

*build*offsite

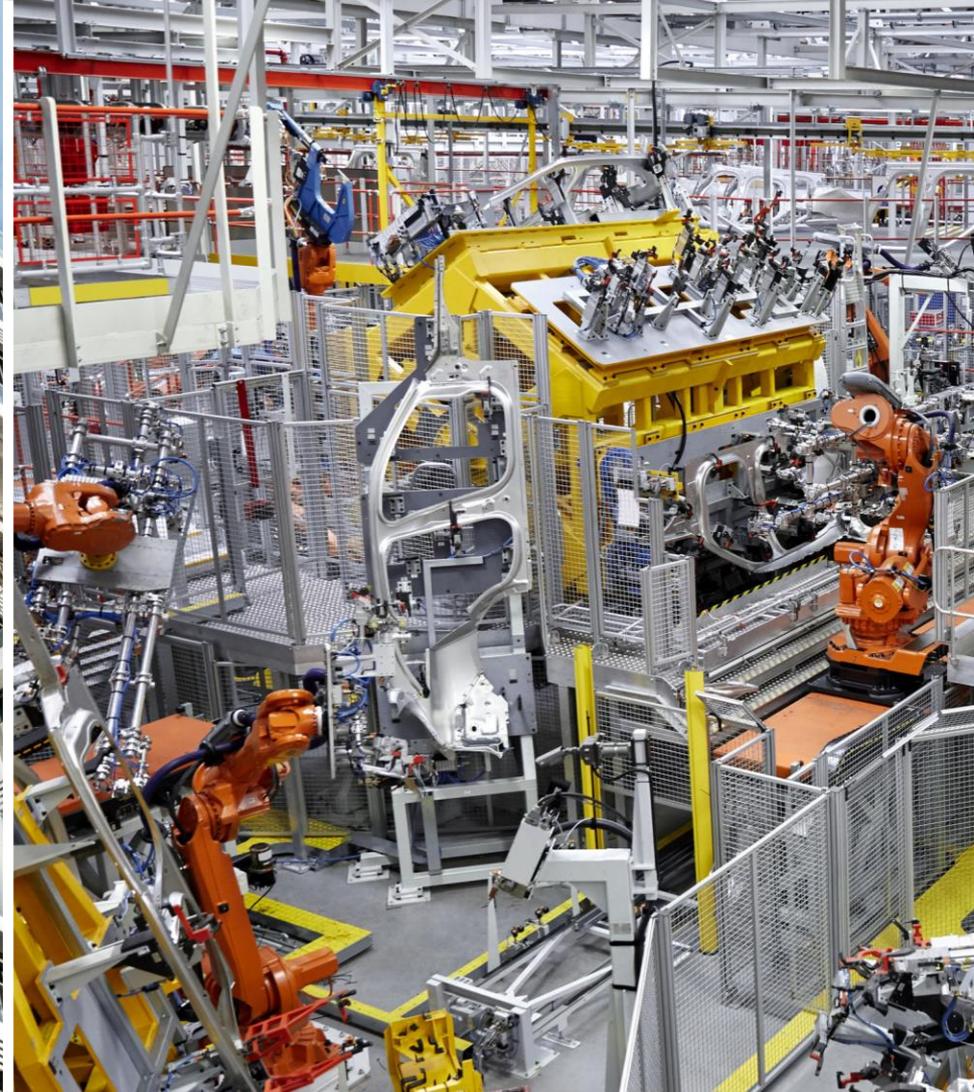
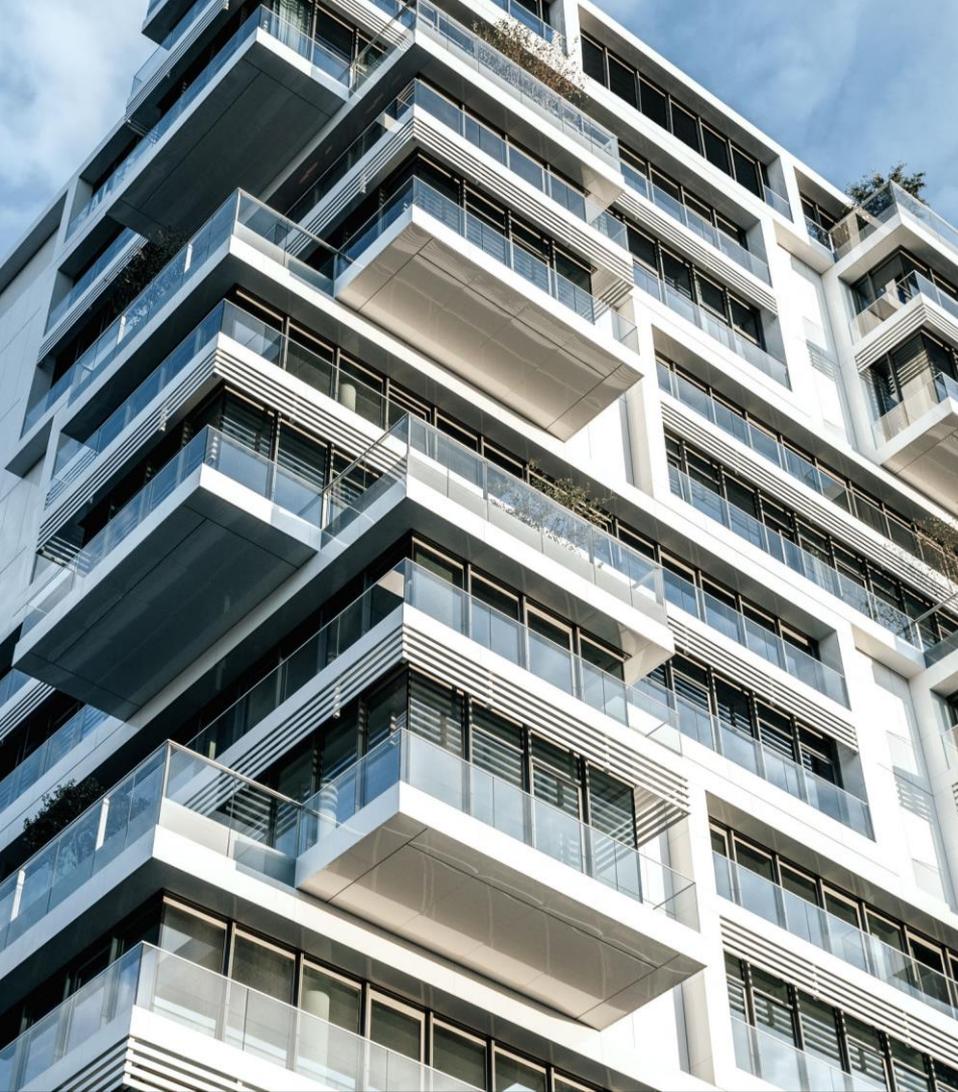


