

# Forge 发展路线图动态： Fusion和 Forge Data

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**翻译：梁晓冬**

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# 数据带来的挑战

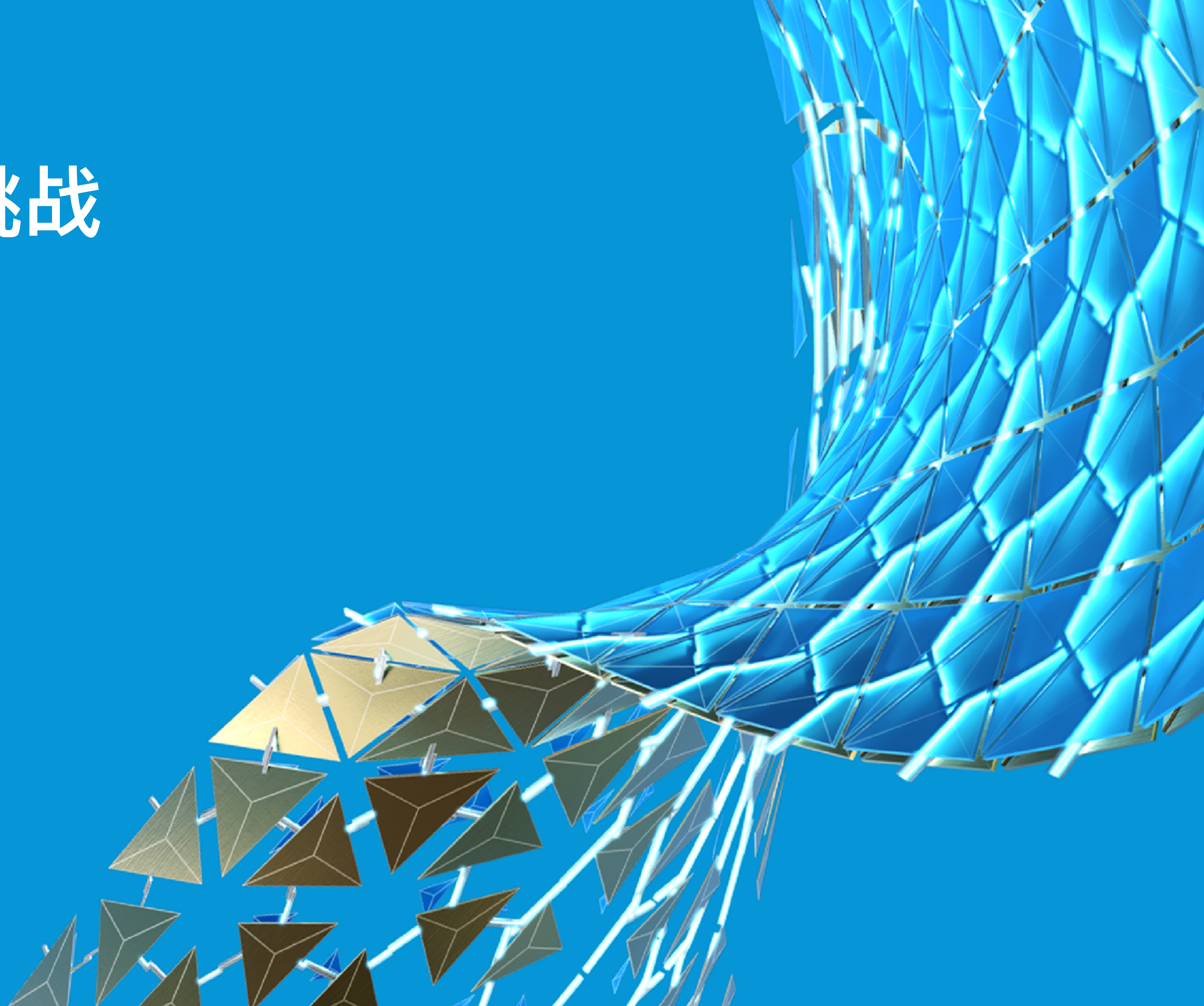










Image courtesy of Tesla Motors, Inc.



Image courtesy of Gensler



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# 未来的数据

价值点在哪里？

互用性

应用程序间数据的自由流动

协作性

不同团队间的数据分享

可检索

过滤和检索数据

可追溯

追溯和检查数据

可分析

洞察数据













表示层

业务逻辑

数据







表示层

业务逻辑

数据



表示层

业务逻辑

数据



表示层

业务逻辑

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表示层

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表示层

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表示层

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表示层

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表示层

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表示层

业务逻辑

数据



表示层

业务逻辑

数据

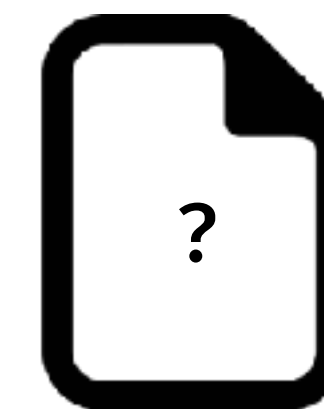


您的app

表示层

业务逻辑

数据





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# 今天的数据

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追溯和检查数据

可分析

洞察数据



# 今天的数据

## 数据挑战

互用性

~~应用程序间数据的自由流动~~

大量资源投入到数据解析，有用数据丢失

协作性

~~不同团队间的数据分项~~

过度数据分项，和数据噪音

可检索

~~过滤和检索数据~~

数据检索时间长

可追溯

~~追溯和检查数据~~

缺乏保持数据粒度的

可分析

~~洞察数据~~

因为数据不一致和噪音，大量投入前期数据分析工作





表示层

业务逻辑

数据



表示层

业务逻辑

数据



表示层

业务逻辑

数据







表示层

表示层

表示层

业务逻辑

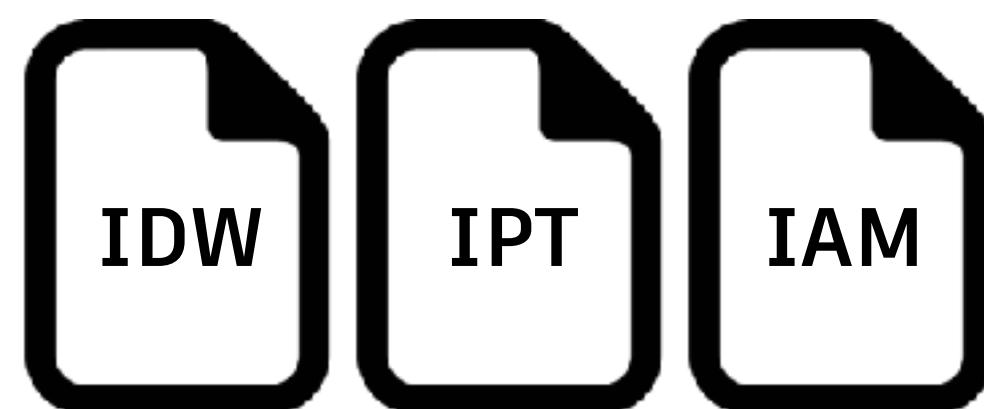
业务逻辑

业务逻辑

数据

数据

数据







表示层

业务逻辑

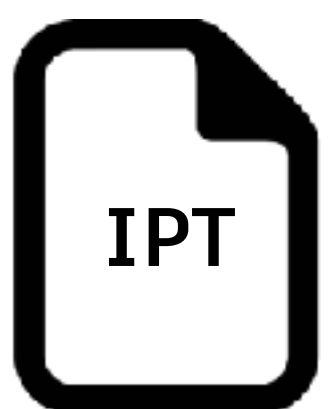
数据



表示层

业务逻辑

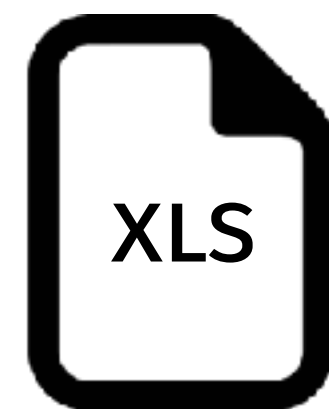
数据



表示层

业务逻辑

数据





您的app

表示层

表示层

表示层

业务逻辑

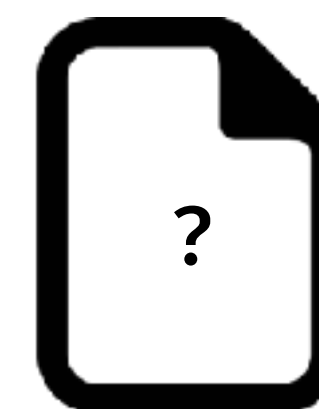
业务逻辑

业务逻辑

数据

数据

数据





# 未来的数据

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过滤和检索数据

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追溯和检查数据

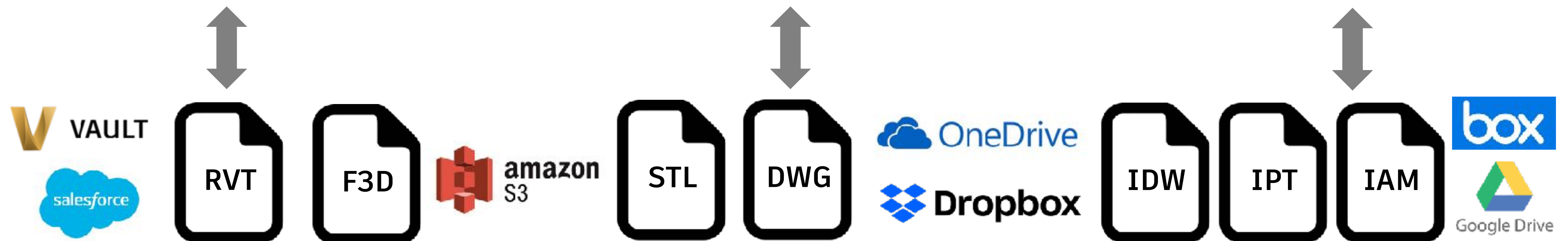
可分析

洞察数据

A F F T M B  
R A O N P I ...

