

Fusion on Forge Data

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The Data Challenge







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Data in the future

Where does the value lie?

Interoperability

move data freely between apps

Collaboration

share data between people

Search

filter and query for data

Traceability

track and audit data changes

Analytics

gain insights from data







Presentation

Business Logic

Data





Presentation

Business Logic

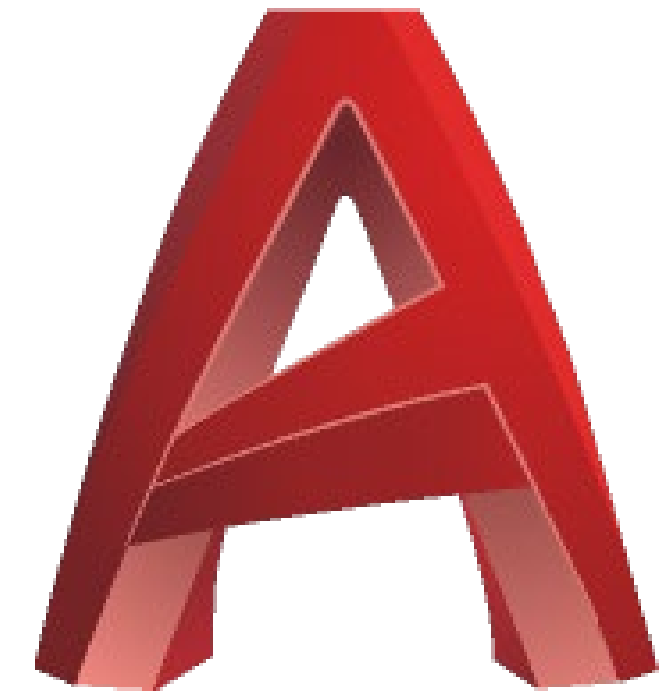
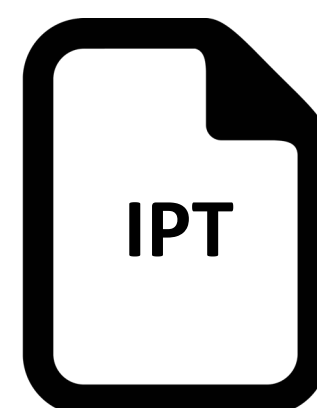
Data



Presentation

Business Logic

Data



Presentation

Business Logic

Data



R

Presentation

Business Logic

Data



RVT

I

Presentation

Business Logic

Data



IDW

IPT

IAM

A

Presentation

Business Logic

Data



DWG



Presentation

Business Logic

Data



RVT



Presentation

Business Logic

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IDW

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Presentation

Business Logic

Data



XLS



Presentation

Business Logic

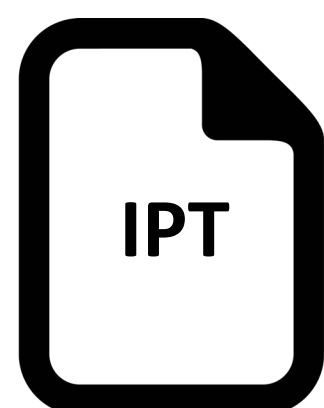
Data



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Data

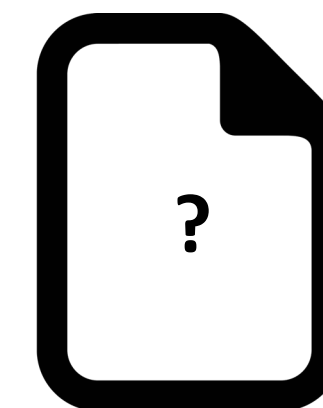


YOUR APP

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Business Logic

Data



Data in the future

Where does the value lie?

Interoperability

move data freely between apps

Collaboration

share data between people

Search

filter and query for data

Traceability

track and audit data changes

Analytics

gain insights from data

Data today

Where do the challenges lie?

Interoperability

move data freely between apps

Collaboration

share data between people

Search

filter and query for data

Traceability

track and audit data changes

Analytics

gain insights from data

Data today

Where do the challenges lie?

Interoperability

~~move data freely between apps~~

spend time translating data, losing information along the way

Collaboration

~~share data between people~~

oversharing and data noise

Search

~~filter and query for data~~

time and computationally-expensive to search

Traceability

~~track and audit data changes~~

lack of granular data change persistence

Analytics

~~gain insights from data~~

significant analytics prep work due to inconsistent, noisy data

R

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Data



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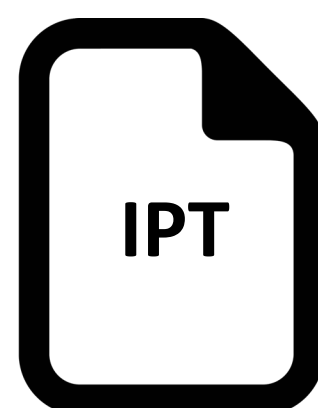
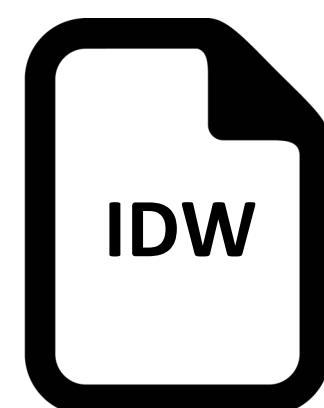


I

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Data



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Business Logic

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Business Logic

Data



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Business Logic

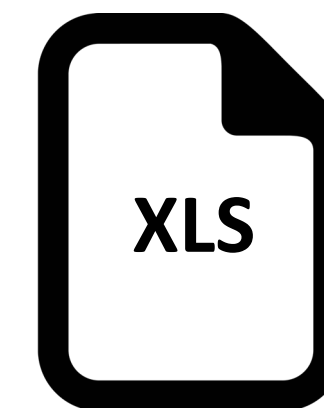
Data



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Data





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Business Logic

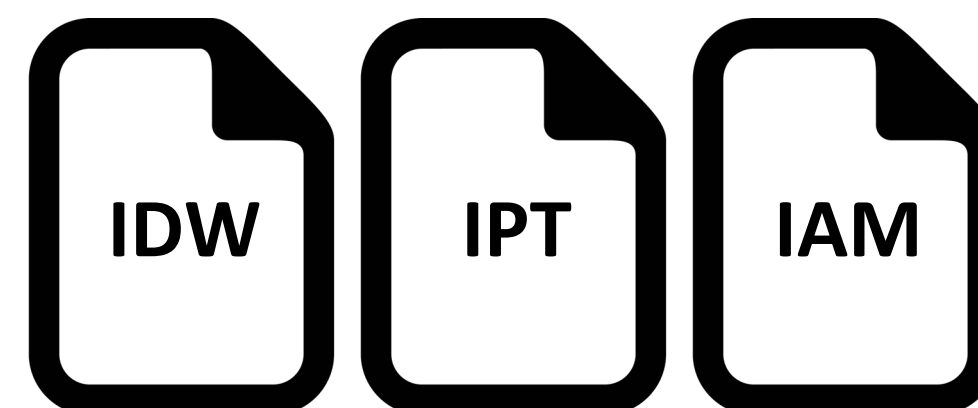
Data



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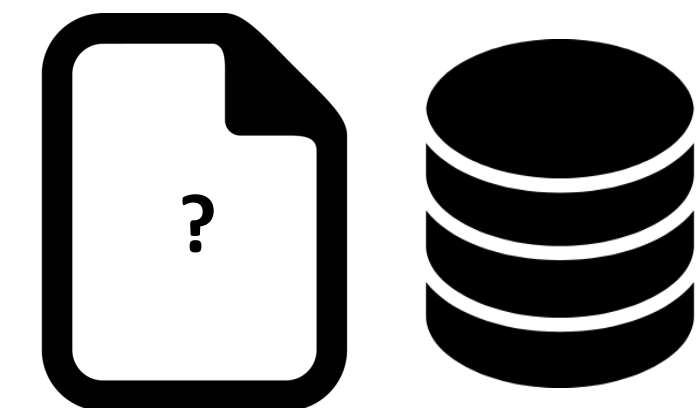


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Data in the future

Where does the value lie?