Convergence of AEC and MFG

Demir Ali
Senior Technical Specialist – D&M
Autodesk UK&I

Lee Mullin
Senior Technical Specialist – AEC
Autodesk NE





1624

The first panelised wood house shipped from England to Massachusetts

1837

Portable cottages produced for export to Australia

1839

Kit houses were shipped by rail for settlers during the California Gold Rush

1889

Eiffel Tower completed using prefabricated cast iron sections

1903

First concrete prefabricated apartment block constructed in Liverpool

1920

Steel framed **Dorlonco** and Timber framed **Weir** houses introduced to overcome post WWI housing shortage

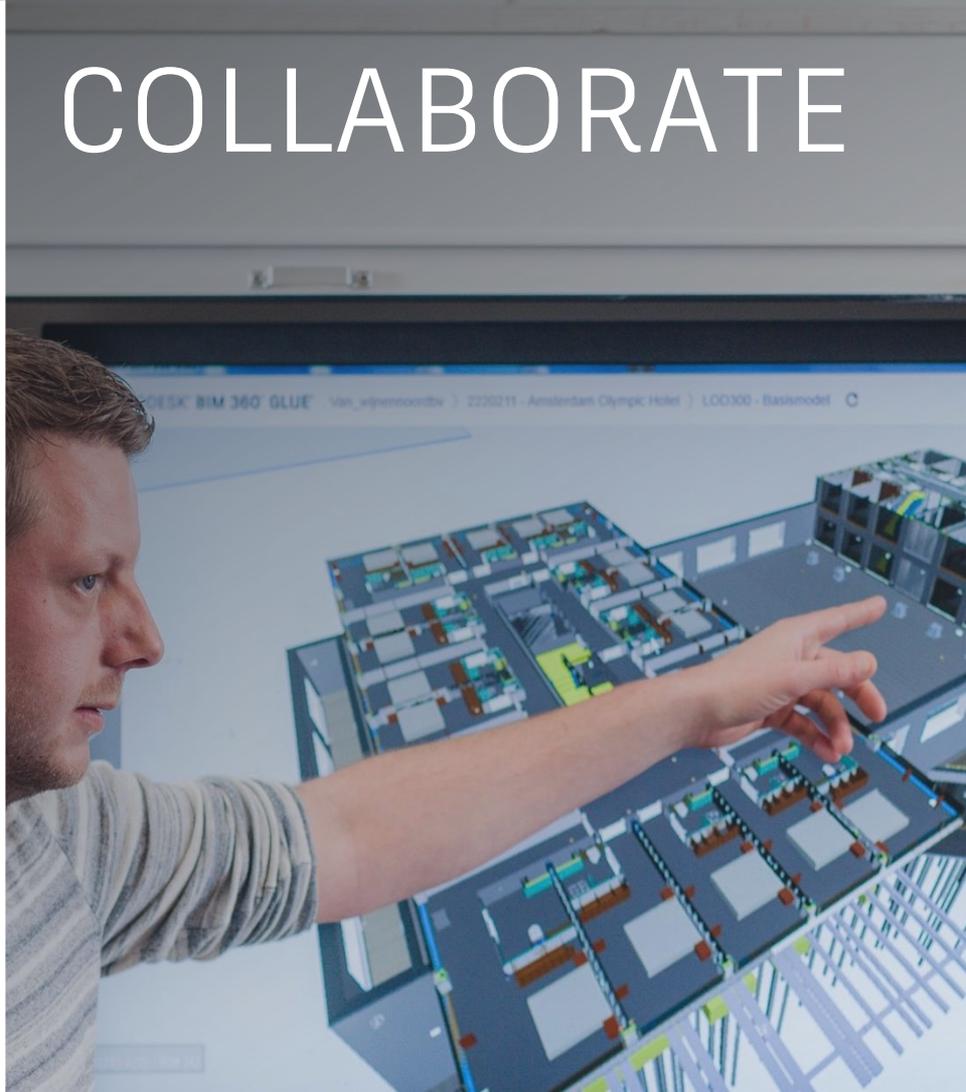
1947

Levittown, New York suburban development started using prefabricated homes. Build at a rate of 150 per week