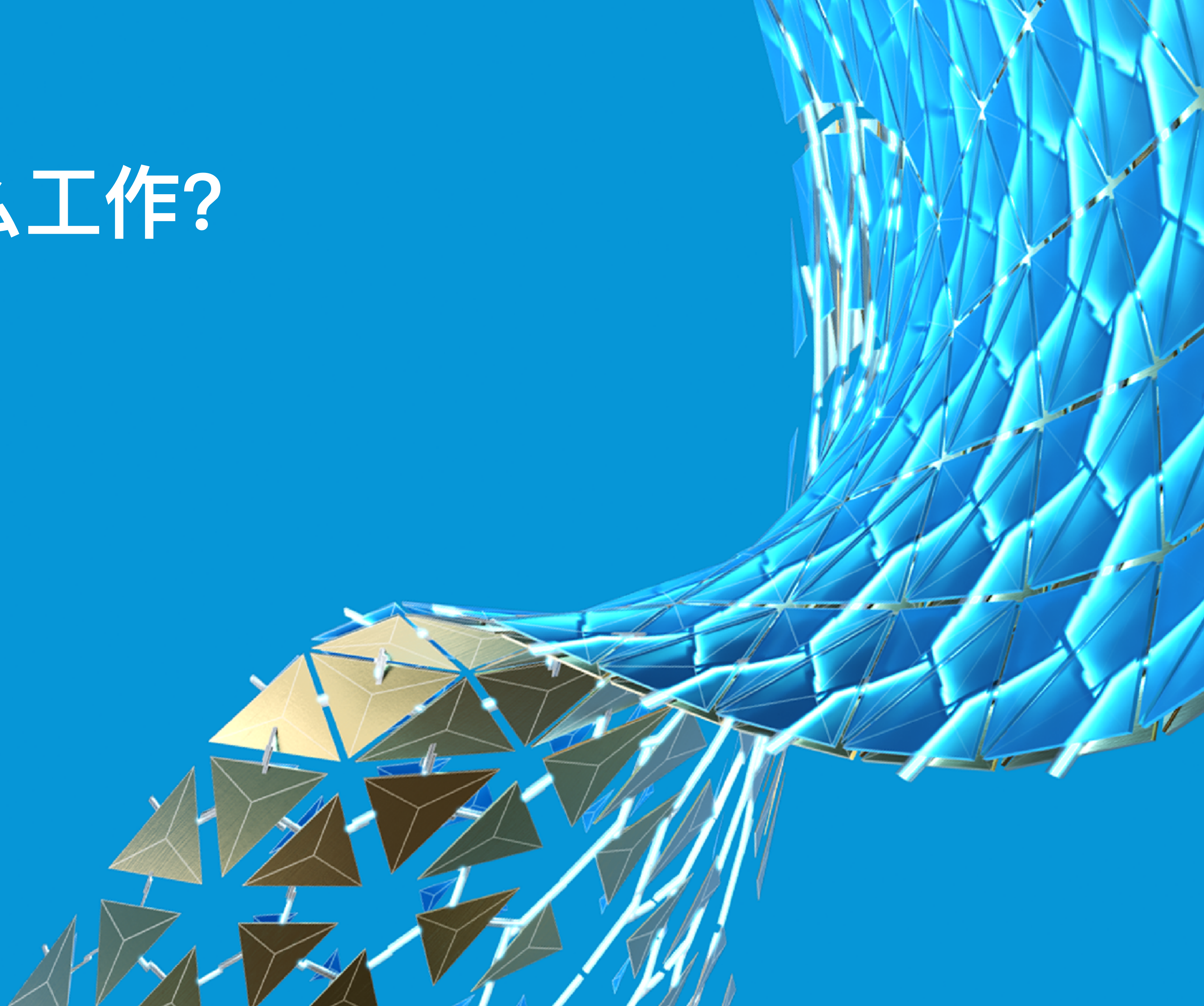


Forge Data





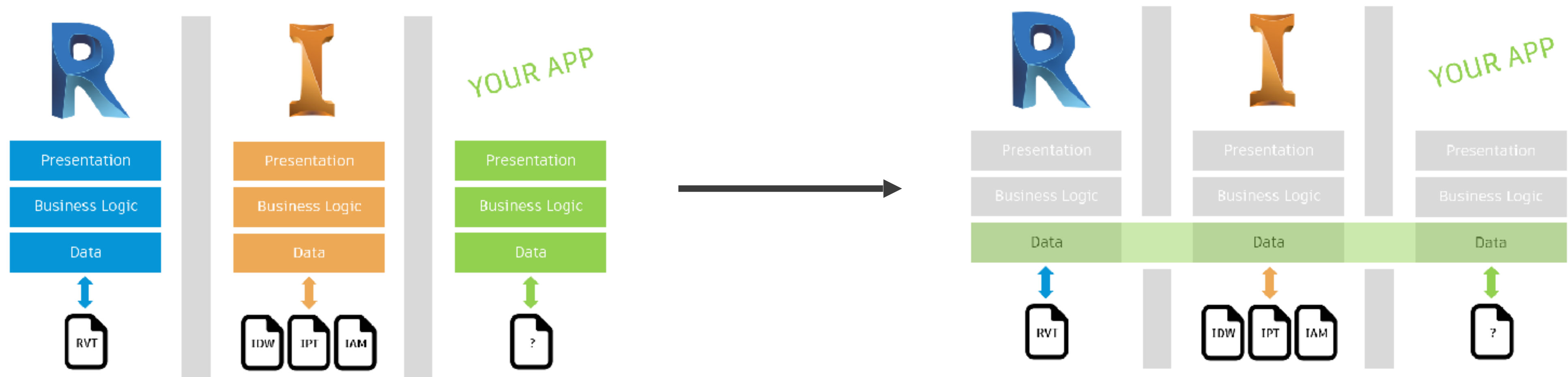
我们做了什么工作？





# 今天的数据和未来

从“数据墙”到“数据窗口”



## 模糊 和不一致的数据

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

## 透明和标准的数据

*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!

But cats cannot read this. Sorry cats.