Interoperability

move data freely between apps

Collaboration

share data between people

Search

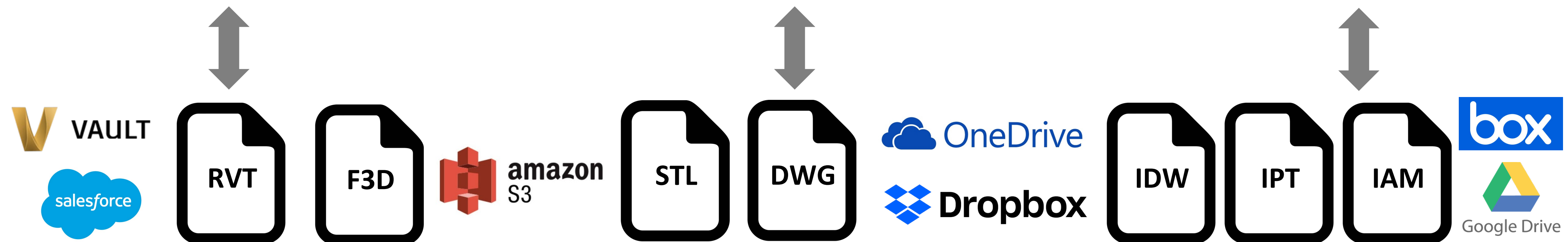
filter and query for data

Traceability

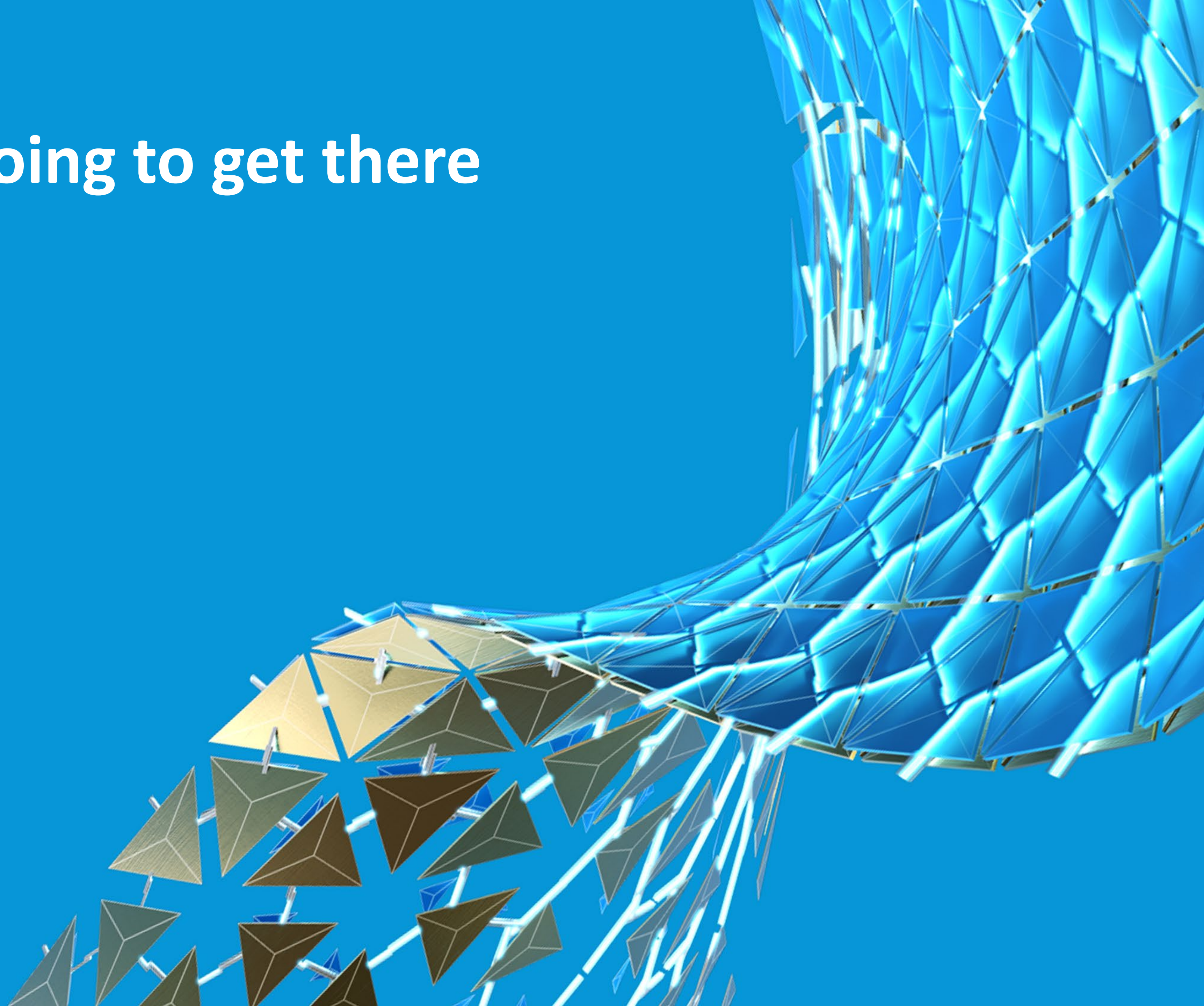
track and audit data changes

Analytics

gain insights from data

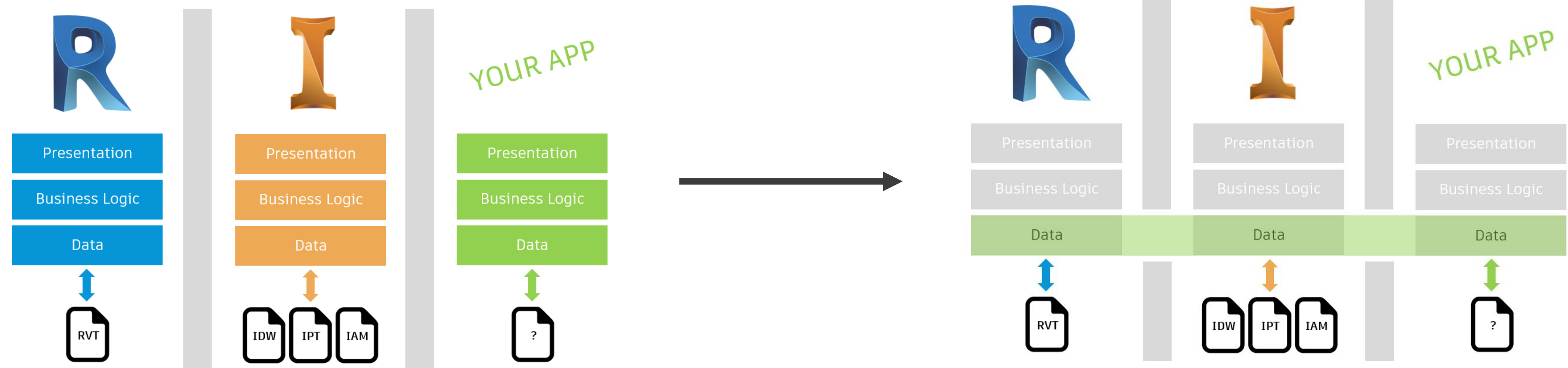


What are we doing to get there
today?



Data today and in the future

Moving from “data walls” to “data windows”



Opaque & Inconsistent Data

Native to a particular application, inaccessible by other applications or only accessible via dedicated, bespoke APIs

Transparent & Standardized Data

Available independent of particular applications, expressed with standard data types, accessible via a standard API

Data transparency and standardization

HTML as an analogy: standard elements and structure

```
<!DOCTYPE html>
<html>
<body>

<h1>My First Webpage</h1>

<p>This is a paragraph of text. It's not fancy in
any way, but you can read it, even if you aren't
software!</p>

<p>But cats cannot read this. Sorry cats.</p>

<p></p>

</body>
</html>
```

My First Webpage

This is a paragraph of text. It's not fancy in any way, but you can read it, even if you aren't software!

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Data transparency and standardization