DESIGN



COLLABORATE



MAKE



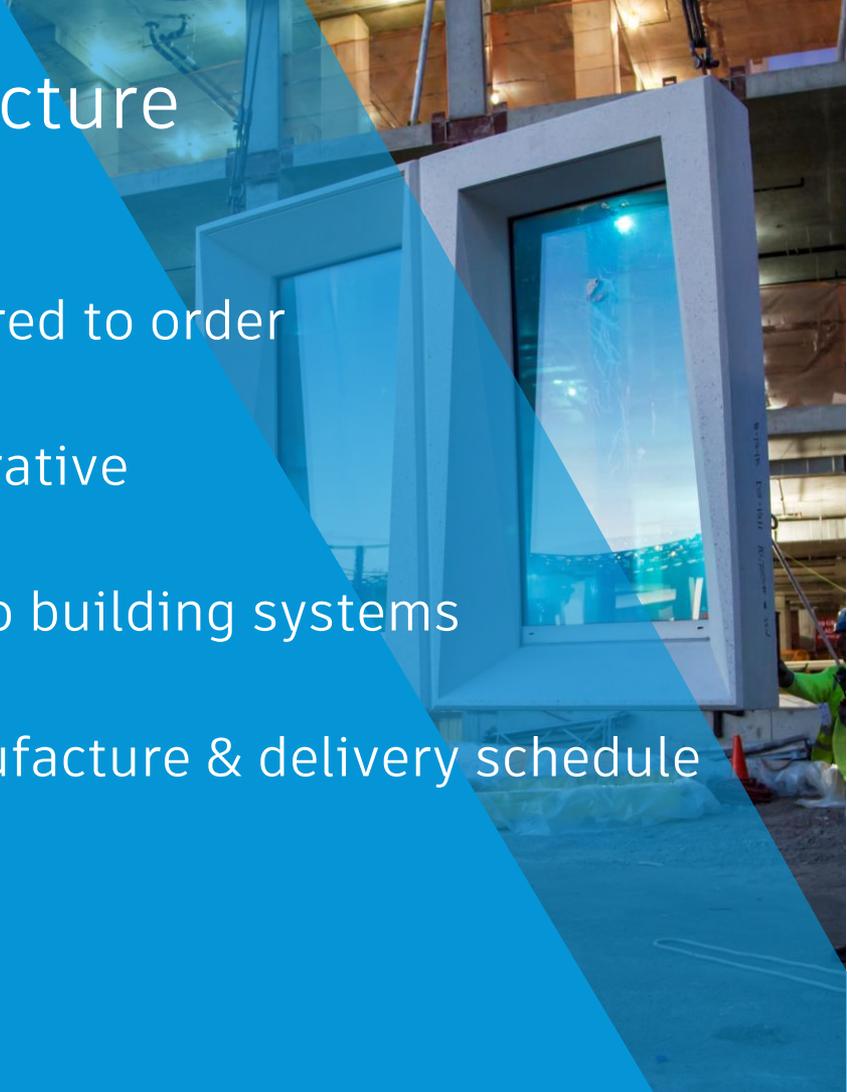


A person with dark hair and a beard, wearing large headphones, is seated at a desk in a modern office. They are looking at two computer monitors. The left monitor displays code or a technical interface, and the right monitor shows a 3D model of a mechanical part. The desk is cluttered with papers, a keyboard, and other office supplies. The entire scene is overlaid with a semi-transparent blue filter. The word "DESIGN" is written in large, white, sans-serif capital letters across the center of the image.

DESIGN

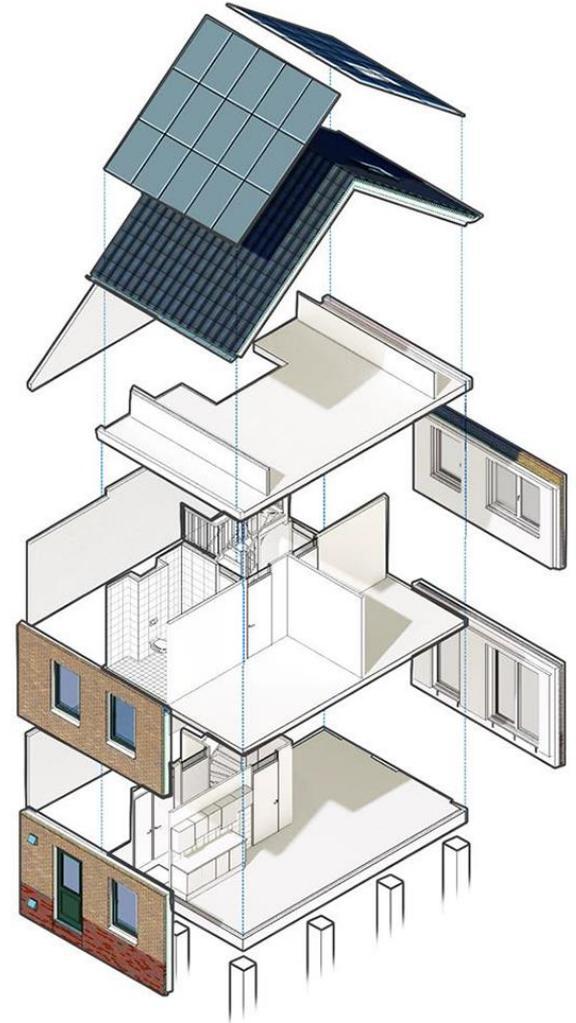
Designing for offsite manufacture

- Designs maybe configured or engineered to order
- Co-ordination of product data is imperative
- Complex designs, often integrated into building systems
- Consideration needs to made for manufacture & delivery schedule