# 数据透明性和标准性

Forge Data正在做的



## 数据规则

不同app中共享的  
数据规范



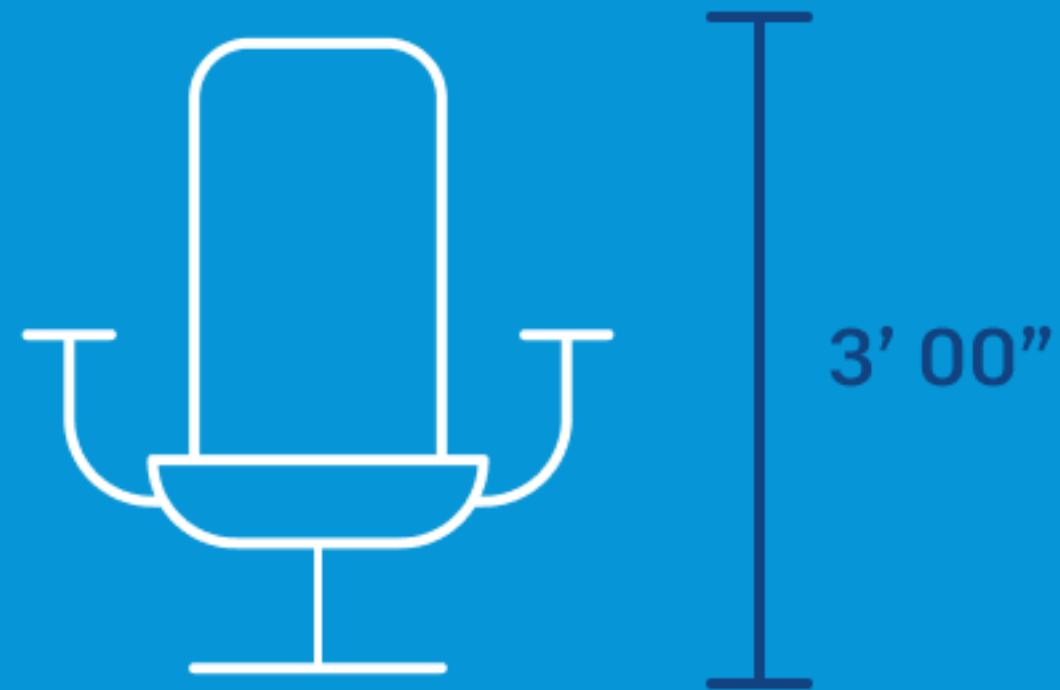
## 数据模型

不同app共性的  
组织数据方式



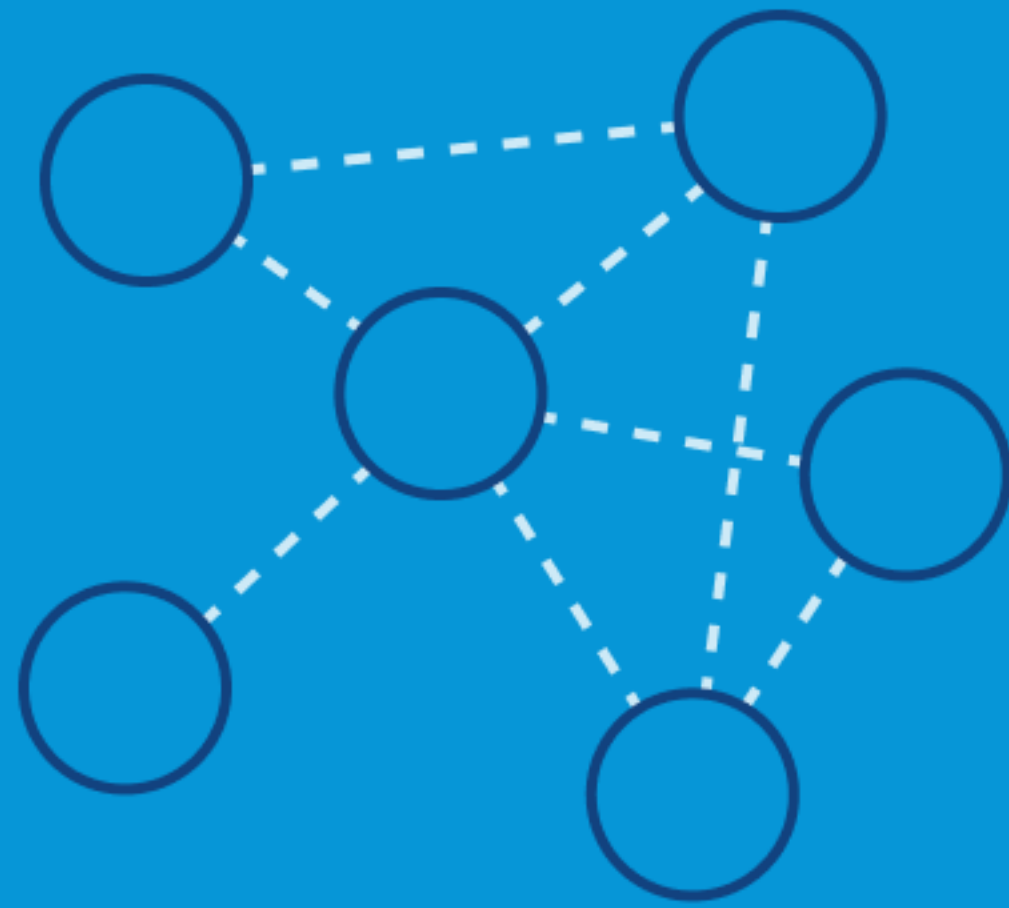
# Data schemas

Ensuring data types are consistent and reusable



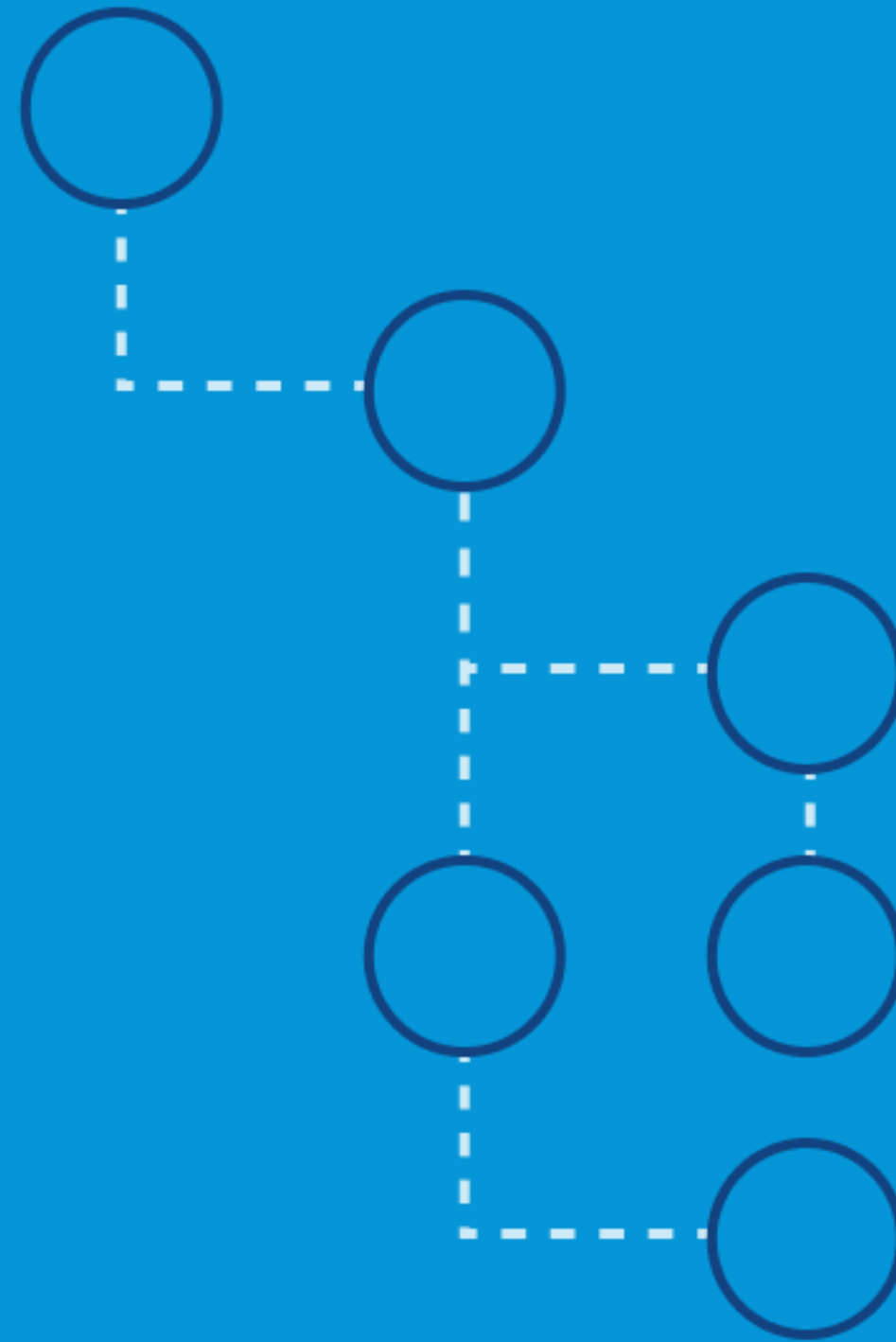
# Data models

Data can be organized in a variety of ways



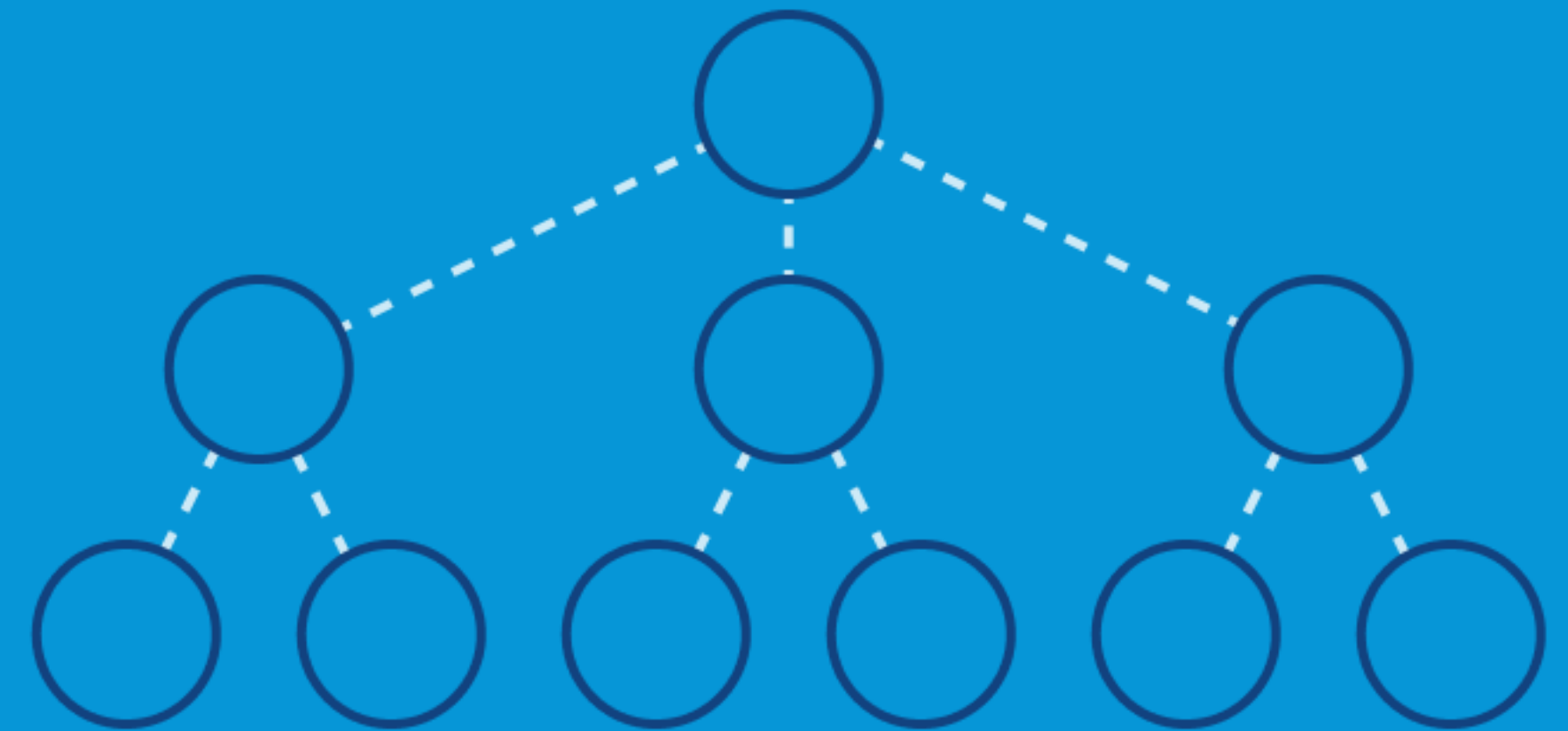
graph

ideal for CAD-based information



hierarchy

ideal for file and folder metadata



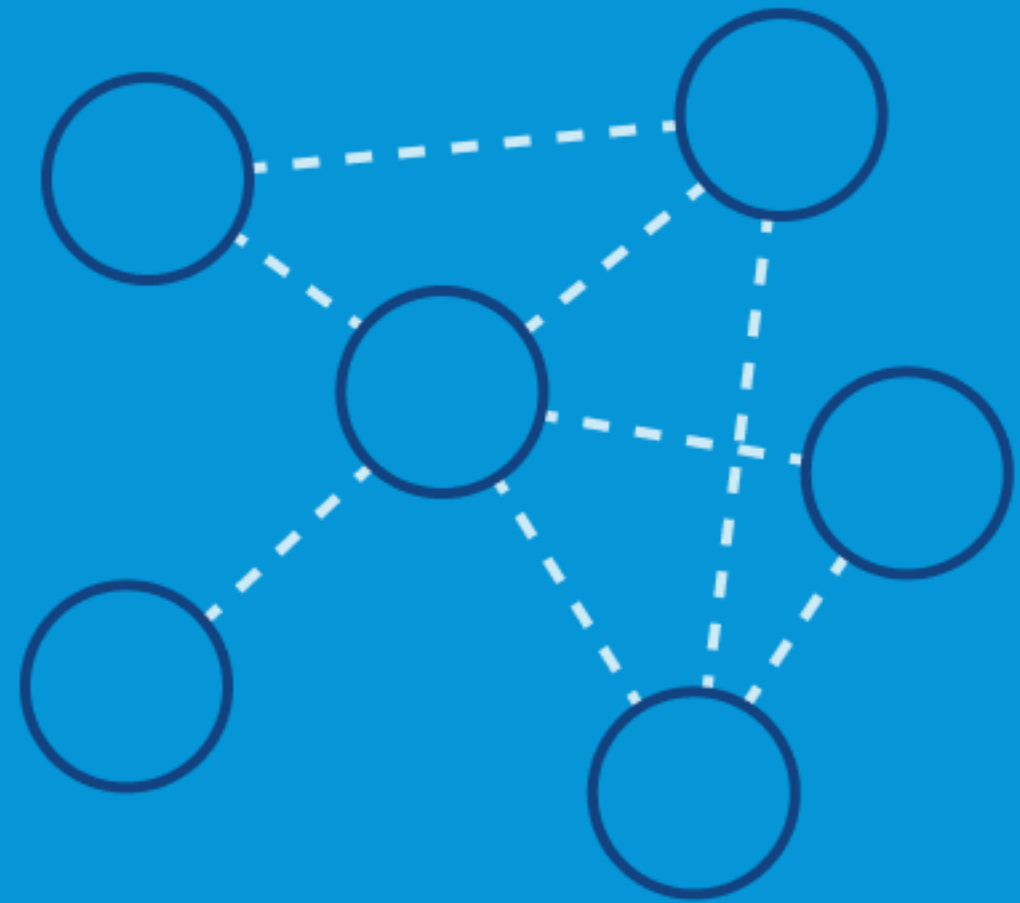
library

ideal for large amounts of static data

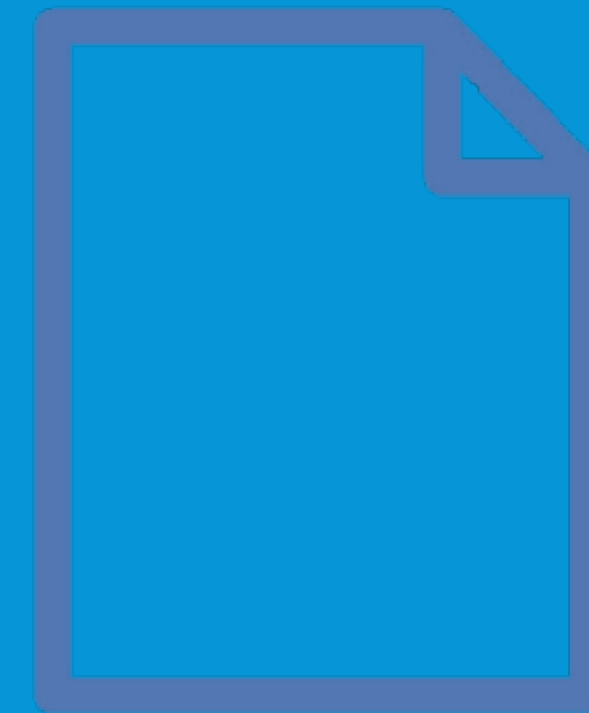


# A hybrid approach in evolving from files to data

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



standardized & transparent data  
models / databases



files & opaque data models



Presentation

Business Logic



Presentation

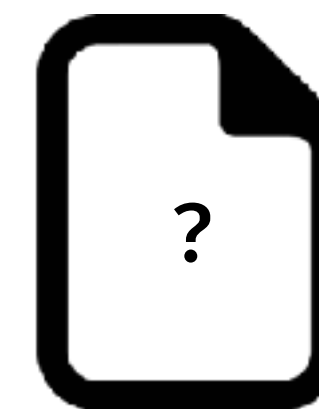
Business Logic

*YOUR APP*

Presentation

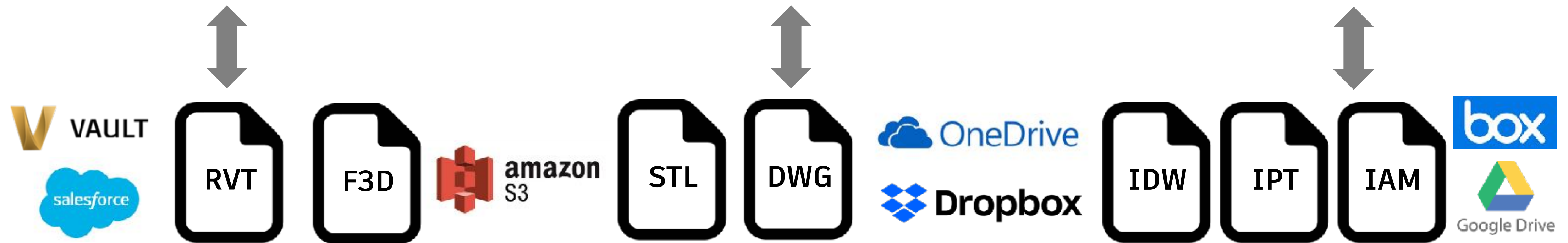
Business Logic

Common data schemas and data models





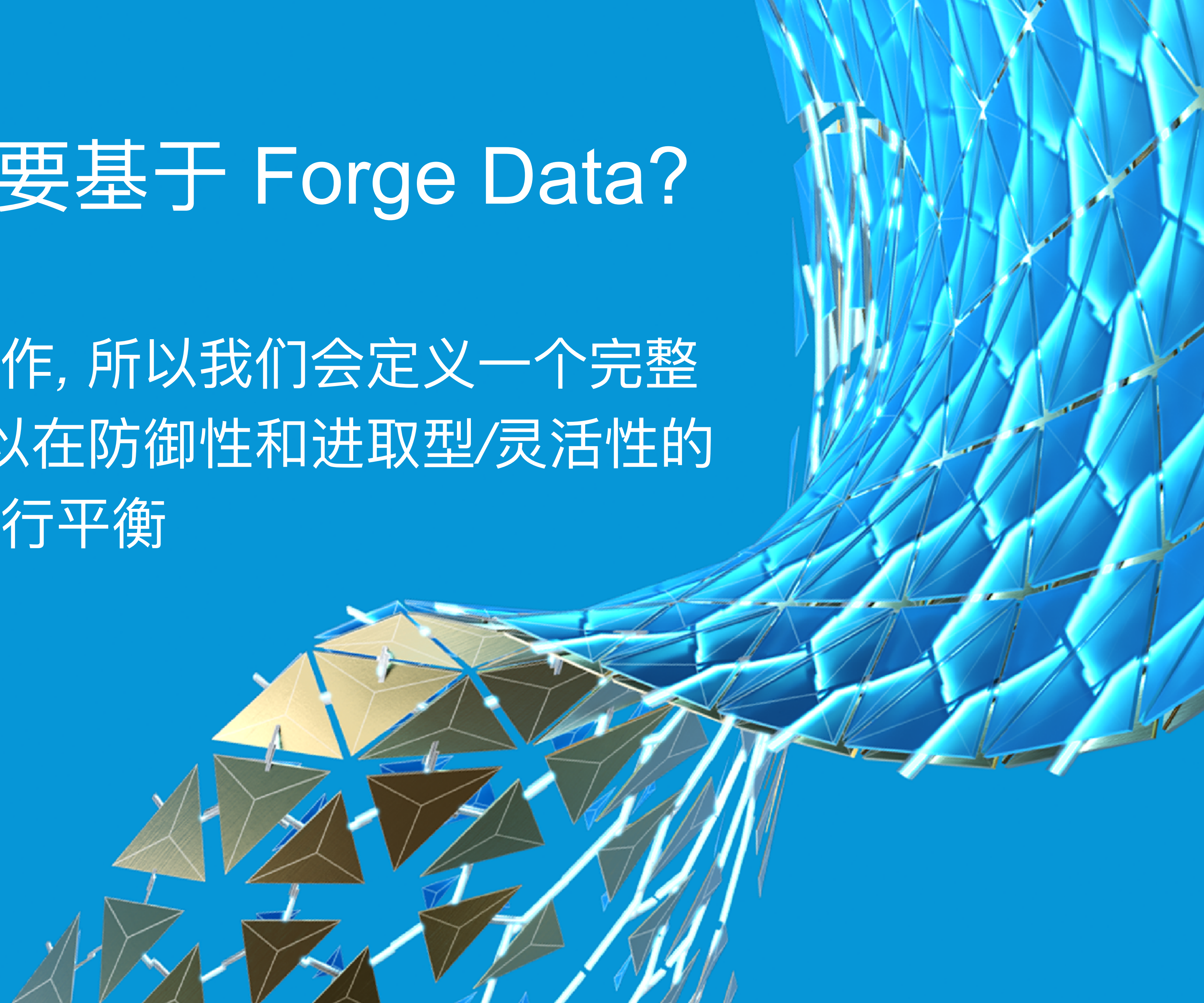
A F F T M B  
R A O N P I ...