What we are developing in Forge Data



data schemas

shared rules for app
data

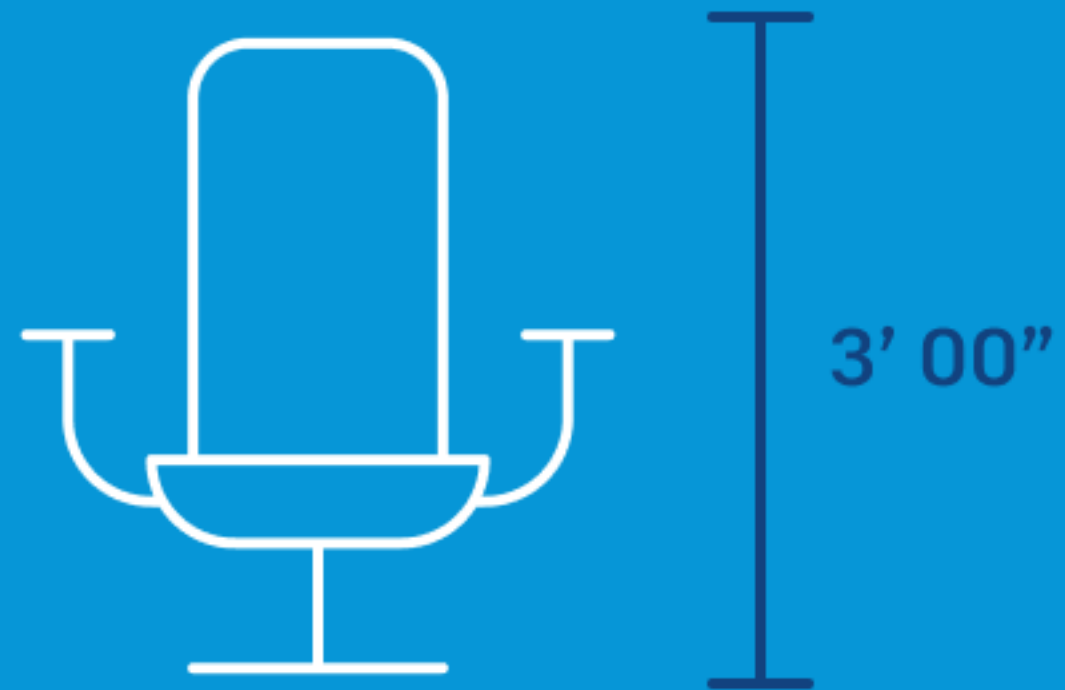


data models

standard ways to organize
data

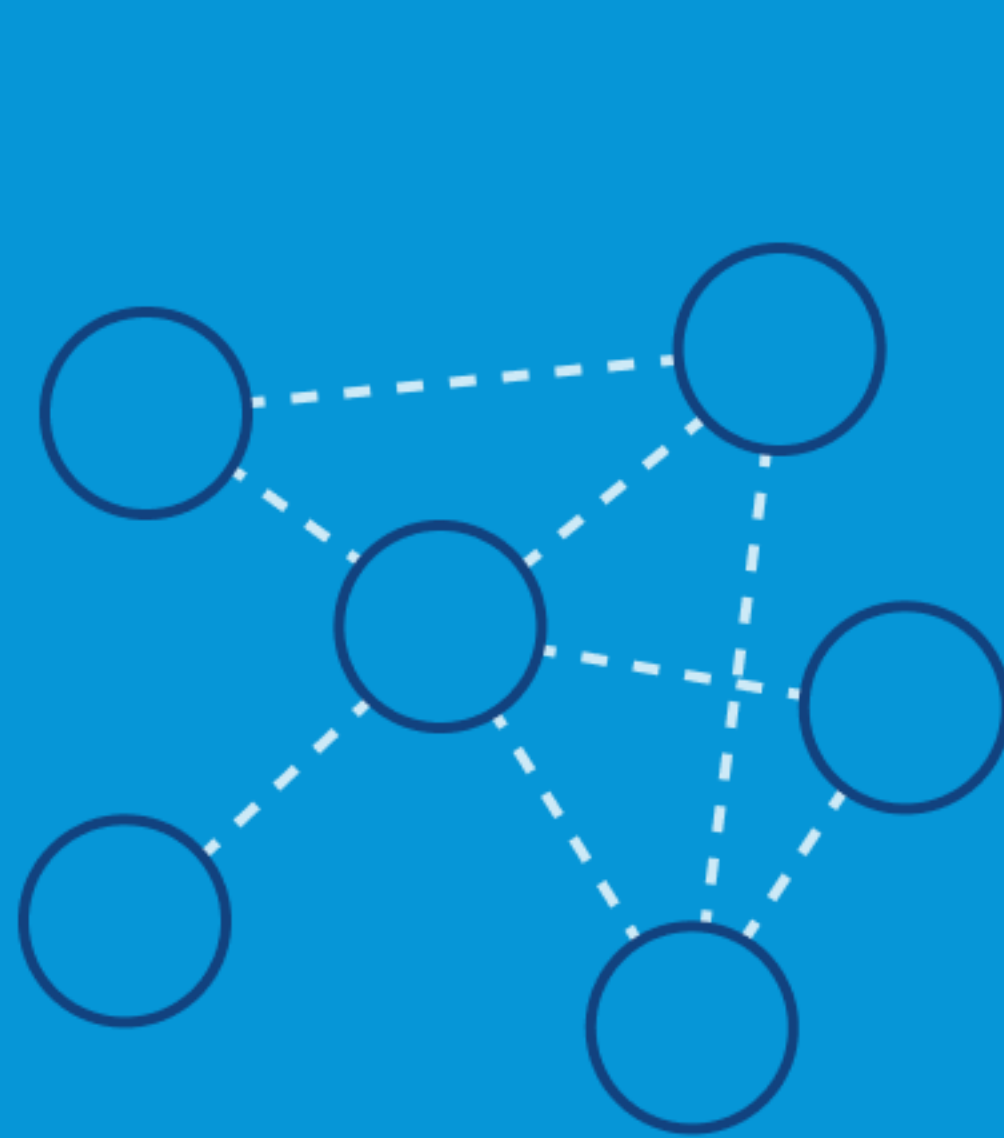
Data schemas

Ensuring data types are consistent and reusable



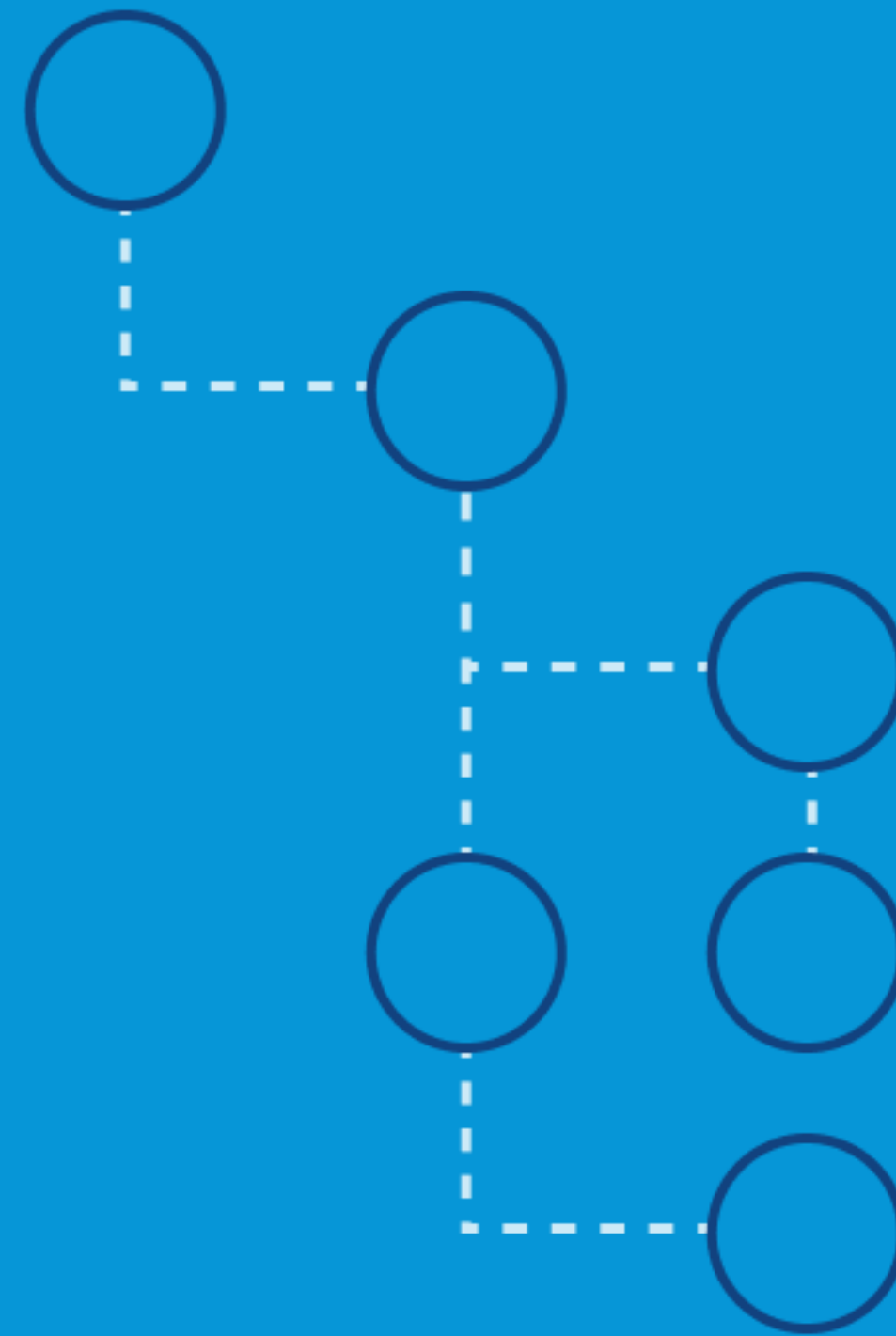
Data models

Data can be organized in a variety of ways



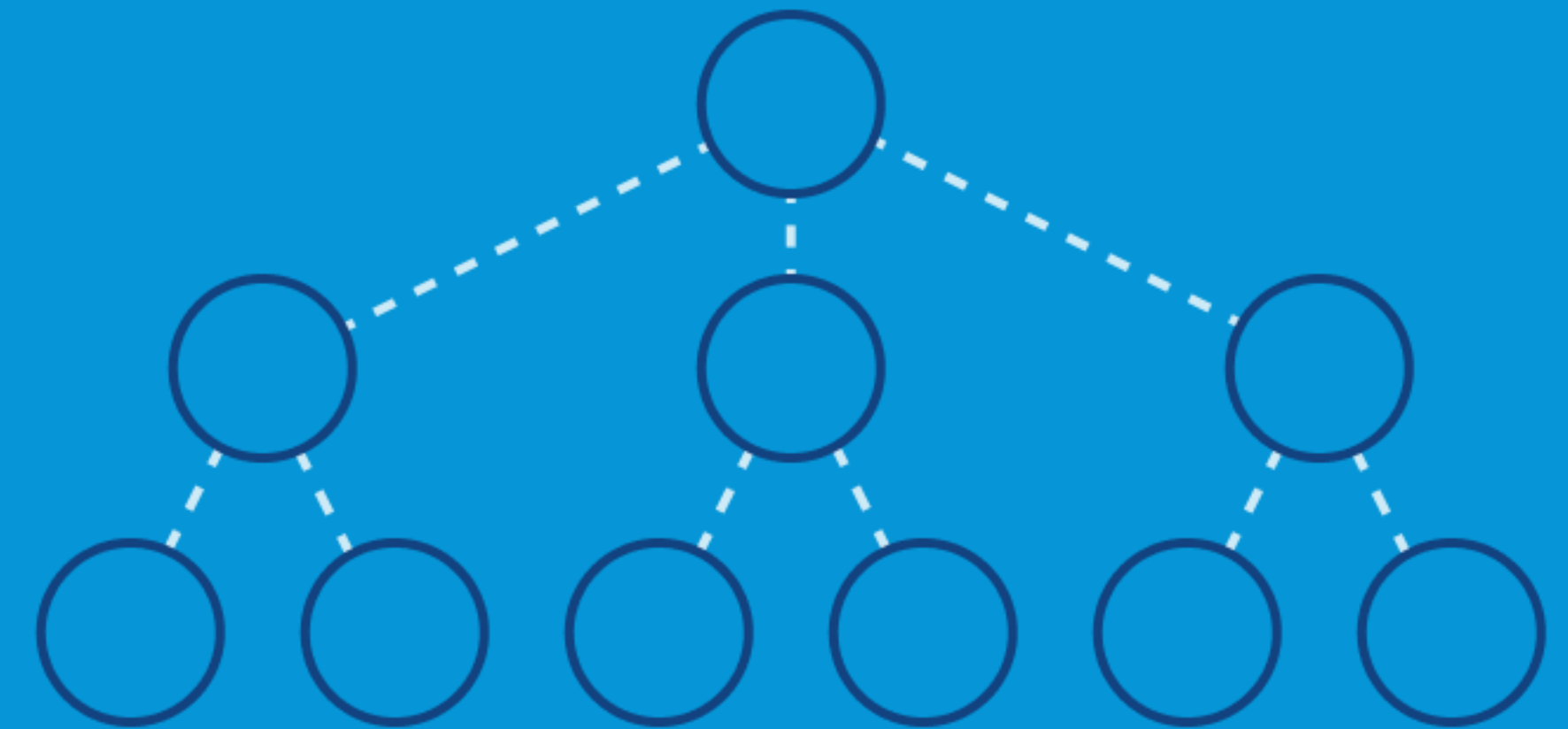
graph

ideal for CAD-based information



hierarchy

ideal for file and folder metadata

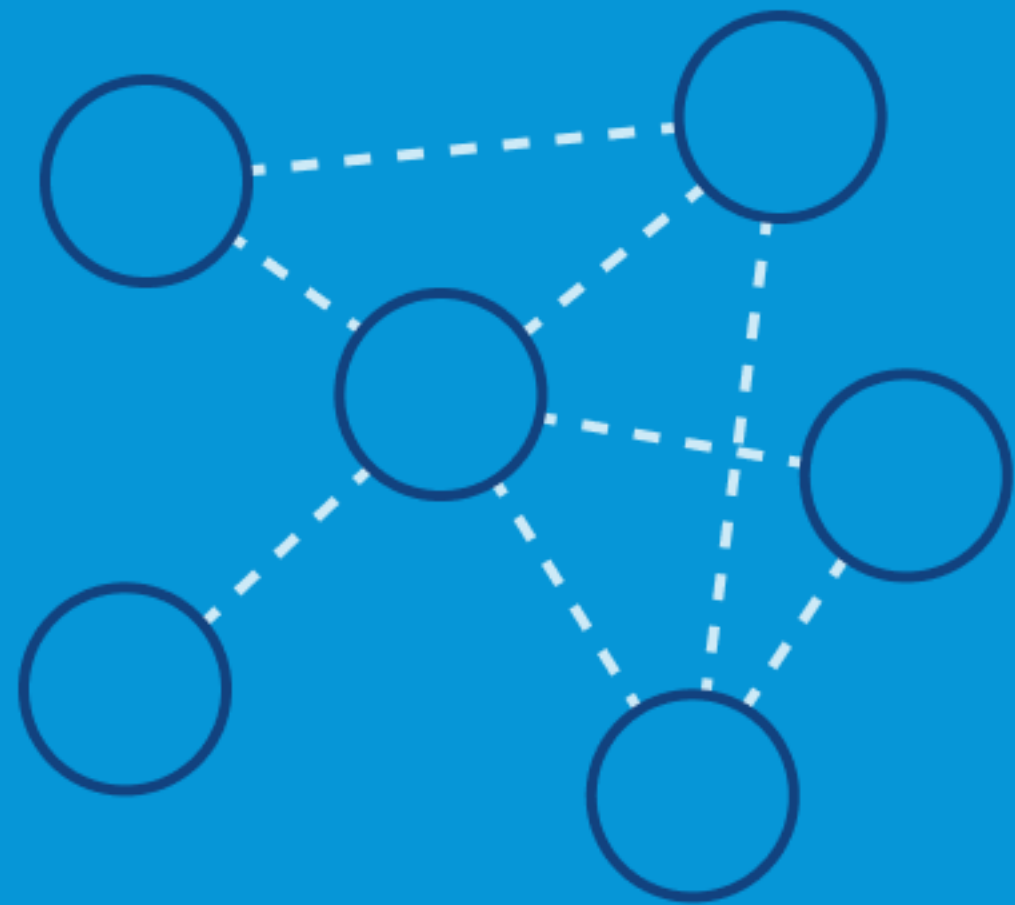


library

ideal for large amounts of static data

A hybrid approach in evolving from files to data

Data still contained in files, but more and more data stored in transparent databases