Using modular design principles

- Manufacturing companies have been using modular approaches to their designs for many years.
- It allows variations to be built using the same ingredients but a different recipe.
- Although not limited to, when applied to design it allows companies to:
 - Create intelligent designs and data easily
 - Respond faster to proposals
 - Save materials and waste
 - Avoid revalidation for new concepts



Place Create Free Move Free Rotate Joint Constrain Hide All Show Show Sick Mirror Pattern Copy Bill of Materials Parameters Create Derived Substitutes Plane Point UCS Shrinkwrap Shrinkwrap Substitute

Component Position Relationships Pattern Manage Productivity Work Features Simplification

Layout Browser Model X +

Assembly | Modeling

- Bathroom Pod.iam
 - Relationships
 - Representations
 - Origin
 - YZ Plane
 - XZ Plane
 - XY Plane
 - X Axis
 - Y Axis
 - Z Axis
 - Center Point

Logic X +

Rules Forms Global Forms External Rules

Bathroom Pod

Using modular design principles





Properties (3D View)

3D View: (3D) Edit Type

Graphics

View Scale	1:100
Scale Value 1:	100
Detail Level	Medium
Parts Visibility	Show Original
Visibility/Graphics ...	Edit...
Graphic Display O...	Edit...
Discipline	Architectural
Show Hidden Lines	By Discipline
Default Analysis Di...	None
Sun Path	<input type="checkbox"/>