# 为何 Fusion 要基于 Forge Data?

我们团队间进行合作, 所以我们会定义一个完整的制造业平台, 可以在防御性和进取型/灵活性的数据策略方案间进行平衡





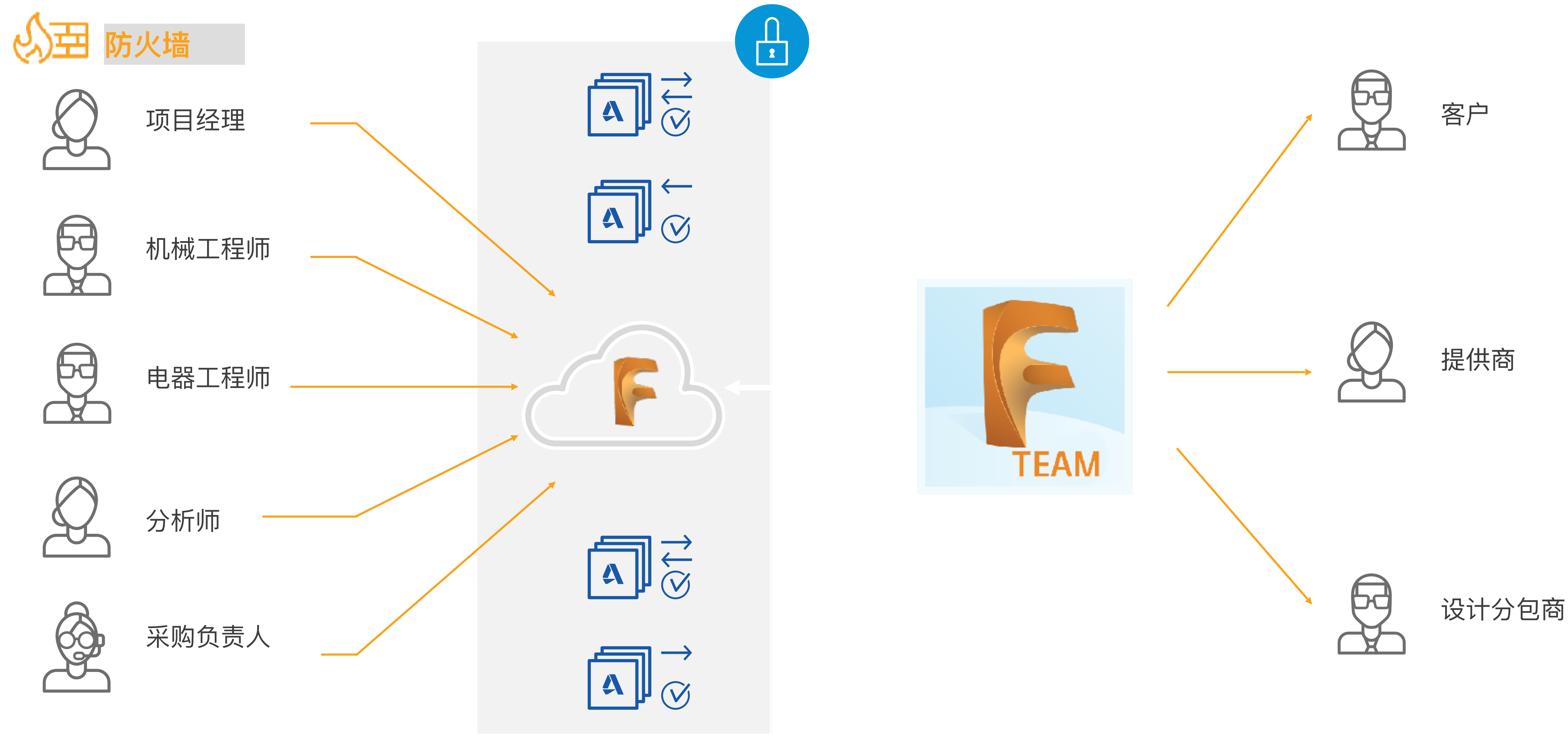


AUTODESK® FUSION 360™

构建于 *Forge Data* 之上



# 团队写作





# Fusion Team的数据管理

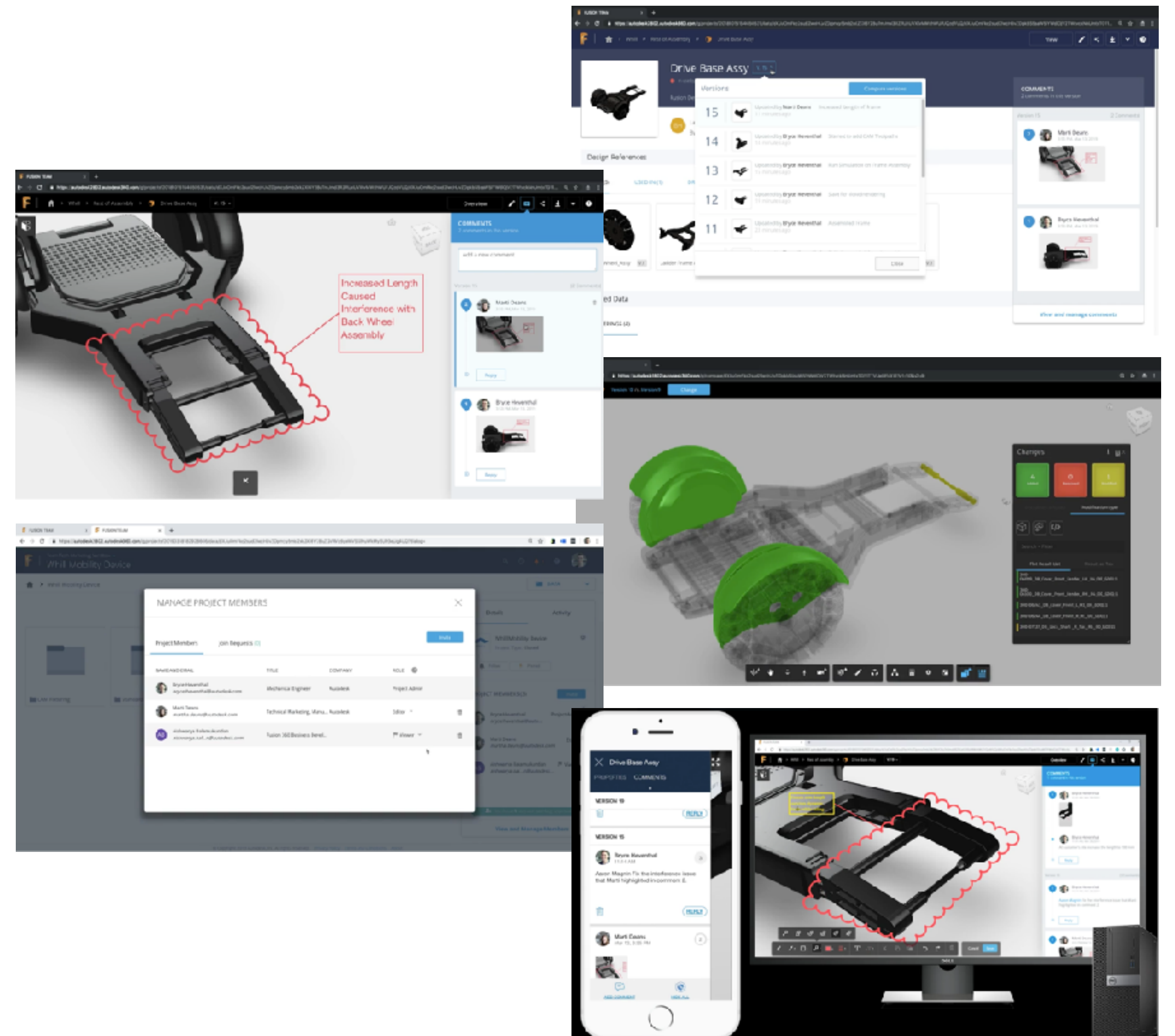
数据保护, 管理, 分享

## 好处

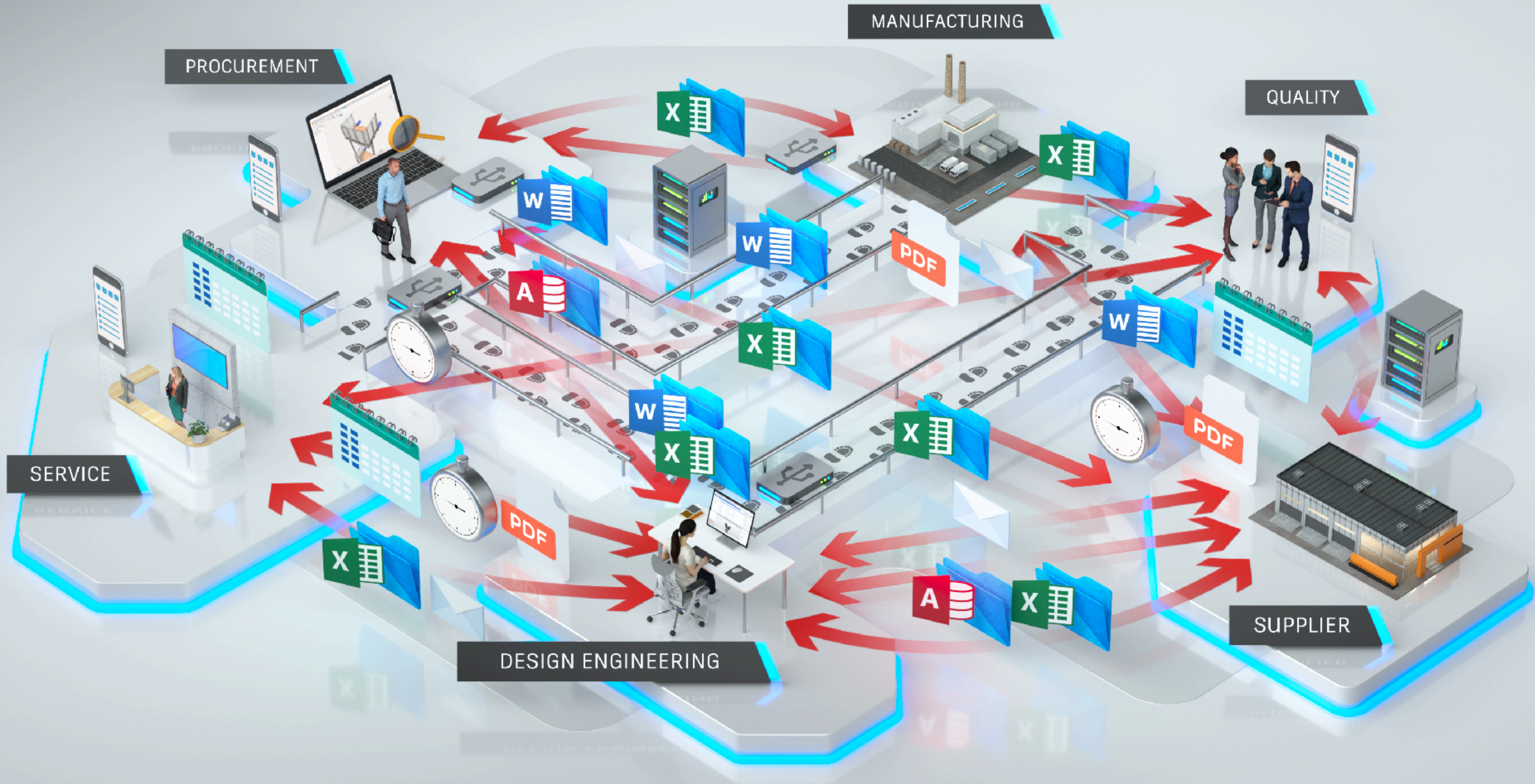
- 邀请内部和外部业主参与到项目
- 安全分享模型和数据
- 全球互联团队
- 任何时候任何地方发生数据决策变化都可以及时追踪