standardized & transparent data
models / databases



files & opaque data models



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Business Logic



Presentation

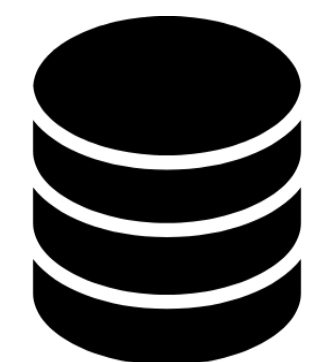
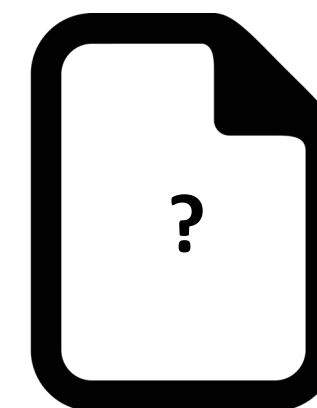
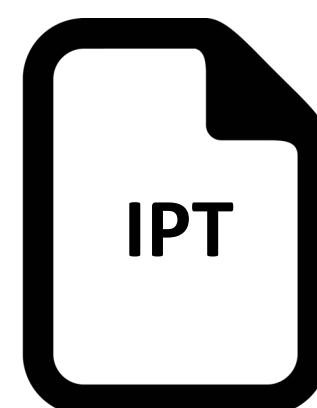
Business Logic

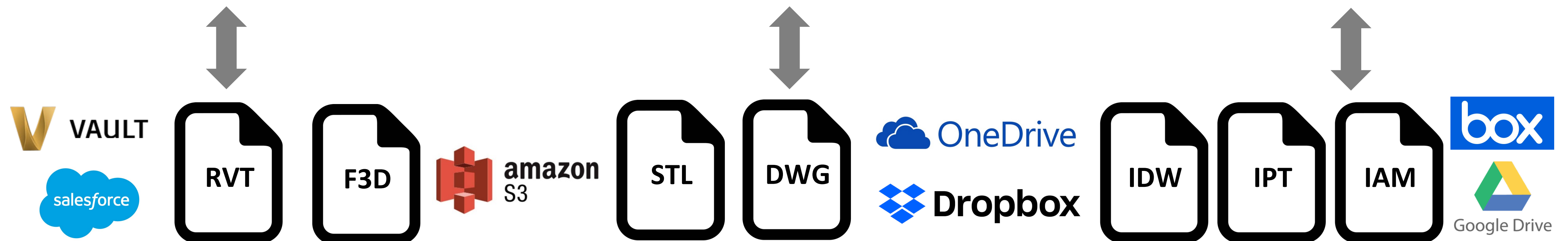
YOUR APP

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Business Logic

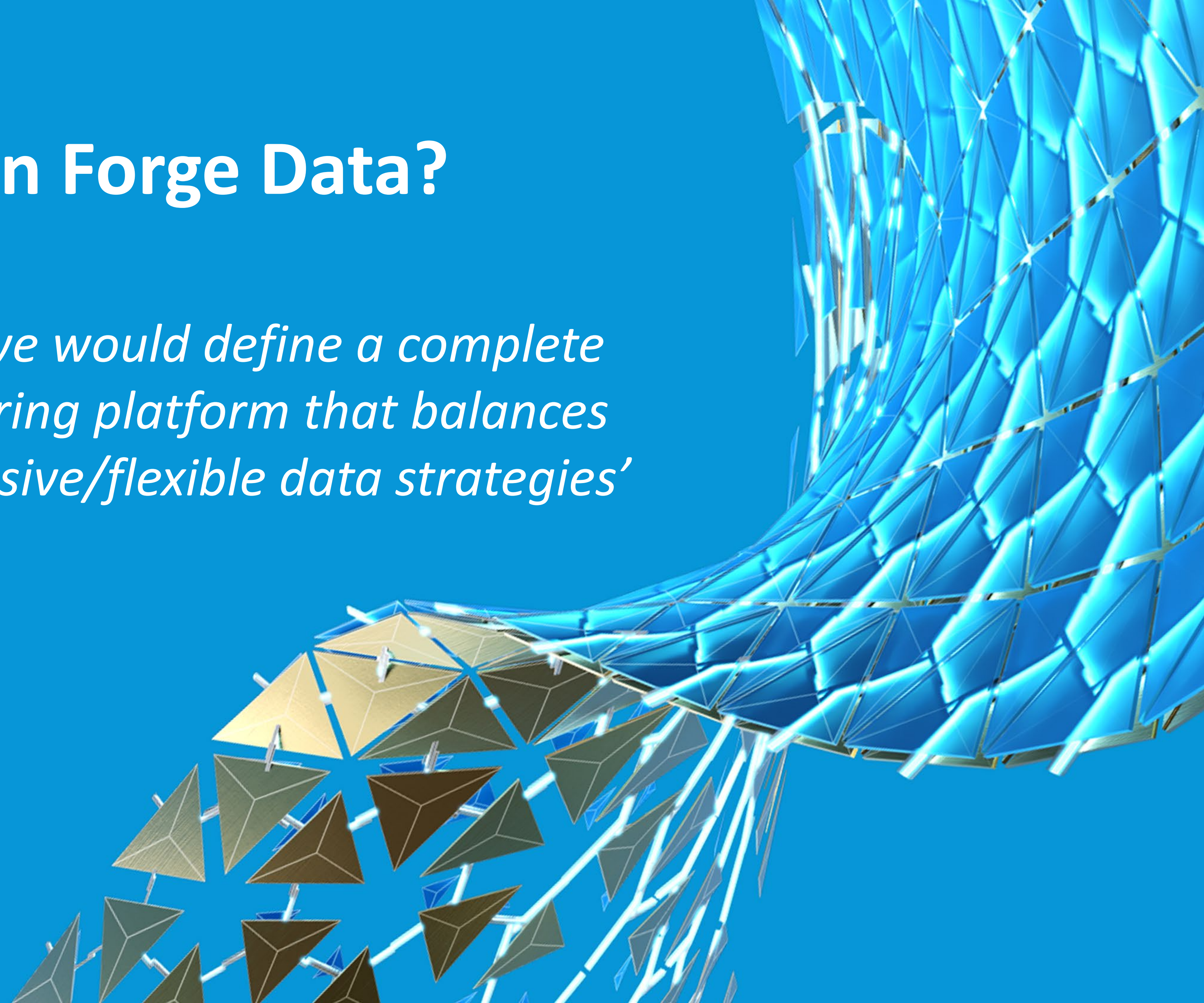
Common data schemas and data models





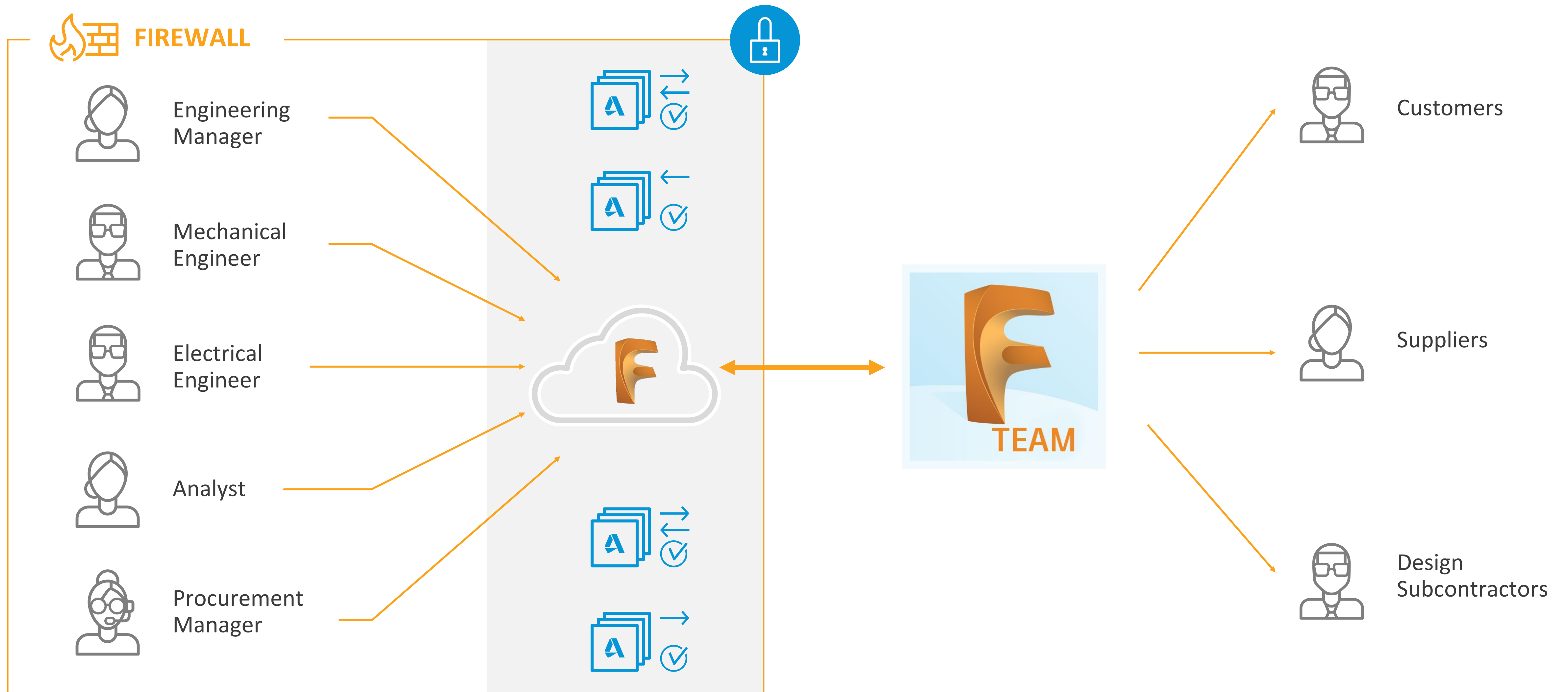
Why Fusion on Forge Data?

