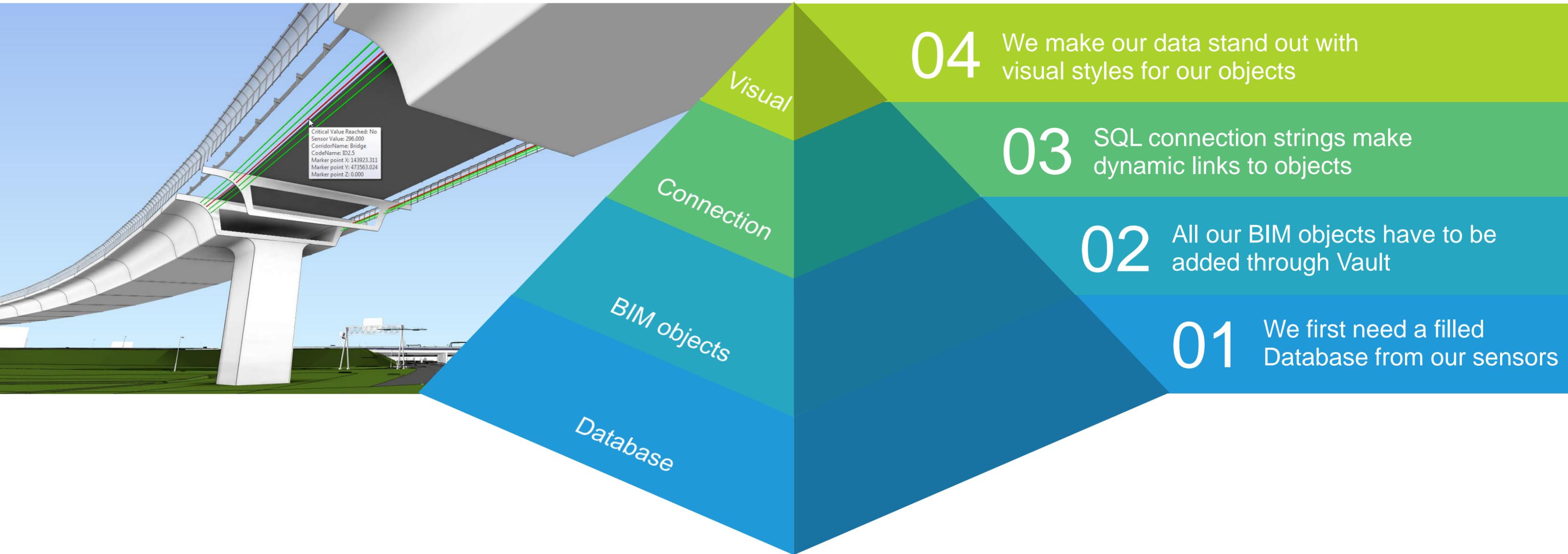
Using IoT services



Using web based SQL Database services

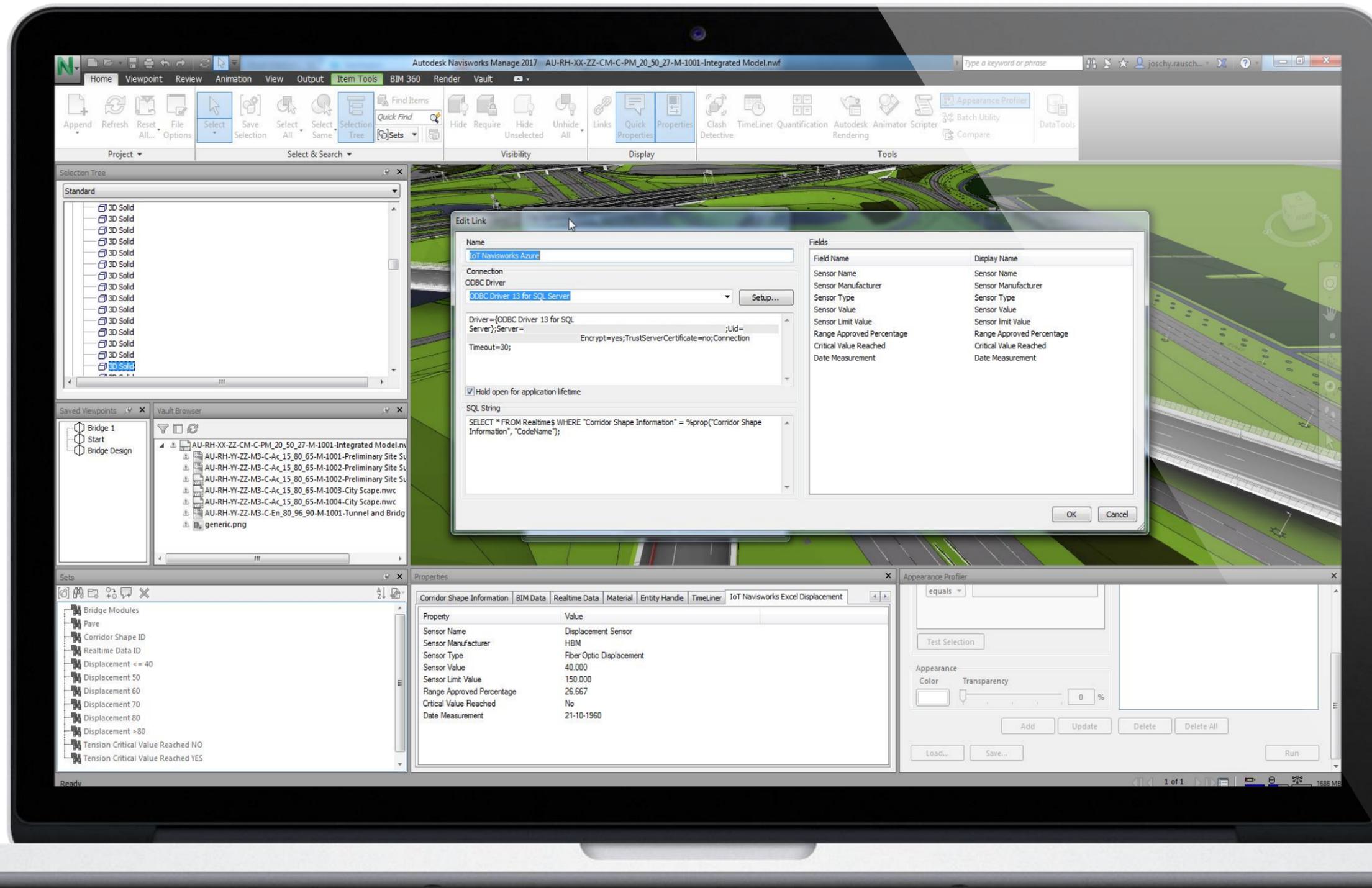


Navisworks workflow



LIVE NAVISWORKS

Linking web based services in Navisworks



Questions, recommendations



Can we use different software?

Revit

Add metadata with SQL databases and visualize data in the same concept as shown of your project

Infraworks

Add metadata (custom schemas) with SQL databases and visualize data in concept stages of your project

LIVE

See your BIM metadata and real-time sensors in VR!

FORGE

All your BIM models on the Forge platform, together with project Dasher!



How did I do?

- Your class feedback is critical. Fill out a **class survey** now.
- Use the AU mobile app or fill out a class survey online.
- Give feedback after each session.
- AU speakers will get feedback in real-time.
- **Your feedback results in better classes and a better AU experience.**