## 功能

- 版本控制
- 云存储
- 注释和圈注
- 文件管理或导出
- 用户管理
- 数据搜索

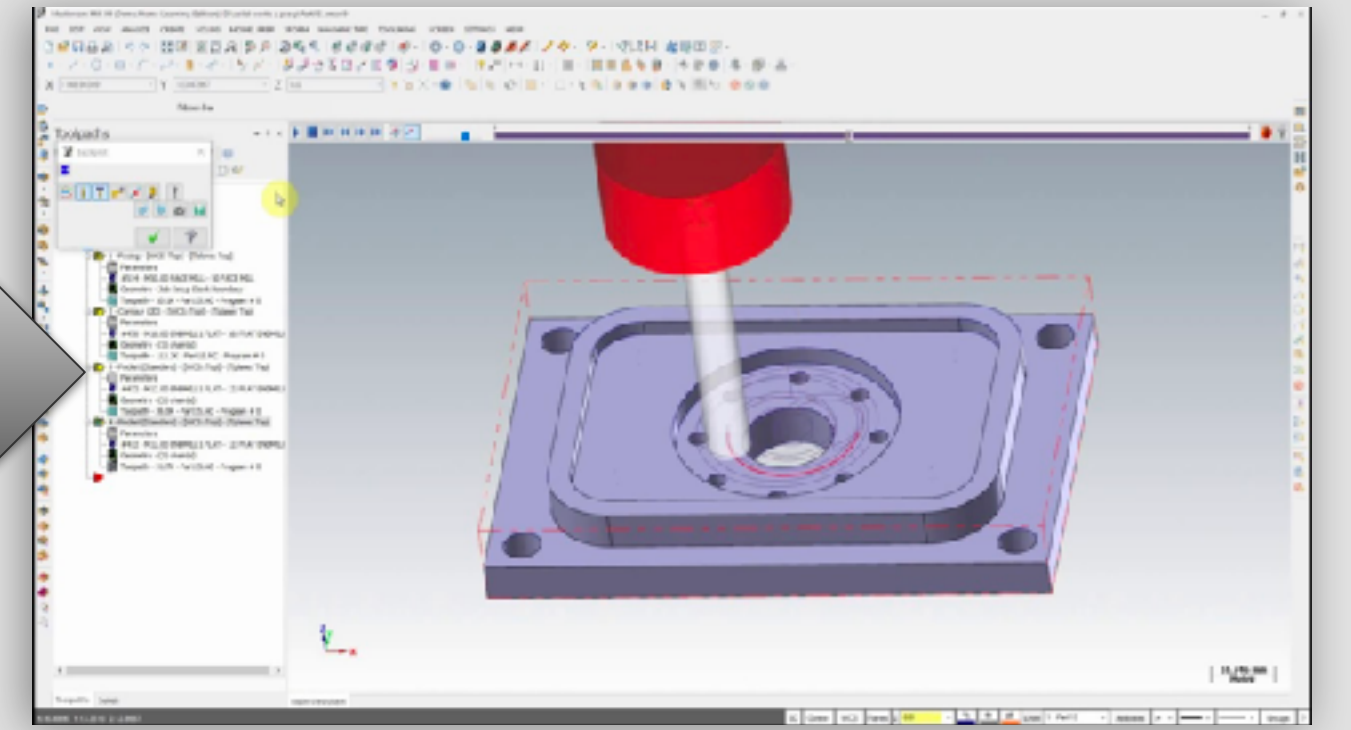
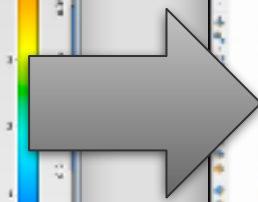
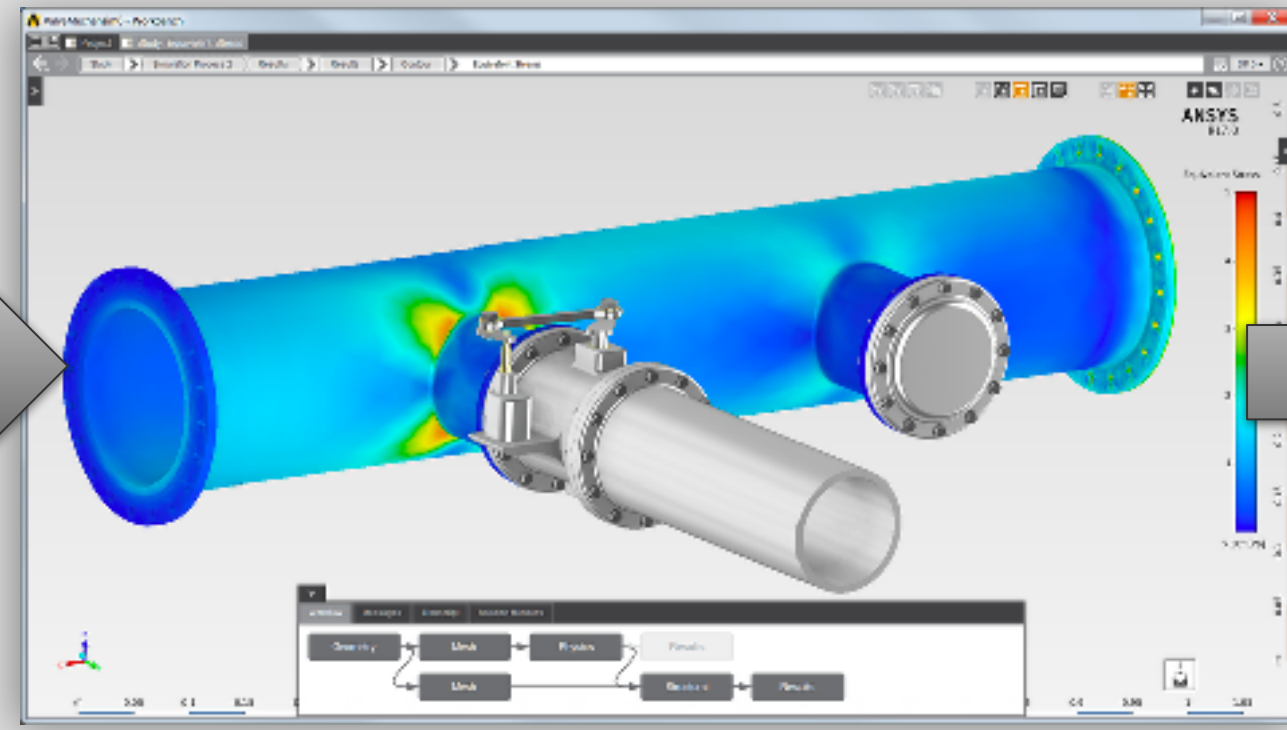
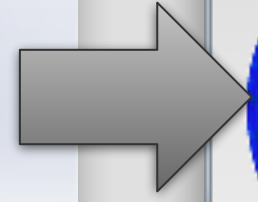
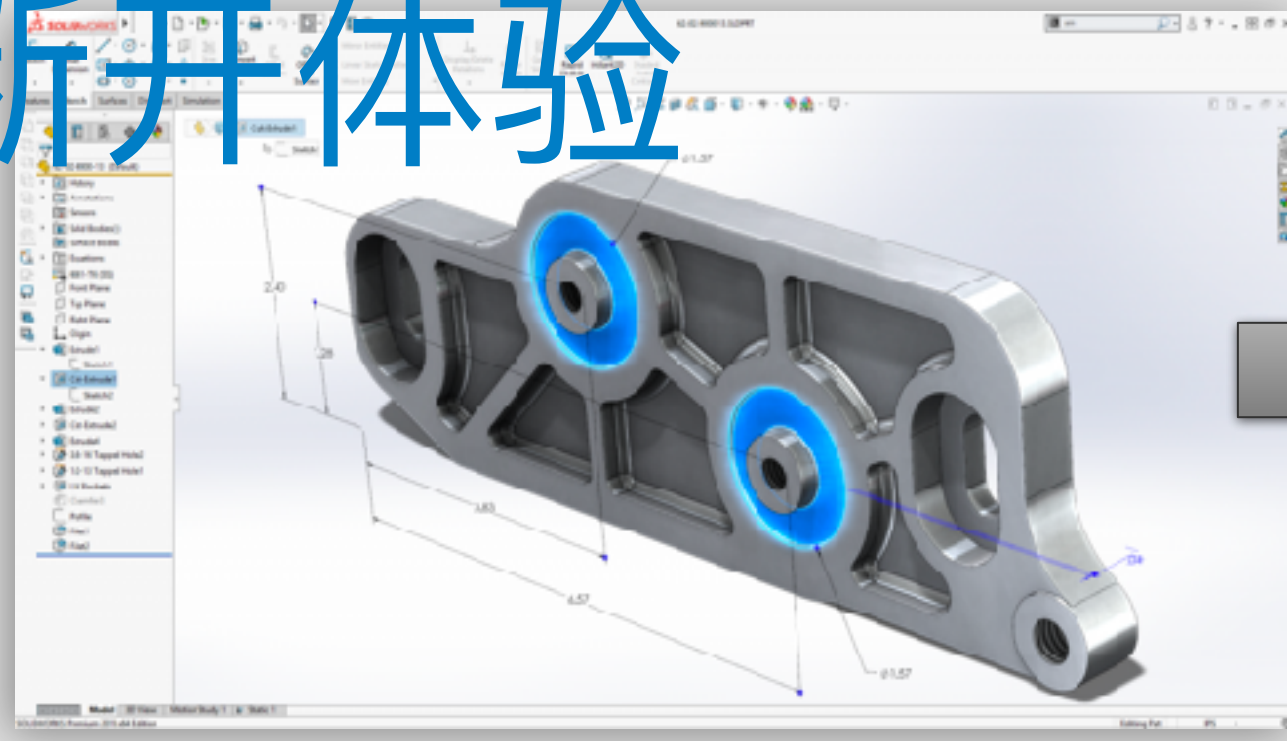