'We partnered, so we would define a complete product manufacturing platform that balances defensive and offensive/flexible data strategies'





Team Collaboration



Team Data Management

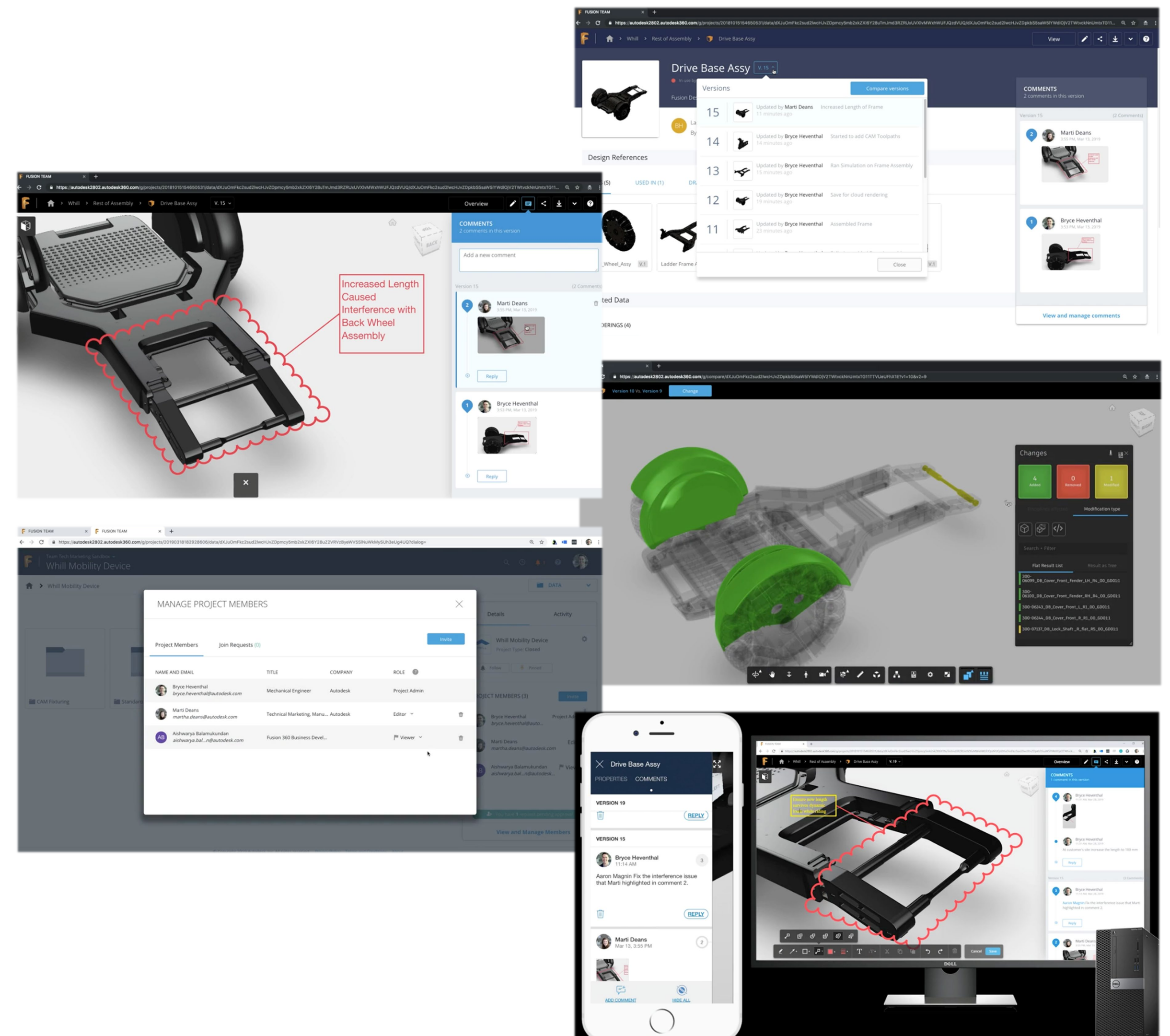
Protect, Manage, Share

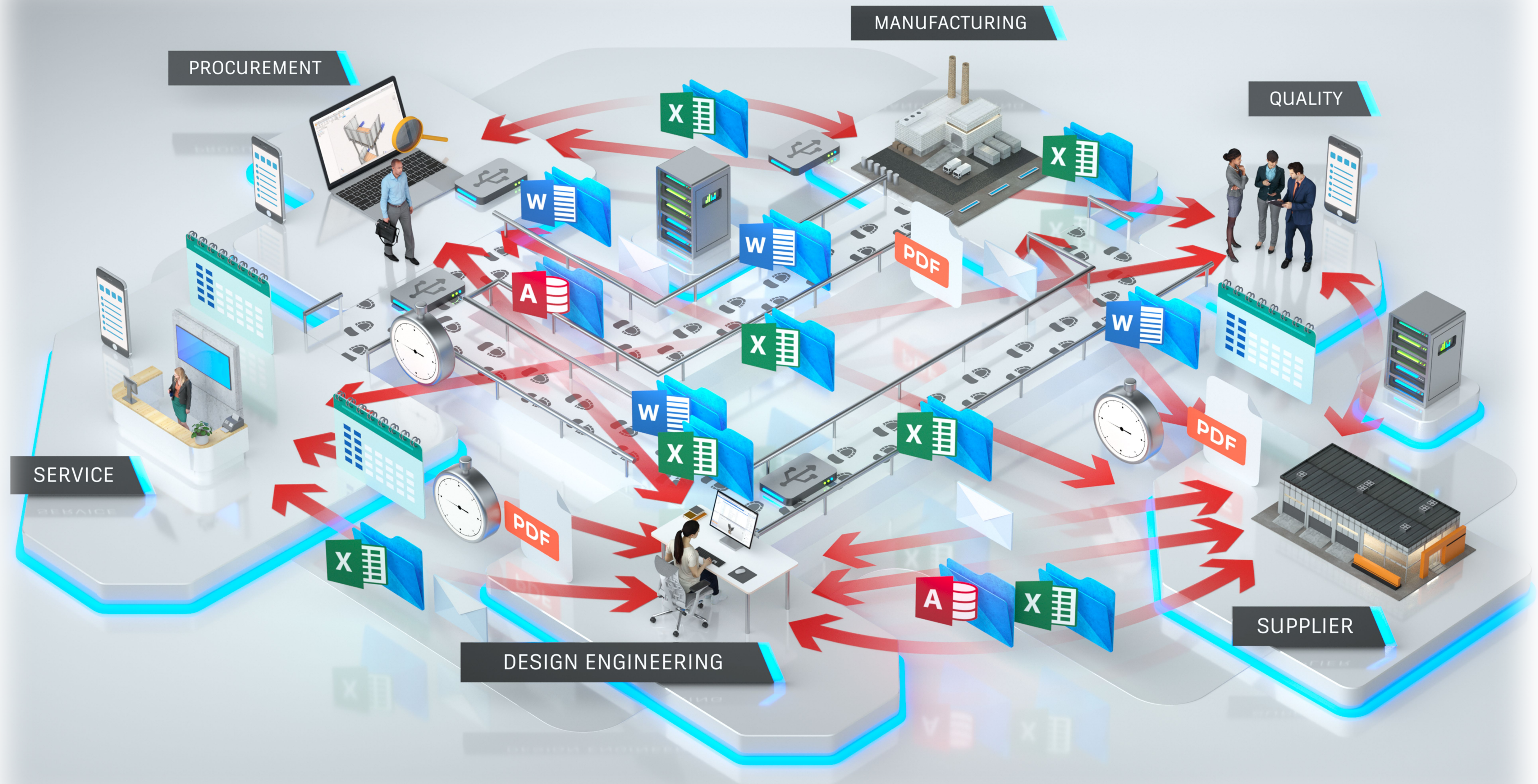
Benefits

- Invite internal & external stakeholders to participate in projects
- Securely share models & data
- Connect teams globally
- Auditable trail of when and where design decisions were made

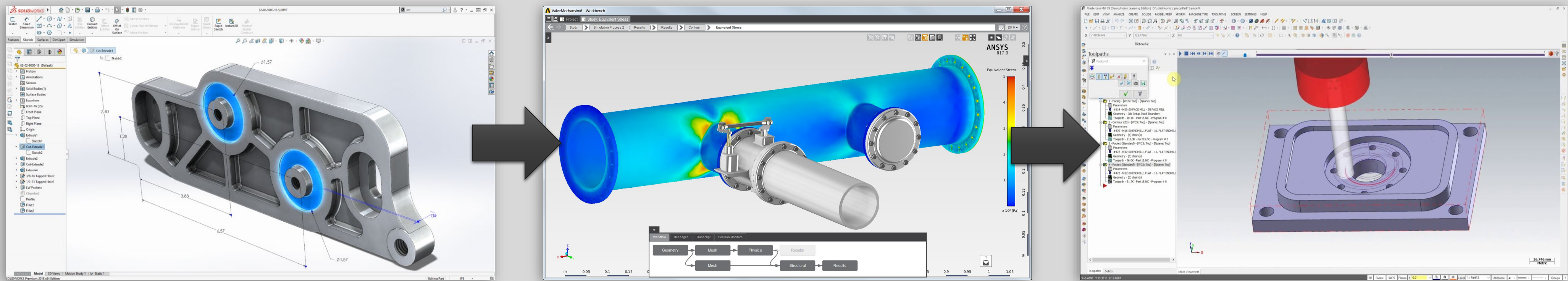
Capabilities

- Version control
- Cloud Storage
- Commenting & Redlining
- File Management/ export
- User management
- Searching