Extents

Crop View

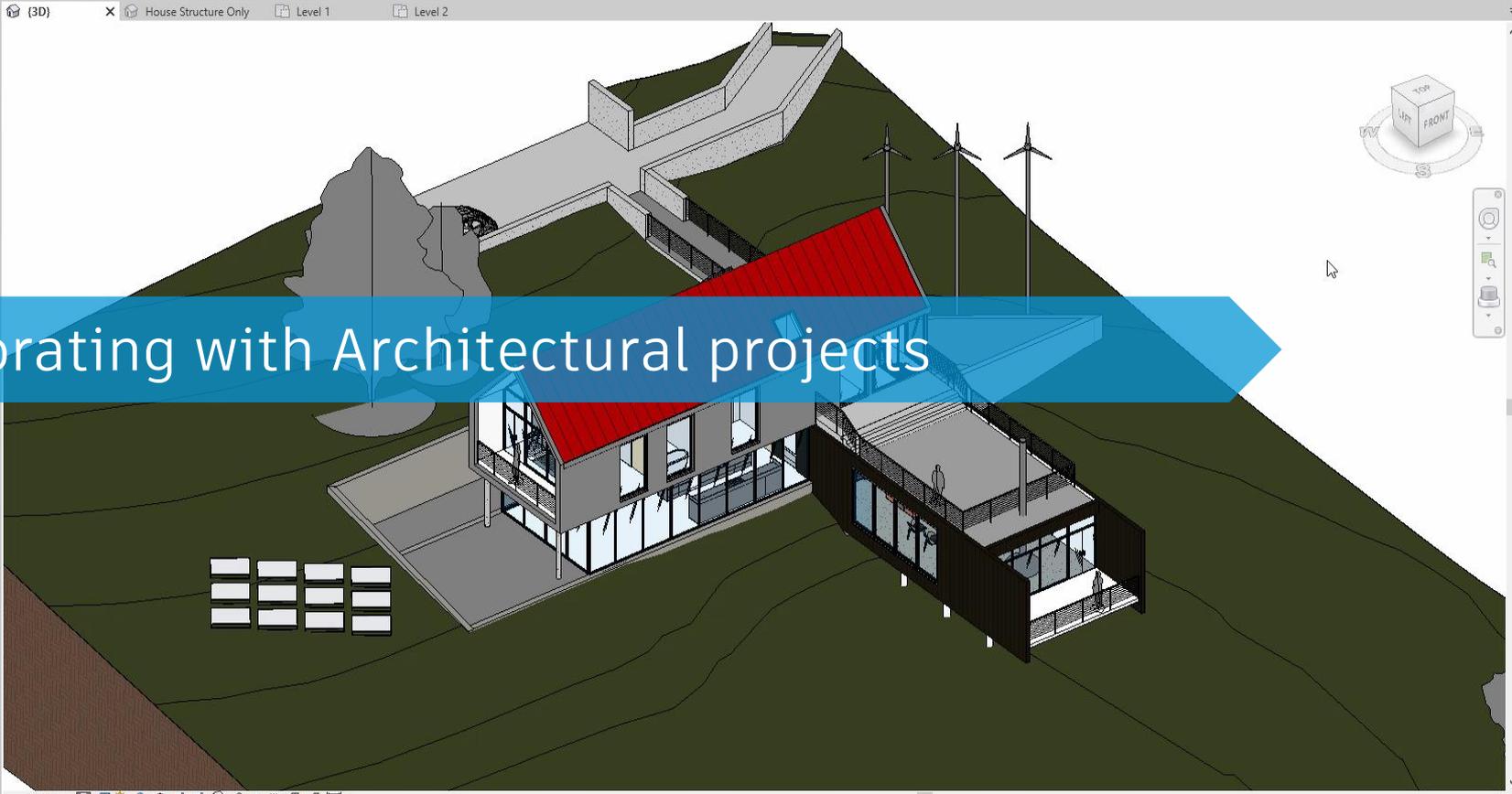
Crop Region Visible

Annotate

Properties help

Project Browser - rac_house_project.rvt

- Floor Plans
 - Level 1
 - Level 2
 - Site
- 3D Views
 - Approach
 - Bathroom
 - Bathroom Walls
 - Feature Staircase
 - Feature Staircase-Parallel
 - From Yard
 - House Only
 - House Structure Only
 - Kitchen
 - Kitchen Layout
 - Living Room
 - Section Perspective
 - Section Perspective - Staircase
 - Solar Analysis
 - (3D)
 - Elevations (Building Elevation)



Collaborating with Architectural projects



MAKE

Delivering manufacturing data

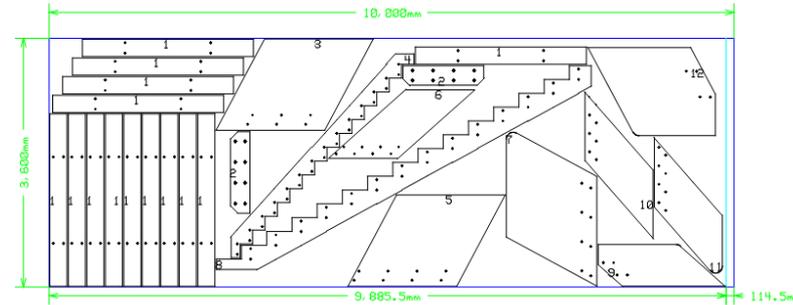


- 3D design enhances the manufacturing pipeline
- Downstream utilisation for manufacturing includes:
 - Fabrication drawings
 - 3D model delivery
 - Bills of materials
 - NC programs
 - Resource Planning