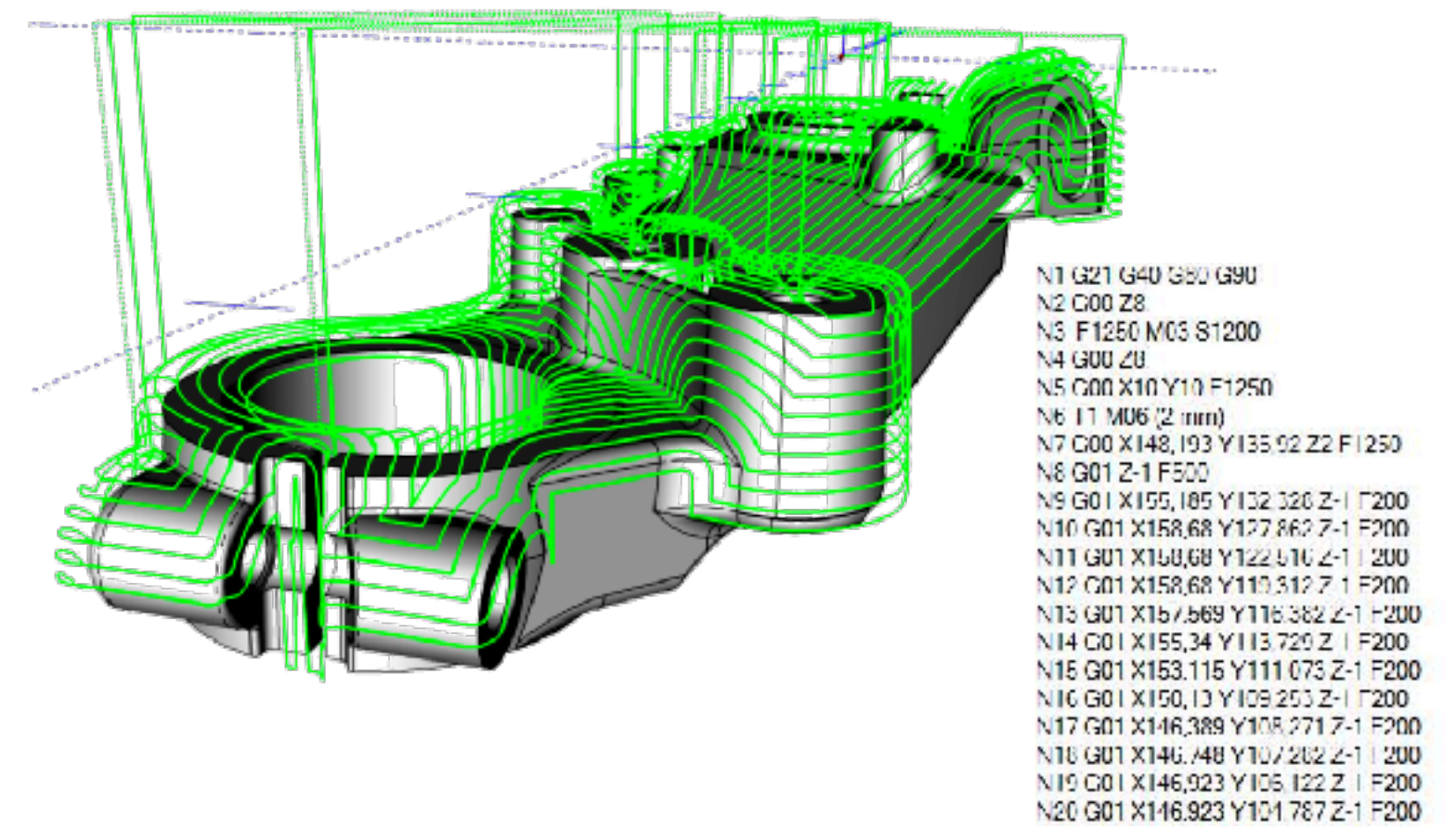
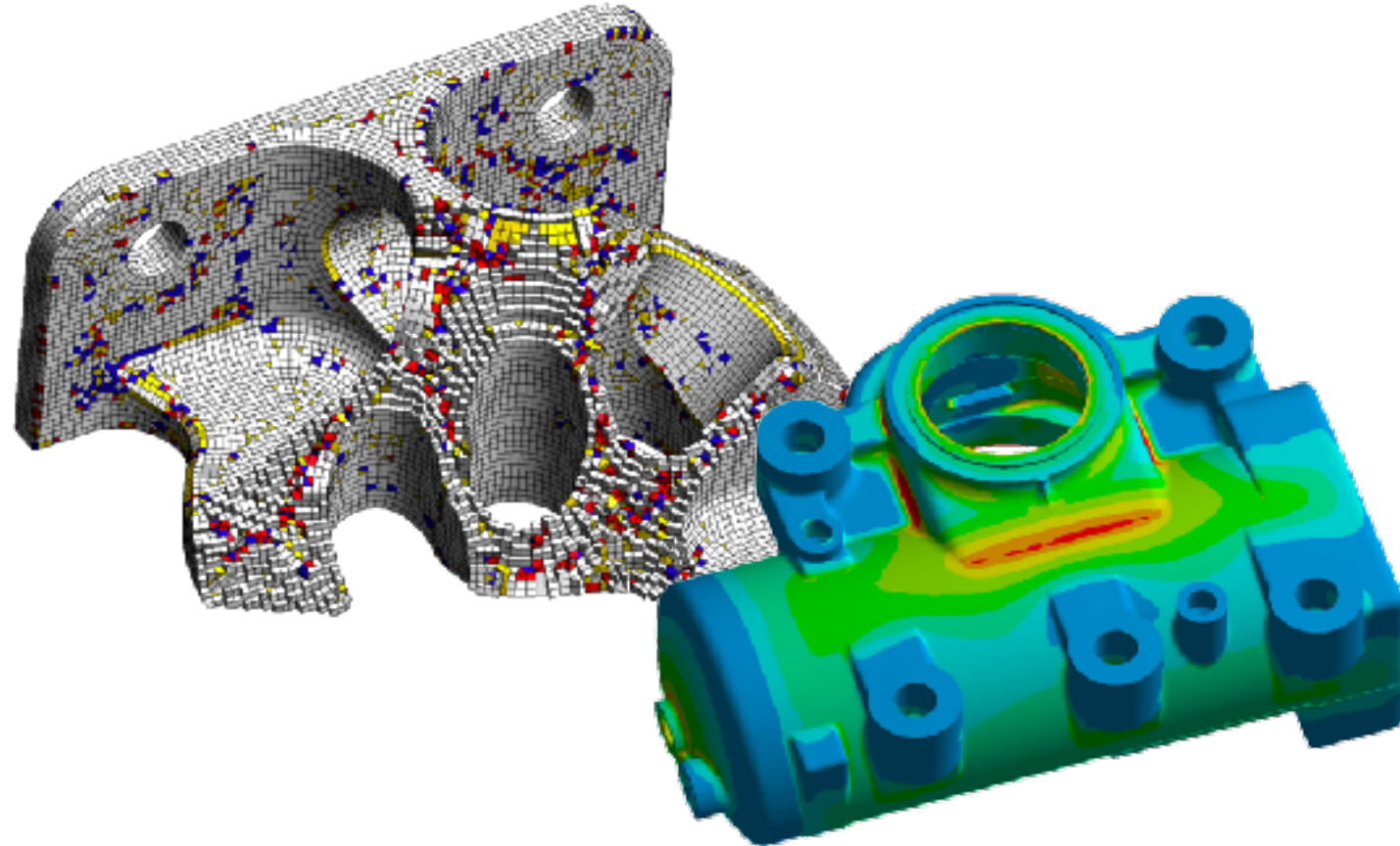
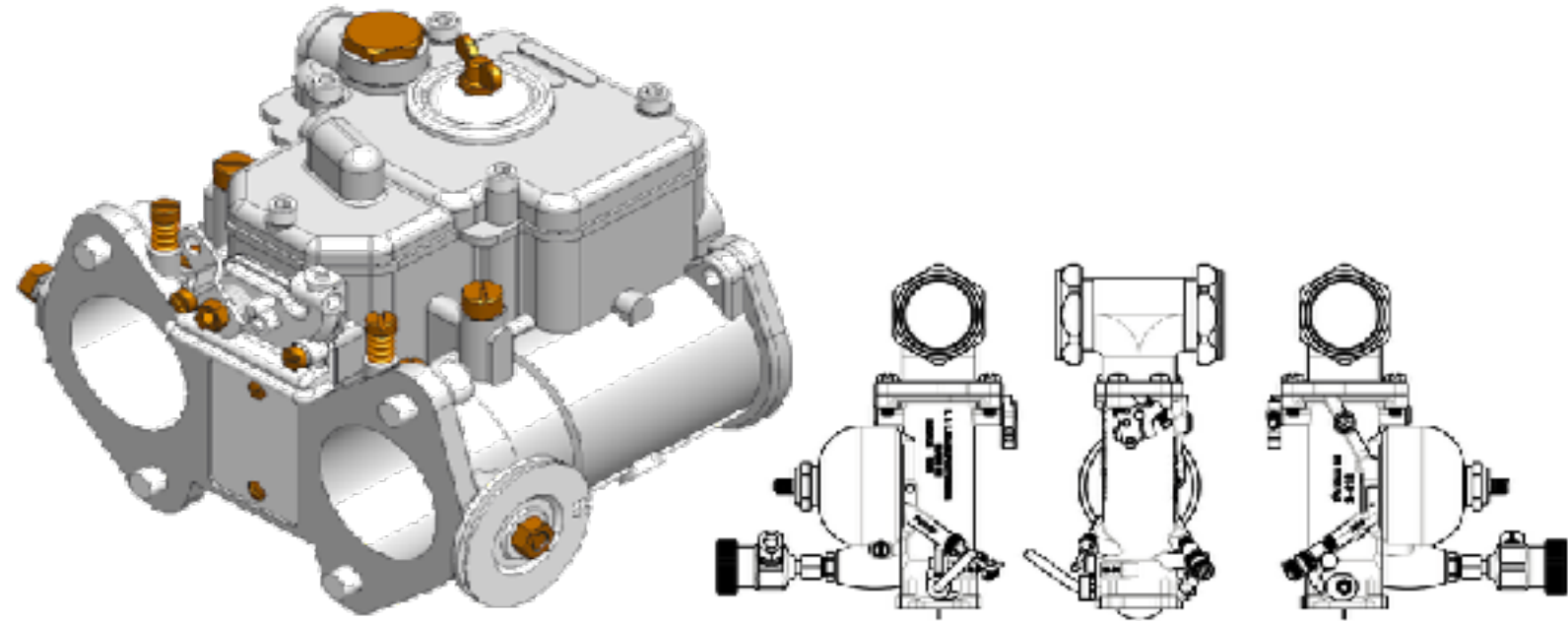




# 串行或断开体验



# 零碎或孤立方案



```
N1 G21 G40 G80 G90  
N2 G00 Z8  
N3 F1250 M03 S1200  
N4 G00 Z0  
N5 G00 X10 Y10 F1250  
N6 T1 M06 (2 mm)  
N7 G00 X148.193 Y135.92 Z2 F1250  
N8 G01 Z-1 F500  
N9 G01 X155.105 Y132.326 Z-1 F200  
N10 G01 X158.68 Y127.862 Z-1 F200  
N11 G01 X160.68 Y122.416 Z-1 F200  
N12 G01 X158.68 Y117.912 Z-1 F200  
N13 G01 X157.569 Y116.382 Z-1 F200  
N14 G01 X155.34 Y113.725 Z-1 F200  
N15 G01 X153.115 Y111.073 Z-1 F200  
N16 G01 X150.13 Y108.253 Z-1 F200  
N17 G01 X146.389 Y108.271 Z-1 F200  
N18 G01 X146.748 Y107.262 Z-1 F200  
N19 G01 X146.923 Y106.122 Z-1 F200  
N20 G01 X146.923 Y101.787 Z-1 F200
```