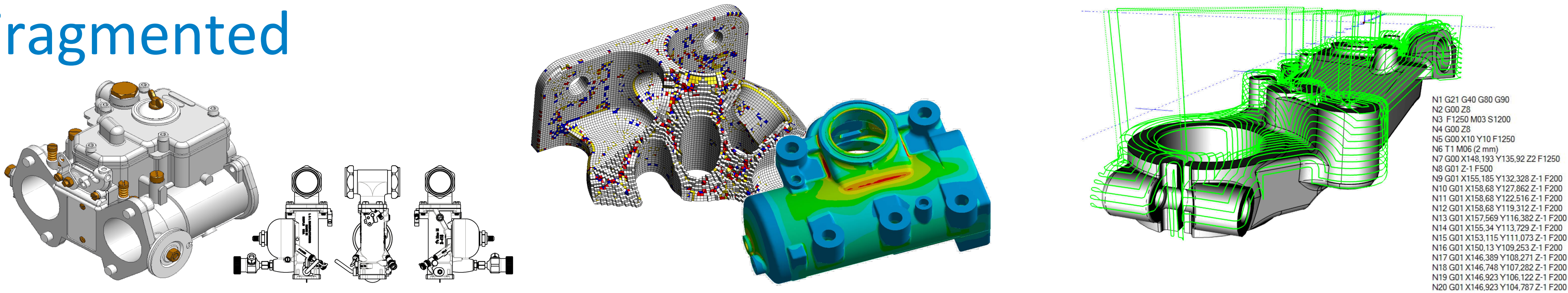




Serial



Fragmented



Proprietary



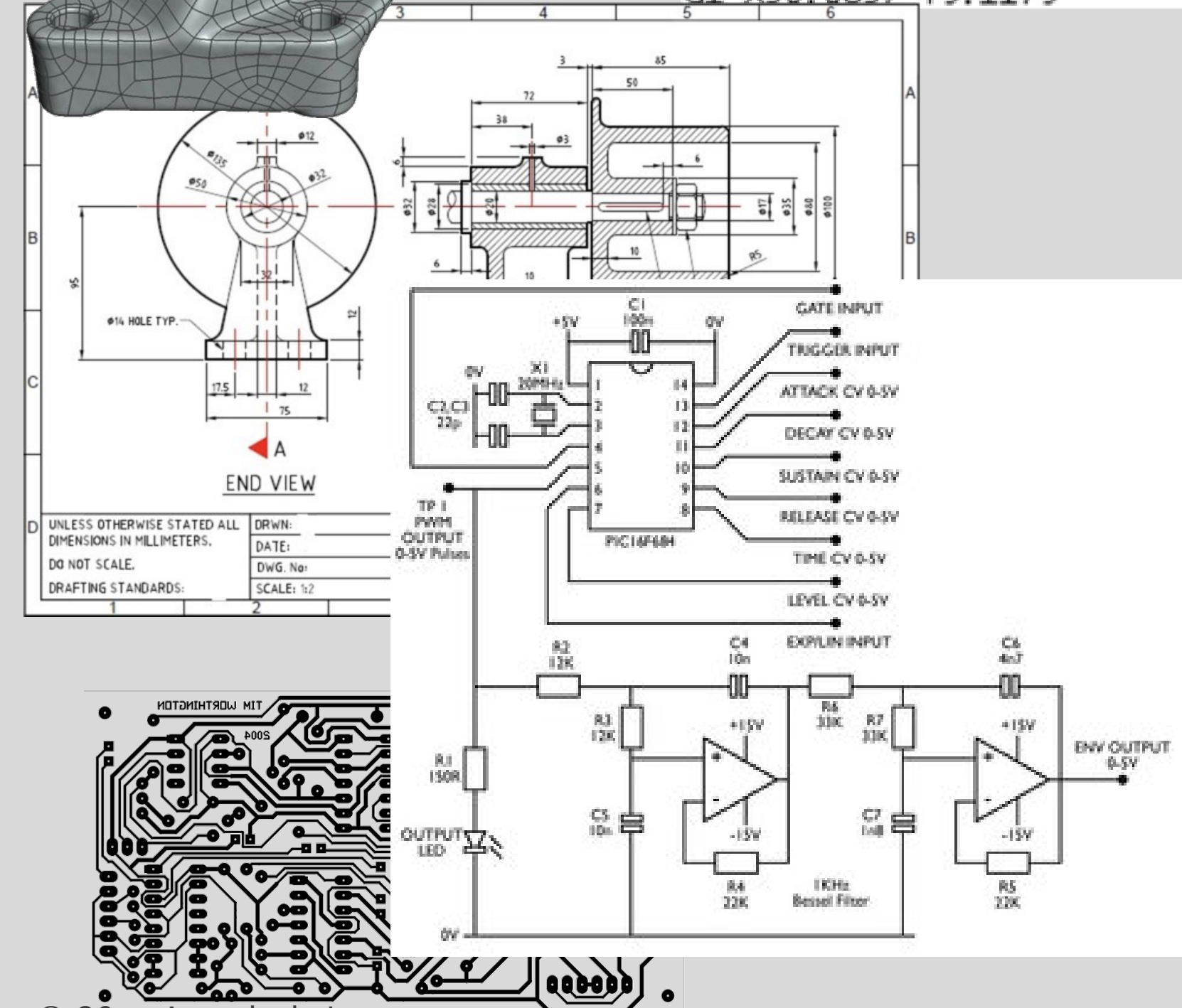
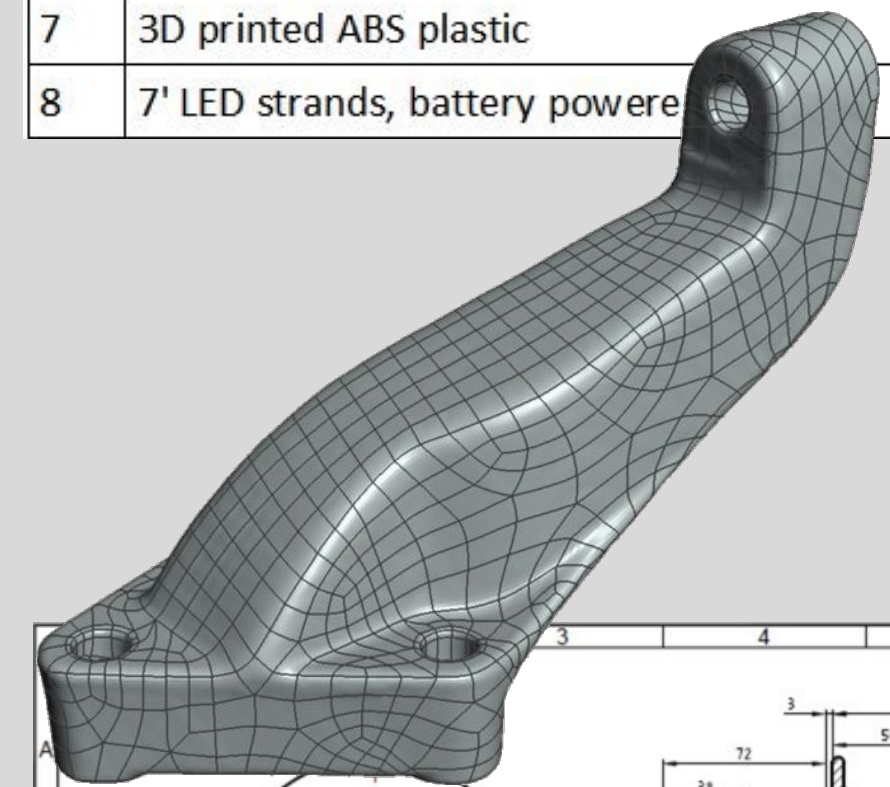
Serial, Fragmented, and Proprietary