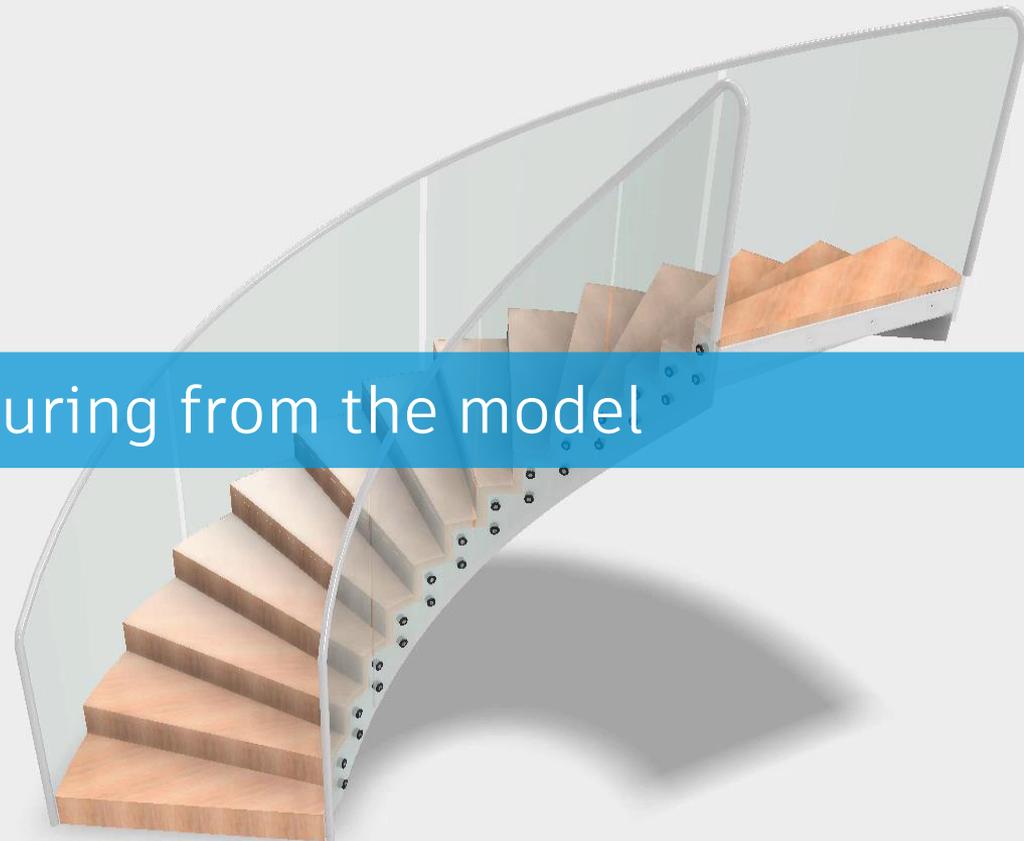
Driving Manufacturing from the model

```

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82 ZA,DA,1
83 DA,'1001','HP','Fusion',1,0
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85 N10MSG("MAIN PROGRAM NO.:1001")
86 N20MSG("FUSION360 LASER - TRUMPF")
87 N30G90
88 N40G71
89 N50TC SHEET TECH("SHT-1")
90 N60TC SHEET LOAD("SHL-1")
91 N70TC_POS_LEVEL(11)
92 N80;GOTOF ENTRY_LASER
93 N90;ENTRY_LASER:
94 N100;(CUT1)
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97 N130TC_LASERCORR_ON(T_LEFT)
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99 N150X1089.256Y937.88
100 N160X1089.006Y938.313
101 N170X1088.89Y938.38
102 N180X1088.39
103 N190G03Y916.38I0J-11
104 N200Y938.38I0J11
105 N210G01X1087.89
106 N220X1087.774Y938.313
107 N230X1087.524Y937.88
108 N240X1082.524Y929.22
109 N250X1083.39Y928.72
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116 N320X1095.804Y1061.941
117 N330X1095.933Y1061.978
118 N340X1096.281Y1062.336
119 N350G03X1080.499Y1077.664I-7.891J7.664
120 N360X1096.281Y1062.336I7.891J-7.664