# 专有技术的阻碍

**SOLIDWORKS**

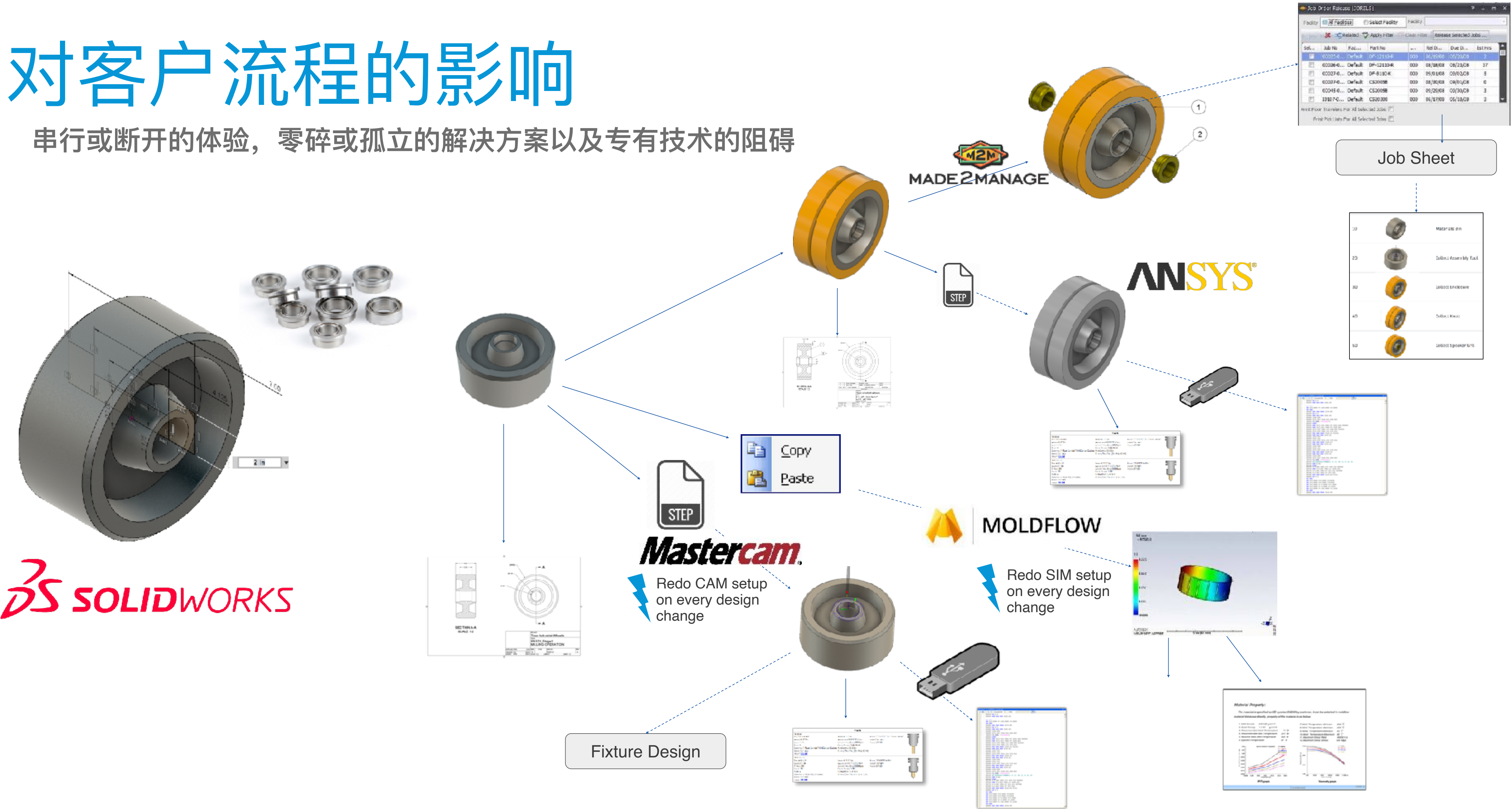
**ANSYS**

**Mastercam**



# 对客户流程的影响

串行或断开的体验，零碎或孤立的解决方案以及专有技术的阻碍



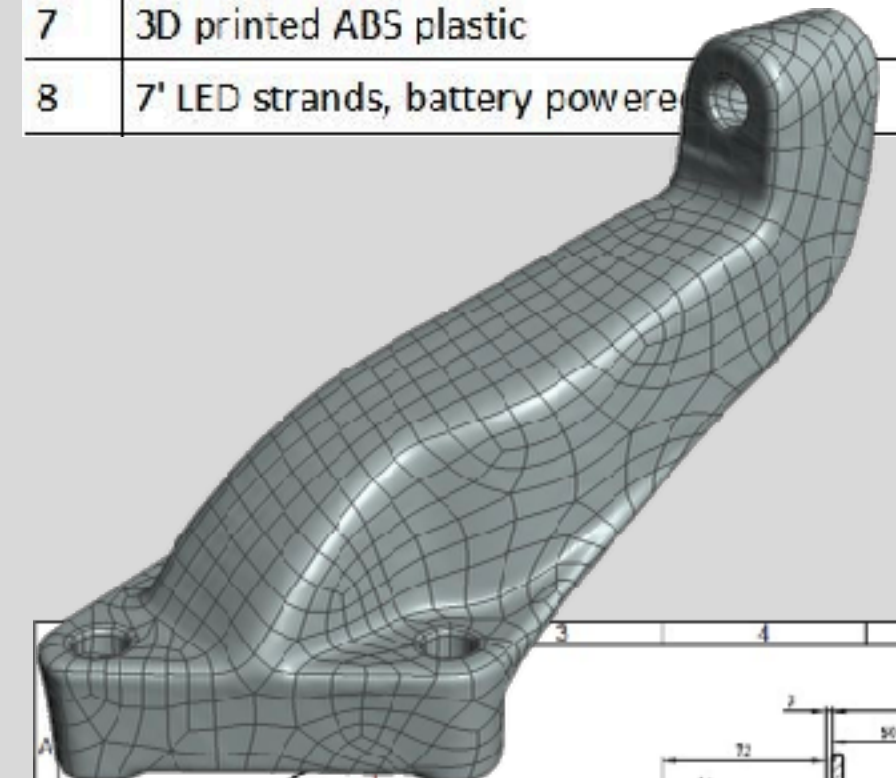


# 数据

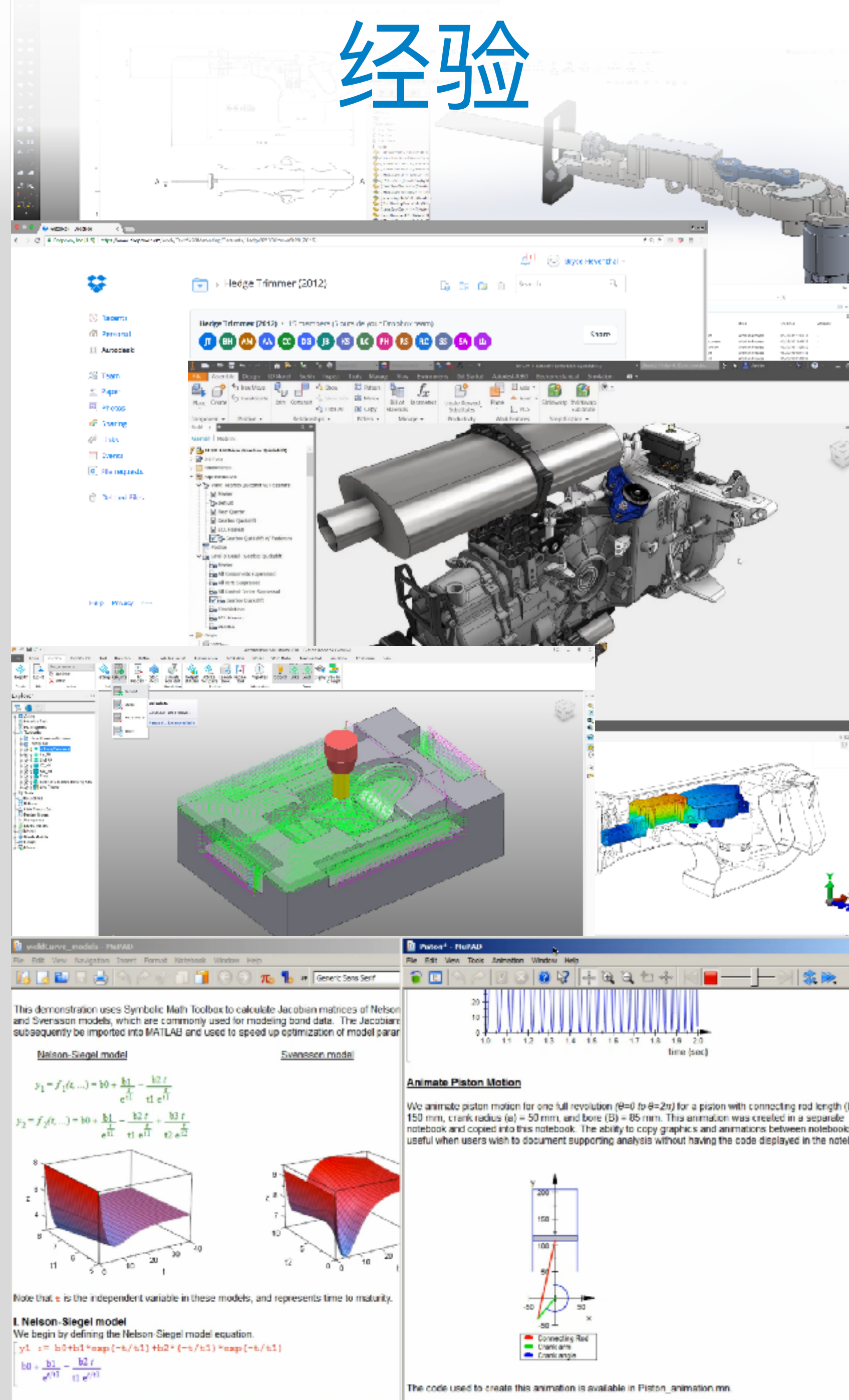
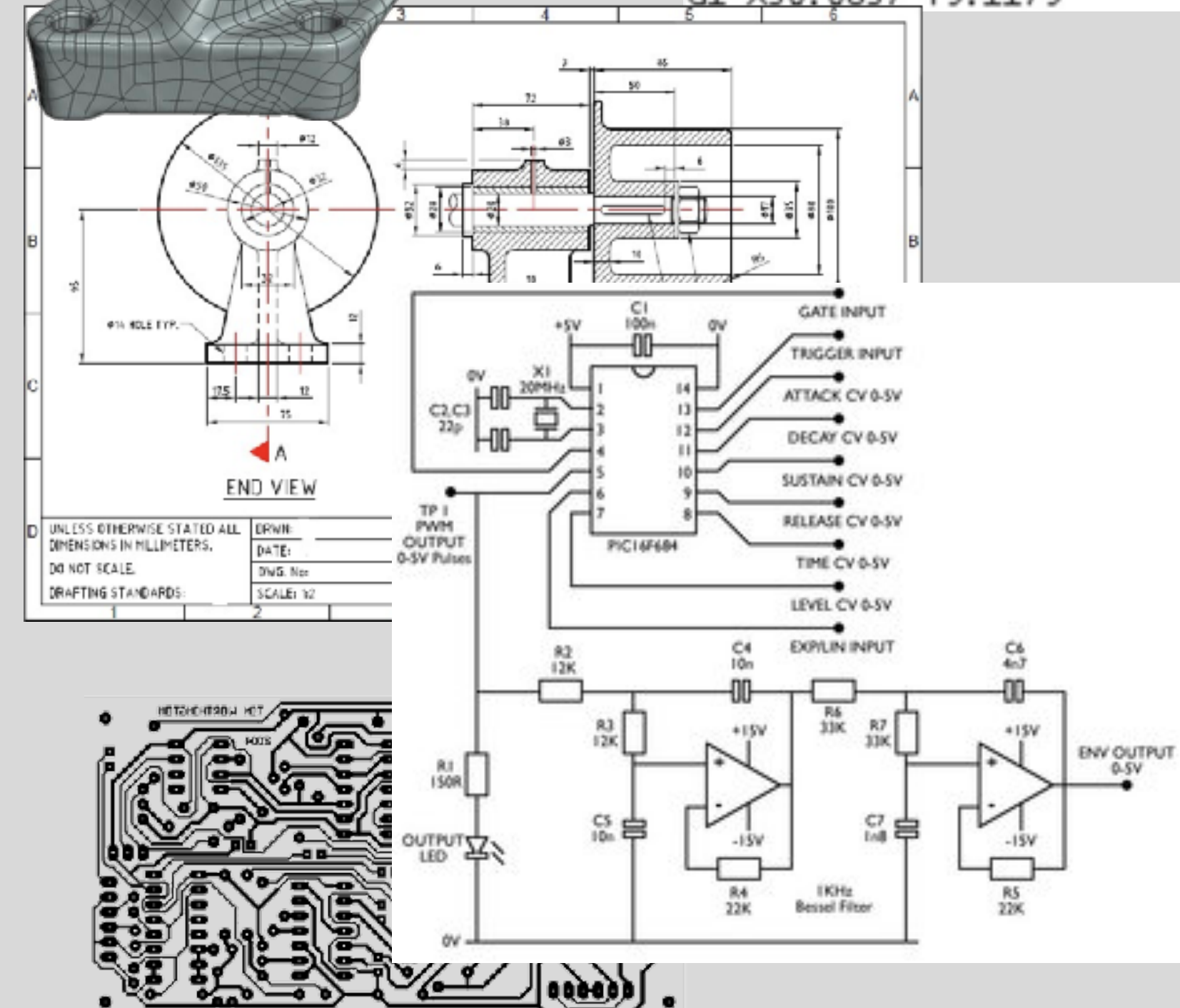
# 经验

# 技术

|   | Part Name                             | Part Description             | Quantity |
|---|---------------------------------------|------------------------------|----------|
| 1 | Pololu Power HD Micro Servo HD-1000K  | Tuning 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       |                              |          |



```
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
```