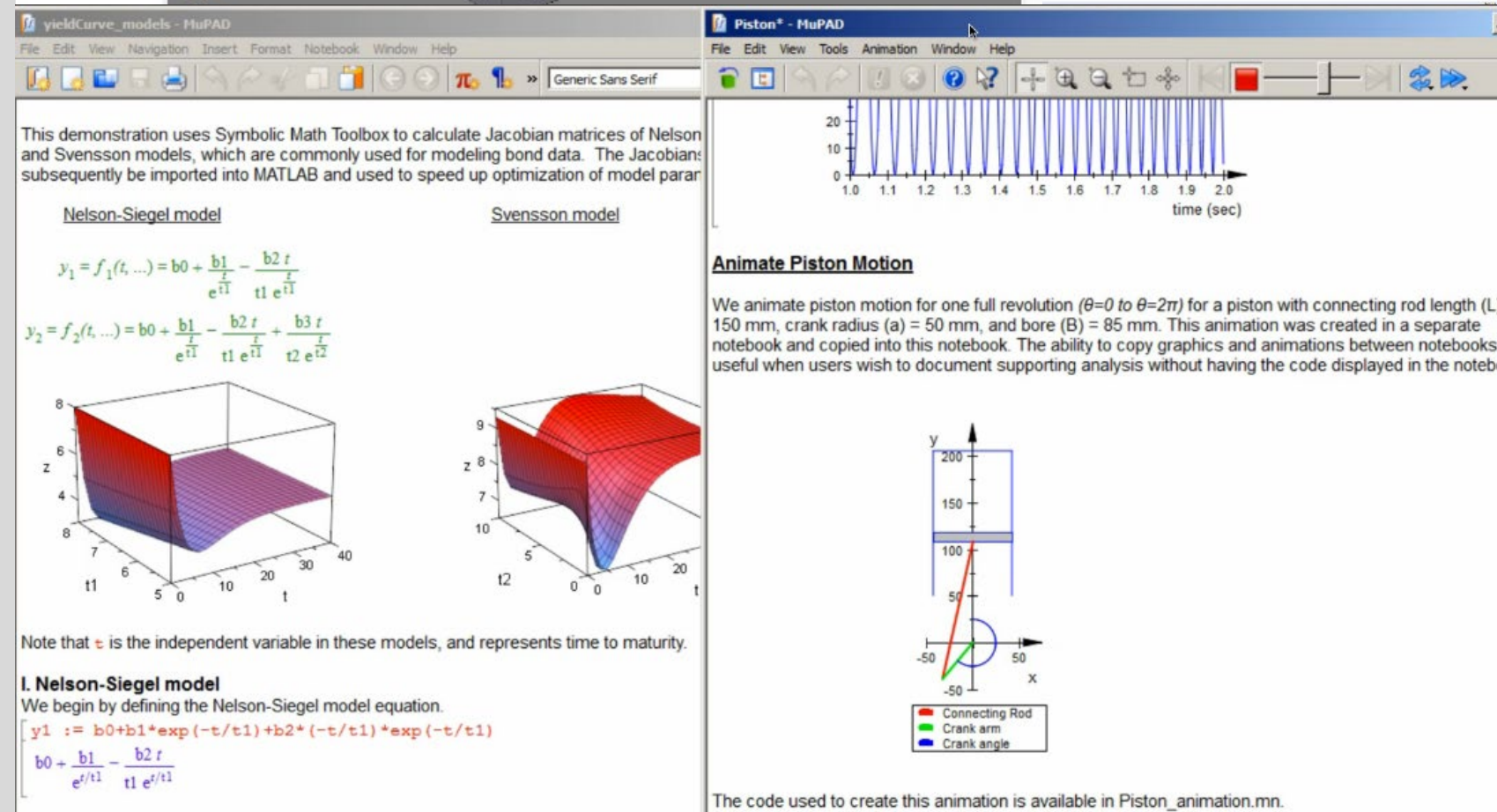
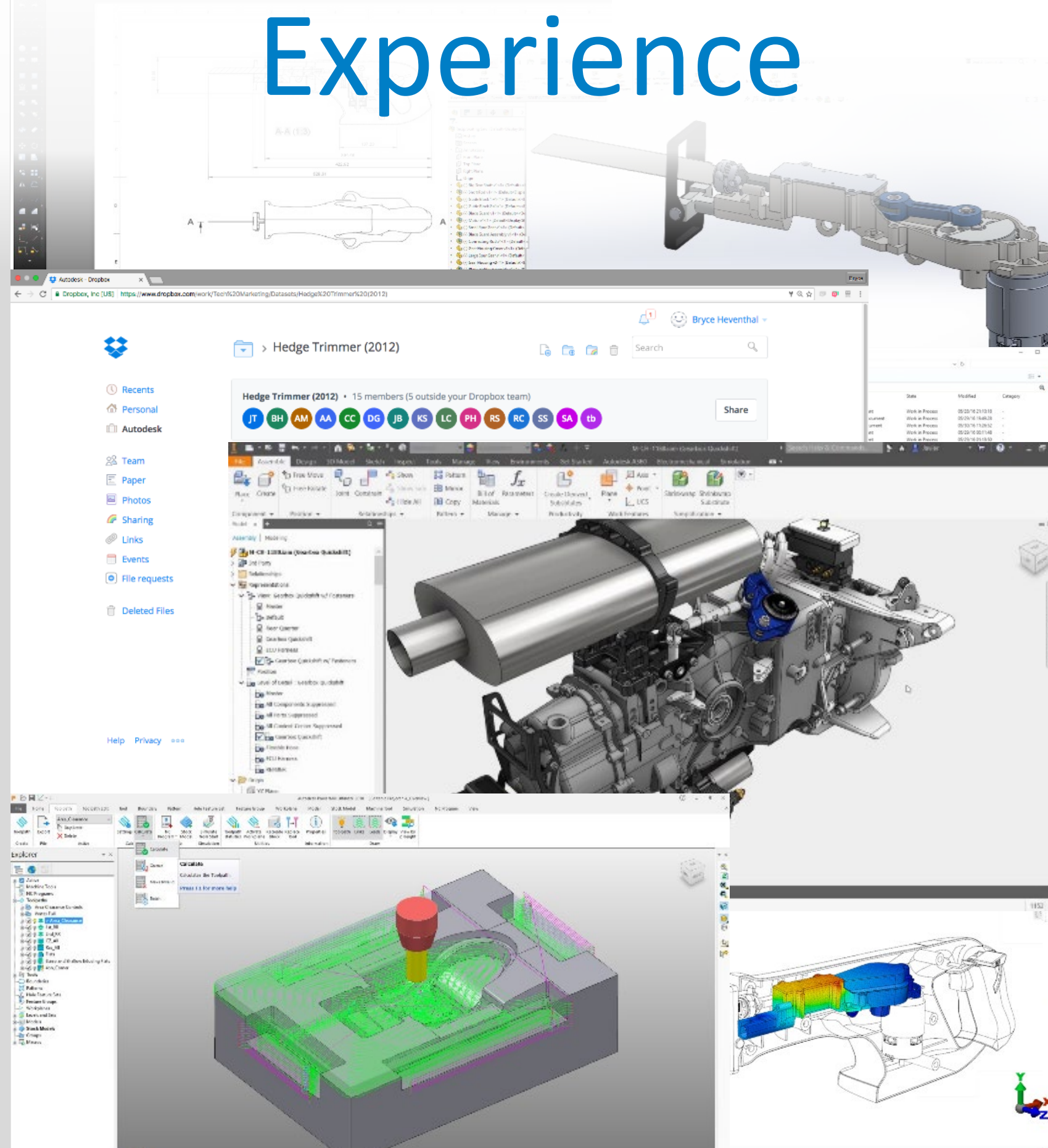
Data

	Part Name	Part Description	Quantity
1	Pololu Power HD Micro Servo HD-1800A	Plucking motors	6
2	Pololu Continuous Rotation Servo 1248	Tuning motors	6
3	Black Delrin rod 3/4" diameter	Tuning peg attachments	6
4	Clear Polycarbonate 1/4" sheet	Guitar stand material	1
5	Black Delrin bar 1" thick	Guitar neck support material	1
6	National Instruments myRio-1900	Microcontroller	1
7	3D printed ABS plastic	Guitar pick holders	6
8	7' LED strands, battery powered	Go Zz	~

```
G0 Z2
G0 X28.7896 Y10.2558
G0 Z0.1
G1 Z-0.1 F100
G1 X28.8448 Y10.2470 F300
G1 X28.8994 Y10.2330
G1 X28.9528 Y10.2139
G1 X29.0042 Y10.1892
G1 X29.0531 Y10.1587
G1 X29.1001 Y10.1238
G1 X29.1439 Y10.0831
G1 X30.0837 Y9.1179
```



Experience



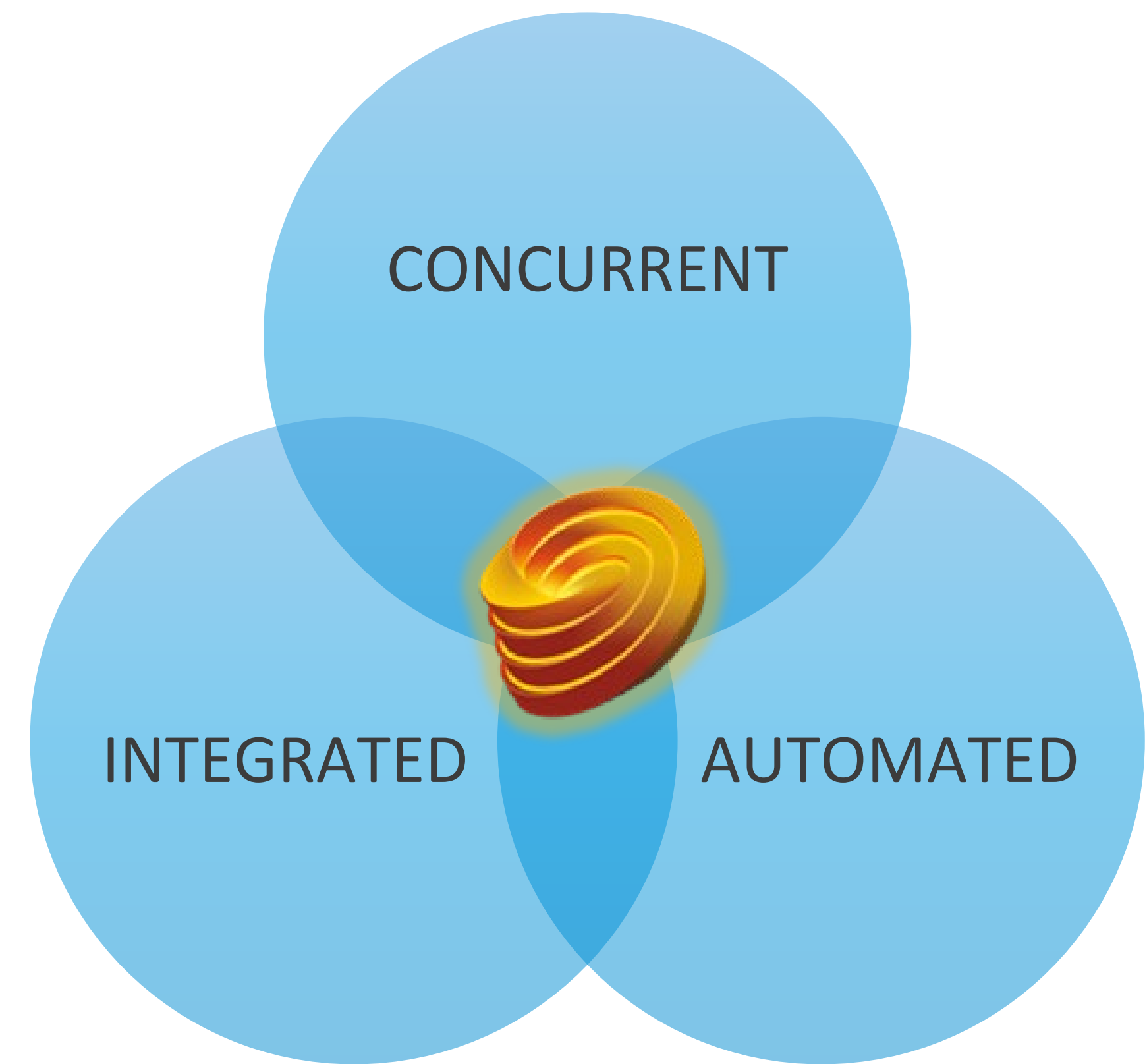
Technology



Manufacturing Data Framework

Empower D&M teams to design and make better products faster

- Data at the Center
- Support highly collaborative editing of Product data
- Support automation workflows
- Support Customization
- Enable Insights and Decision Making



Use Example | Extensible Properties

Without Fusion on Forge Data

- **Limited property availability**, all managed by Autodesk - only available in the Fusion Modeler and Derivative Service outputs
- Not available via Data API (i.e. **no automation opportunity**)
- All property edits dirty the model and **version the file** forward
- Concurrent edits clobber each other
- Potentially **inconsistent** (e.g. duplicate part numbers live within distinct files)

With Fusion on Forge Data

- Properties can surface in **any UI** – Autodesk or our partner applications
- **Extensible**, can define custom properties of varying types
- **Hyper-collaboration** by different roles and tools:
 - Edits happen outside the context of model, concurrently
 - No conflict on edits to different properties
 - High frequency edits model
- **Consistency** (e.g. unique part numbers managed in central Forge Data)

Use Example | Bill of Materials

Without Fusion on Forge Data

- CAD-BOM relationships are **encapsulated** in the Fusion file
- Product-BOM relationships are either **not managed** or managed externally
- Any collaboration around BOM data requires **export and import** operations, making it impossible to identify the single source of truth

With Fusion on Forge Data

- All BOM relationships are managed in Forge Data providing a **single source of truth**
- Business rules can identify how to **propagate changes** in one type of BOM relationships to another or flag data as out of date
- Non-Design colleagues can contribute to Product Structure in upstream and downstream business workflows

Fusion Components Navigator

(WORK IN PROGRESS)

- New web-based Components navigator
- Exposes entire design structure (xrefs and local components) outside Fusion 360 experience
- Selectively expose properties encapsulated within classic files
- Structure accessible via REST APIs by any partner application
- Interactive eventing of signification notifications and bidirectional writeback

Common Data Experience Demo App FQA

Common Data Experi...