121 N370G01X1096.629Y1062.695
  
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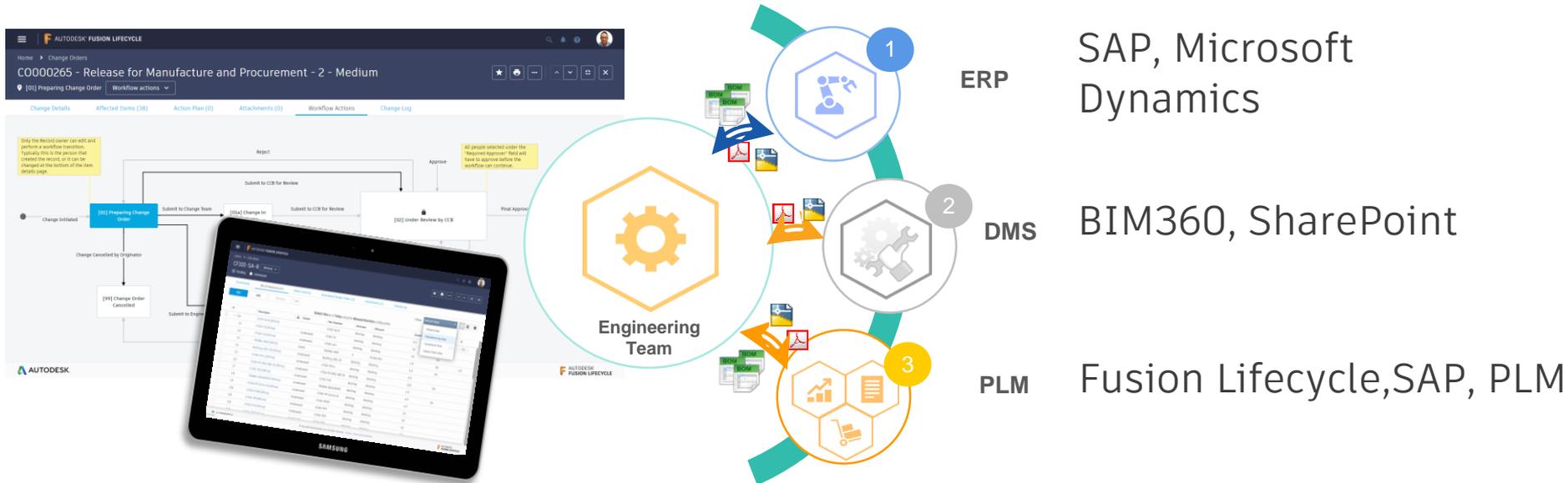
- | | | |
|---------------------|--------------------|-----------------|
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| 4) ADSK-001880 | 5) ADSK-001896 | 6) ADSK-001890 |
| 7) ADSK-001895 | 8) ADSK-001894 | 9) ADSK-001892 |
| 10) ADSK-001891 | 11) ADSK-001889 | 12) ADSK-001898 |



Driving Manufacturing from the model

Managing and delivering data to the business

- Departments outside of design & manufacturing don't care about CAD. Item numbers, Bills of Materials and anything else needed to buy, manage and deliver the product is all that matters.
- Data is often entered again & again, leading to errors, when instead, data can be integrated ensuring the information is always correct & current.



Sign in



Email

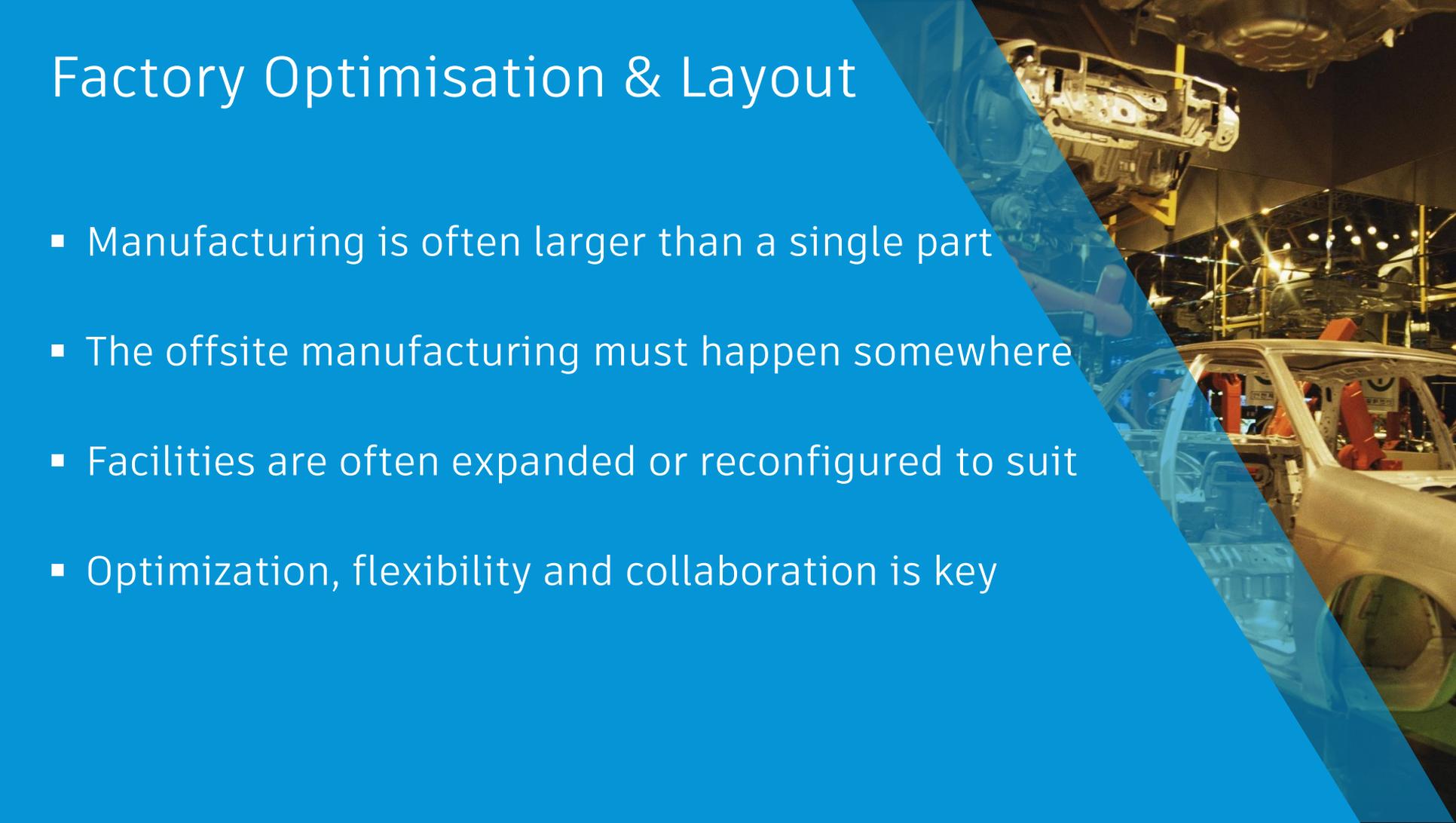
pal77

NEXT

NEW TO AUTODESK? [CREATE ACCOUNT](#)

Managing and delivering data to the business

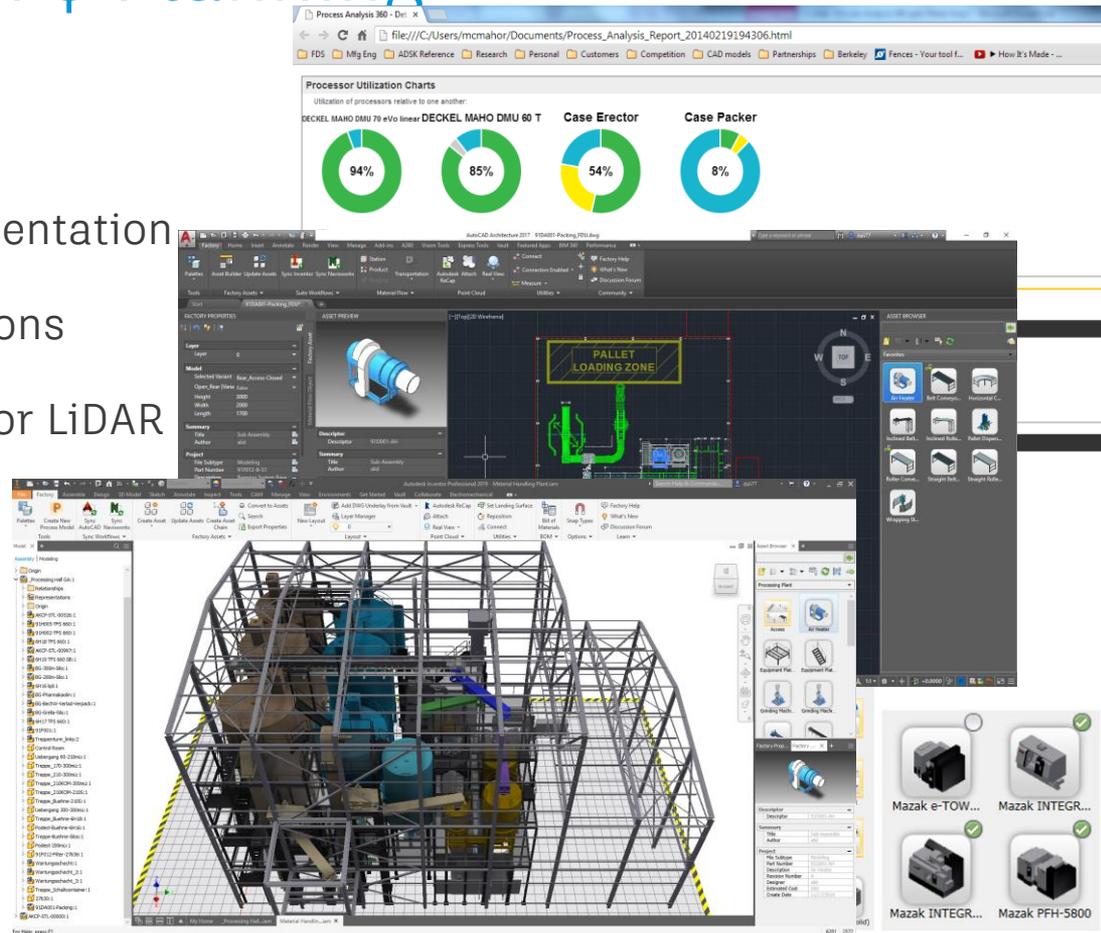