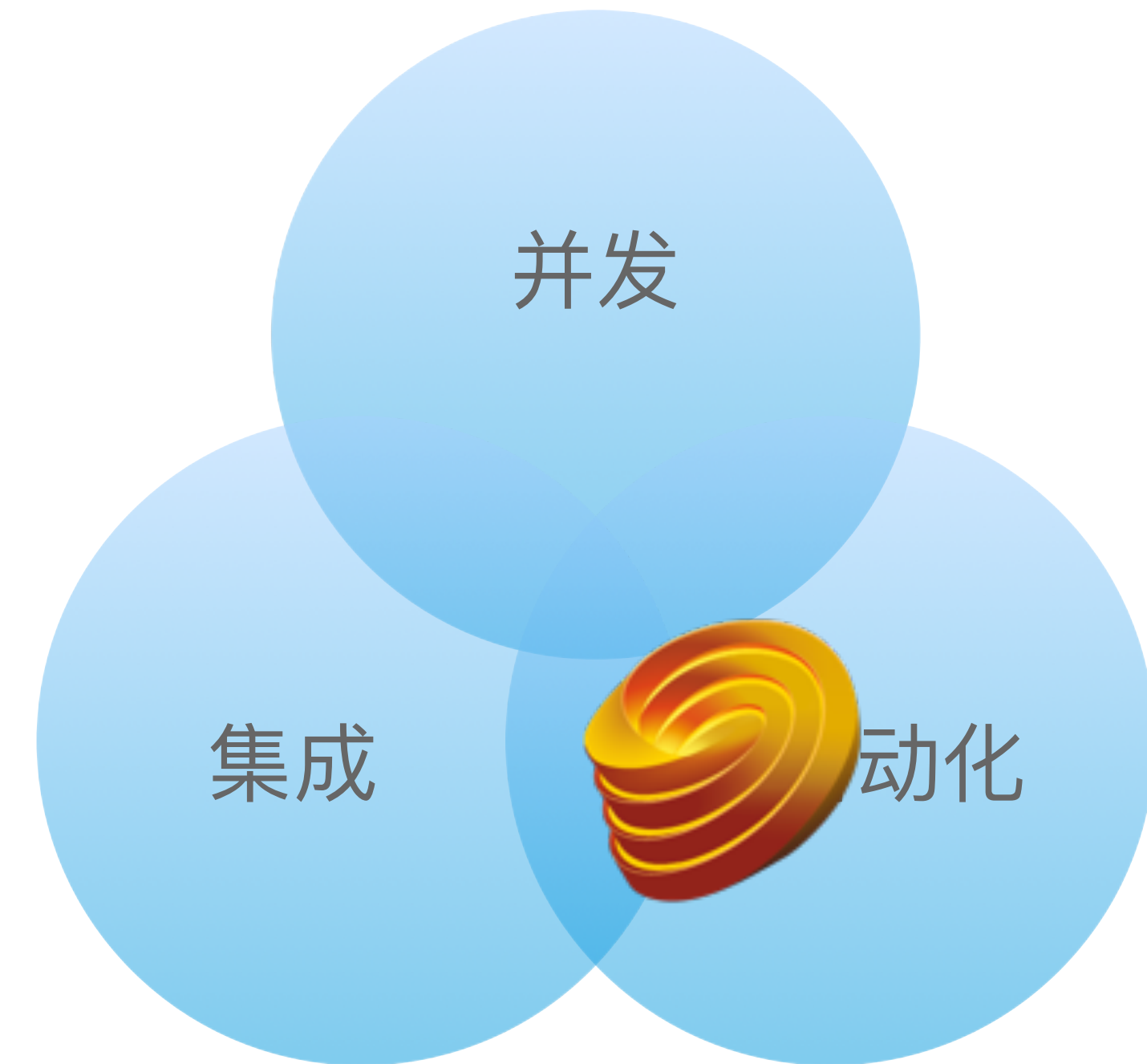




使您的分布式团队能够更快地制作出更好的产品

# 制造业数据平台

- 以数据为中心
- 提供高度协作的产品数据编辑
- 支持自动化 workflow
- 客户和/或第三方合作伙伴可以通过编程方式访问数据
- 帮助洞察和更好的决策





# 案例 | 扩展属性

## 没采用Forge Data

- 有限的属性访问, 由 Autodesk管理 – 只在 Fusion文件或Forge的数据提取服务可以拿到
- 无 数据 API (即: 无法自动化)
- 所有属性编辑会产生一个新的模型版本
- 协同编辑无法实施
- 潜在的数据不一致 (例如. 不同文件中的重复产品编号)

## 采用了Forge Data

- 属性可以在任何平台上呈现 – Autodesk 或我们合作伙伴的应用程序
- 可扩展性, 自定义数据或类型
- 不同工具或角色均可参与的超级协作:
  - 编辑可以并发于模型设计之外的场景
  - N不同属性编辑相互无干扰
  - 可以高频编辑模型
- 一致性 (例如基于Forge Data中心数据的不同产品编号管理)

# 案例 | 材料清单 (BOM)

## 没采用Forge Data

- CAD-BOM 关系数据无管理或保存在 Fusion 文件中
- 产品BOM关系数据没有得到组织管理，或是外部系统管理
- 任何围绕着BOM的协作数据需要导入导出操作。无法识别单一数据源头

## 采用了Forge Data

- 所有 BOM 关系数据由Forge Data的单一数据源提供和管理
- 业务规则可帮助识别如何把某个BOM关系类型中的数据变化，传递到另外的关系类型，或标记为过期。
- 非设计人员也可以在业务过程上下游对产品结构做出贡献



# Fusion 组件：查看视图

开发进行中

- 网络体验的现代化视图
- 实时管理整个组件外部和局部元件参考的粒度
- 有选择地控制他们希望公开的模型设计属性，并使用自定义属性扩展它
- 可通过可编程 REST API 接口完全访问读写
- 事件界面，让合作伙伴应用程序能够收到任何重要里程碑的通知

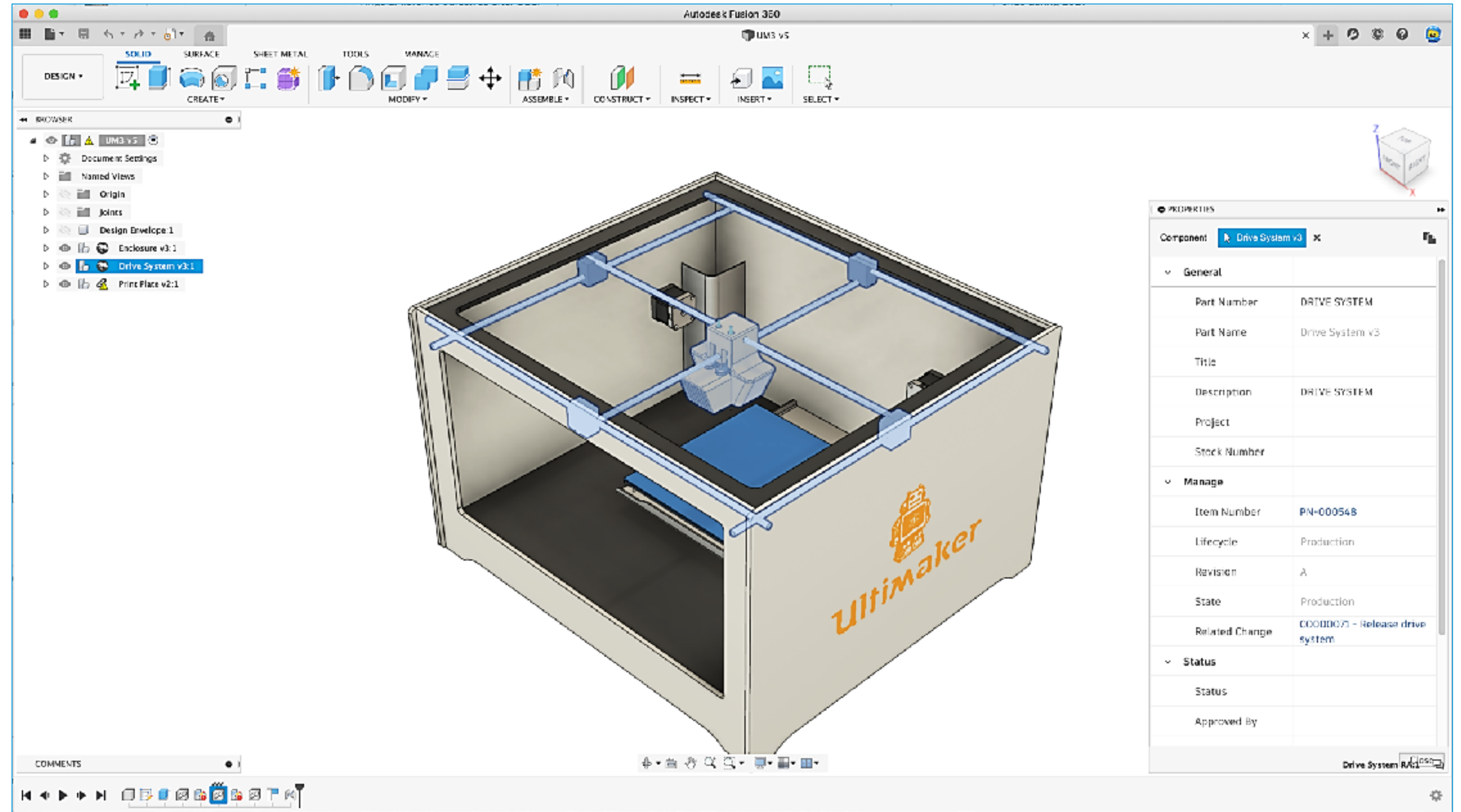
Common Data Experience Demo App FQA

| 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            | Heiten        |             |
| 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 和 Lifecycle 集成

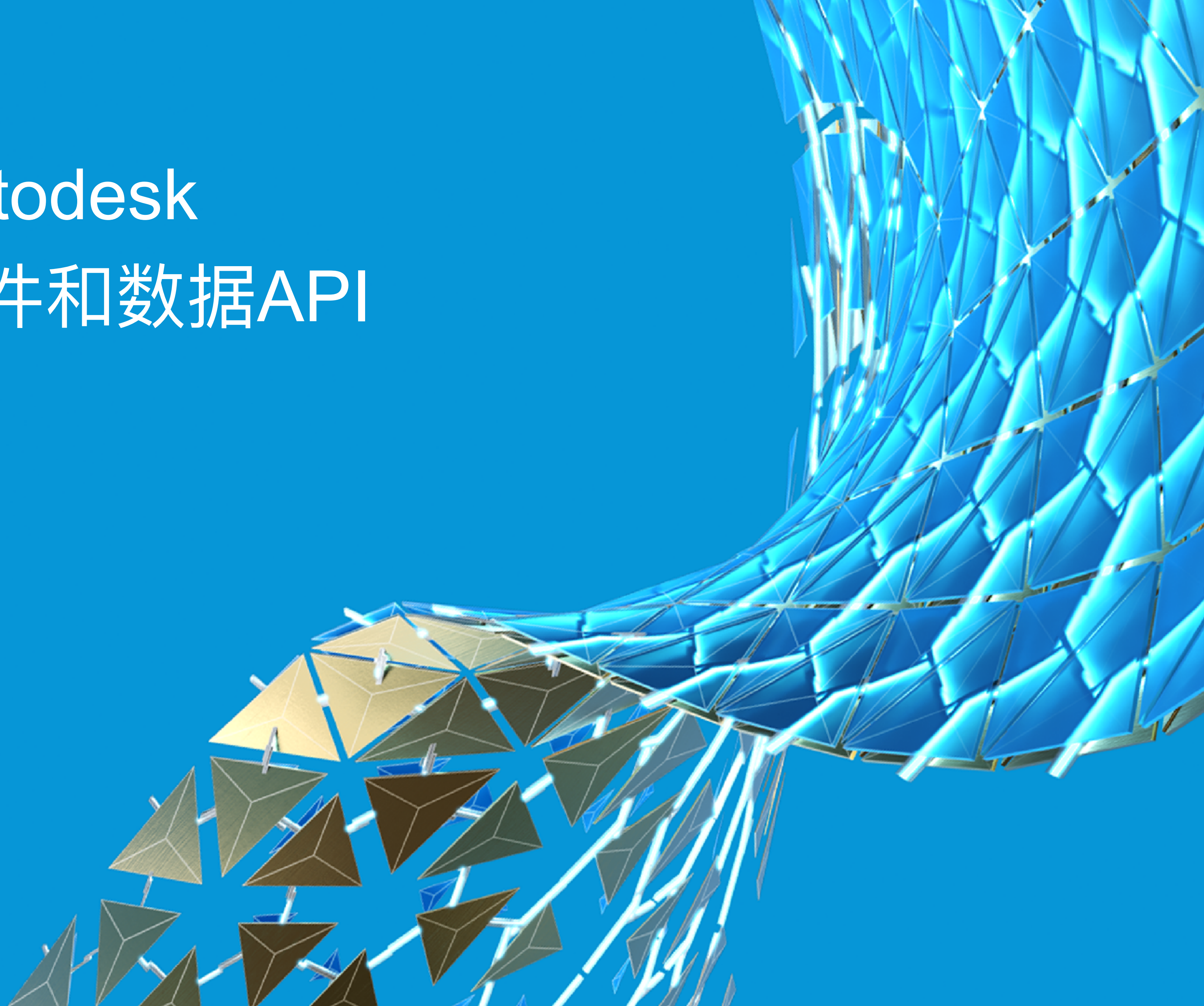
开发进行中

- 高级的流程管理中的数据体验
- 全自动编号组件和图纸
- 系统的工程发布流程
  - 快速发布流程
  - ECO 批复流程
- 自动版本管理和生命周期状态管理





# 即将提供的Autodesk 下一代数据组件和数据API





# 下一代数据API和组件的设计原则

1. 驱动更加透明化的数据模型
2. 通过架构清晰的技术接口来保持自定义数据流程的长久性
3. 确保这些服务可靠性和可扩展性
4. 提供行业领先的数据管理和安全性
5. 通过提供强大而易用的API和SDK，培育 可扩展性



内部目标驱动

内部可扩容

可外部扩展的SDK  
和API



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