Steinr

BodySection_Mid

BodySide

Body_Leg_Connector

CNut

Front_Leg

Hind_Leg

M_Leg

Mouth_Insert

Nut_M2

Pincer

PincerGrip

PincerGrip_Left

PincerJaw

Samurai Scorpion

Screw_M2x16

Screw_M2x5

Screw_M2x8

Spine

History

Properties

Components

Setup Sheet

Setup Sheet Configurator

Diagnostics

Assign Item Number

Quick Release

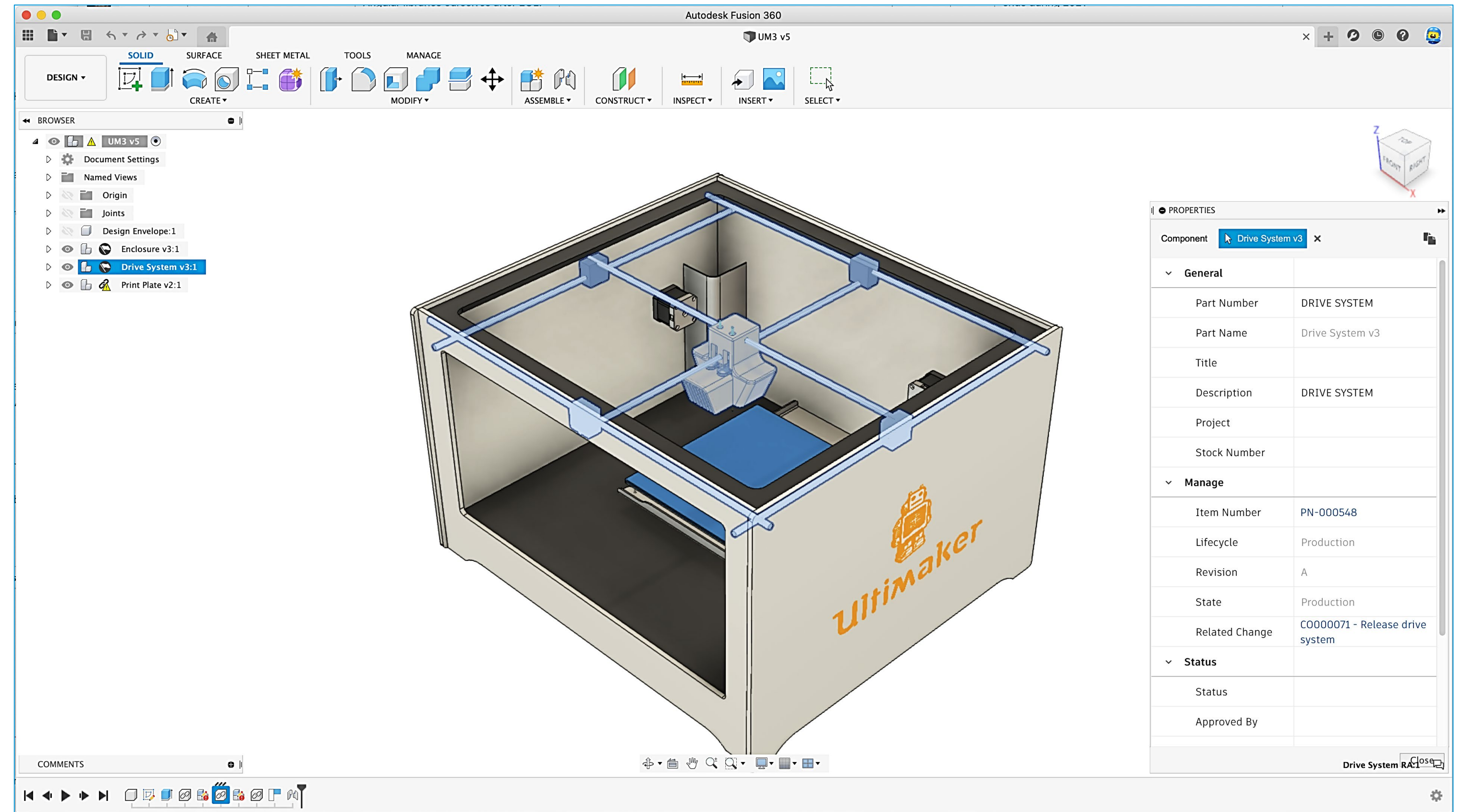
ECO Release

Part Name		Part Number	Title	Description	Project	Stock Number	Designer
Samurai Scorpion		Samurai Scorpion					
Tail_Assembly		SC-0025	Tail Assembly	Tail Assembly	Samurai Scor...	SS-9135	Clark
Nut_M2		Nut_M2	M2 Hex Nut	Hex Nut	Samurai Scor...	SS-5873	Mike
Body		Body					
Screw_M2x16		Screw_M2x16	M2 x 16 Regular Screw	Regular Screw	Samurai Scor...	SS-M216	Hunter
BaseLegAssy		SC-0008	Updated Title	Base Leg Assembly	Samurai Scor...	SS-5912	Sanjay
BasePlate_T		SC-0002	Base plate		Samurai Scor...	SS-5987	Cheyenne
BasePlate_Bottom		SC-0001	BasePlate_Bottom				
Front_Leg		SC-0005	Front Leg	Front Leg	Samurai Scor...	SS-5894	Kim
Hind_Leg		SC-0007	Hind Leg	Back Leg	Samurai Scor...	SS-5667	Hellen
Body_Leg_Connector		SC-0004	Leg Connector	Body Leg Connector	Samurai Scor...	SS-5436	Rob
M_Leg		SC-0006	Middle Leg	Middle Leg	Samurai Scor...	SS-5682	Kim
Internal Comp		Internal Comp					

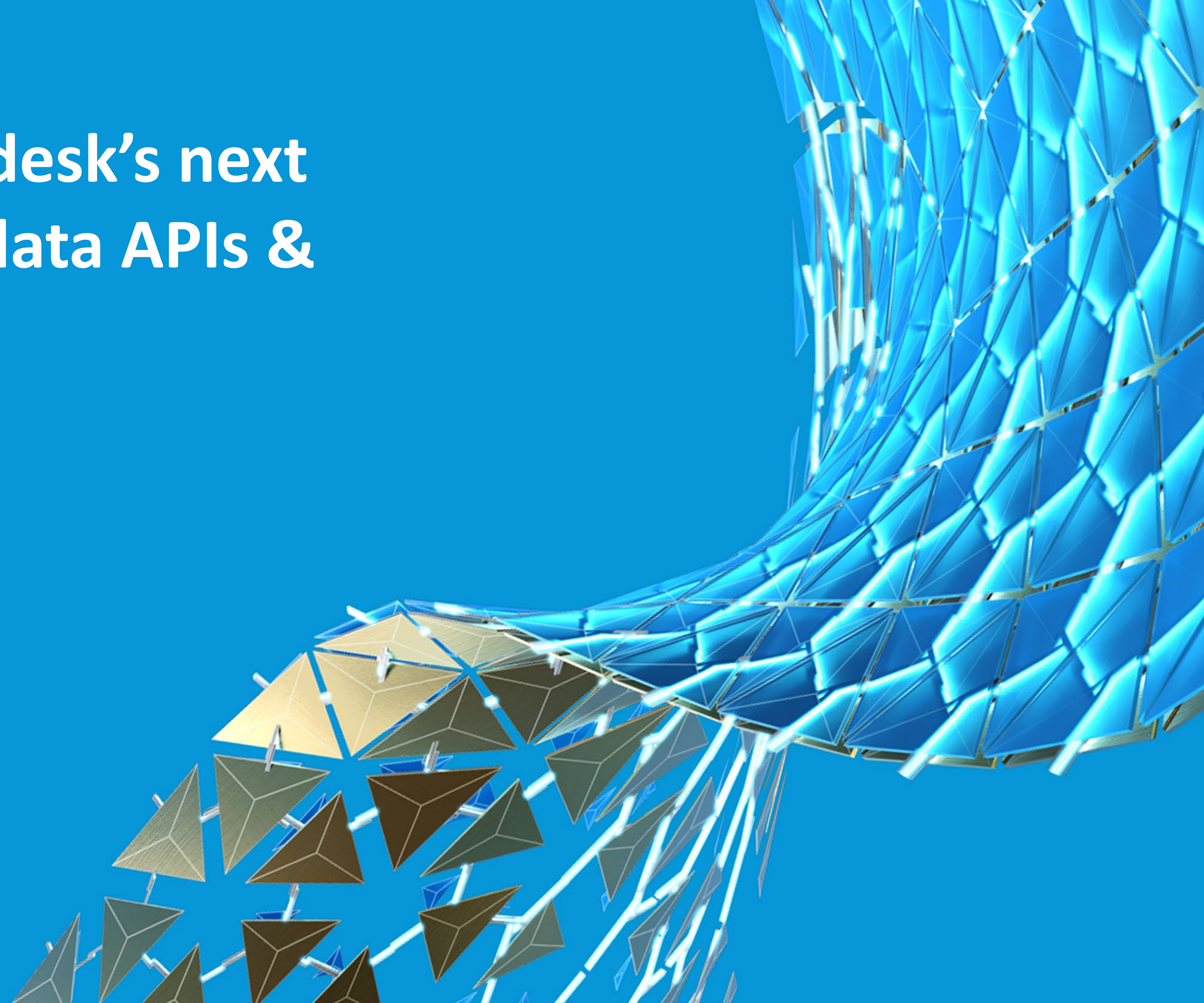
Fusion 360, Team and Lifecycle Integration

WORK IN PROGRESS

- Advancing Data Management with Process Workflows
- Automated Numbering for Components and Drawings
- Engineering Release Process
 - Quick-Release
 - ECO Approval Workflow
- Automated Revisioning and Lifecycle States



Exposing Autodesk's next generation of data APIs & components



Guiding principles for our next-gen data APIs / SDKs

1. Drive more **transparency** in our data models
2. Preserve customer **data / workflow longevity** by architecting **clear technology interfaces**
3. Ensure these services **perform reliably at scale**
4. Provide industry-leading **data governance and security**
5. Foster **extensibility** by delivering **powerful but easy-to-use** APIs / SDKs

Drive Targeted
Internal Adoption

Scale Internal
Adoption

Externalize APIs and
SDKs

Conclusion and Questions

1. Forge Help: <https://forge.autodesk.com/en/support/get-help>
2. Forge Answer Bar
 - a) Search for the Answer Bar from AU site, and then find the Forge specific one
 - b) Time slots will be available around the clock during this year's Virtual AU event!
 - c) Also languages and experts will be advertised, so we can help you as much as possible in a "live" setting
3. Sign for a Forge Developer account on <https://forge.autodesk.com/>



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