Factory Optimisation & Layout

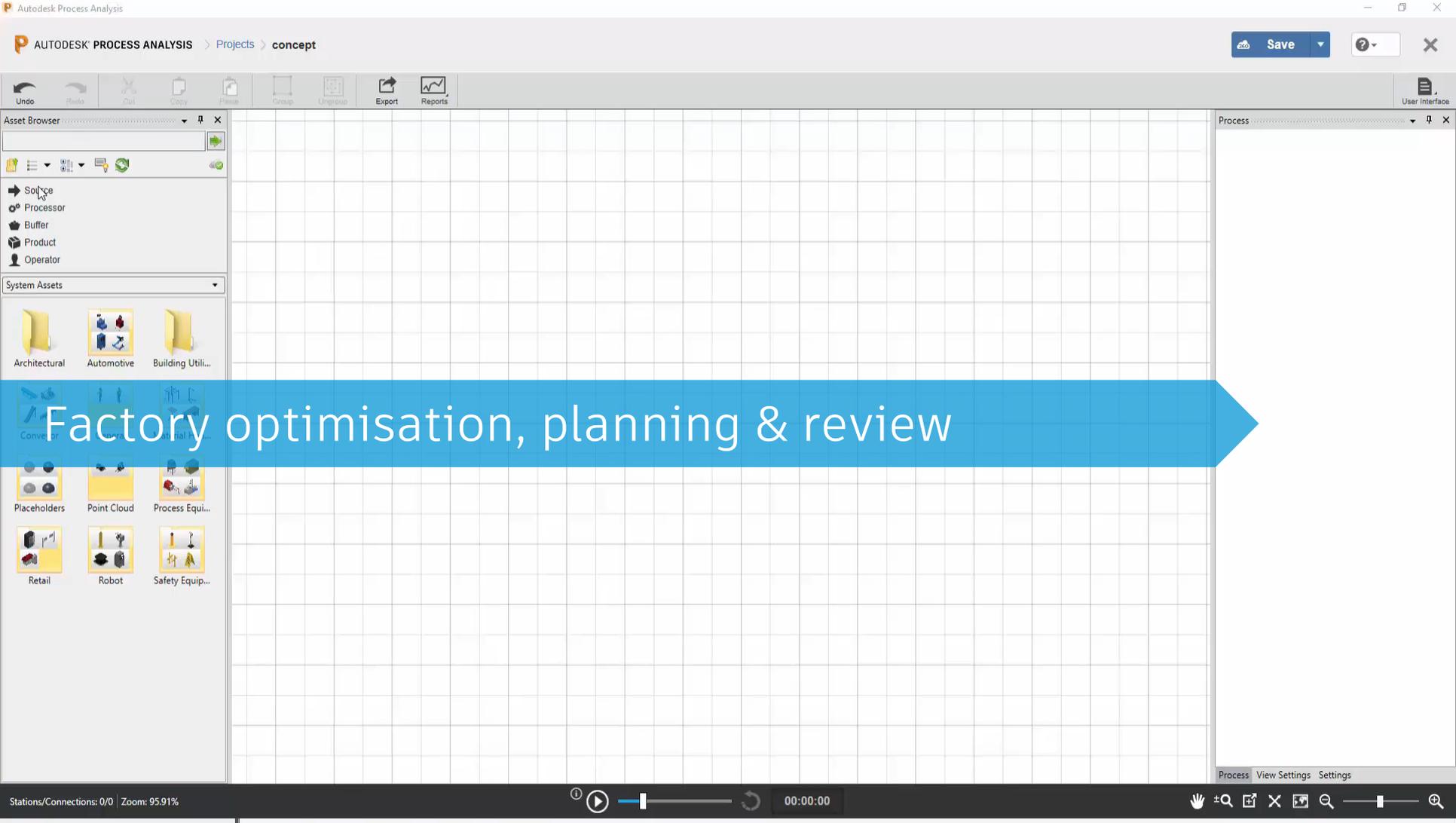
A photograph of a car manufacturing plant. In the foreground, a white car chassis is visible, partially obscured by a large blue diagonal overlay that covers the left side of the image. In the background, another car chassis is suspended from a yellow overhead crane. The factory floor is lit with industrial lights, and various mechanical components and structures are visible.

- Manufacturing is often larger than a single part
- The offsite manufacturing must happen somewhere
- Facilities are often expanded or reconfigured to suit
- Optimization, flexibility and collaboration is key

Factory Optimisation & Planning

- Iterate and improve processes
- Intelligent 2D layout to 3D representation
- Snap fit and intelligent associations
- Incorporate architectural model or LiDAR
- Robust design review in 3D
- Add / update legacy 2D layouts





Factory optimisation, planning & review

Document Management

Search

Status	ID	Type	Sub-type	Title
Open	1	Design	Design	Check for H&S Items

Showing 1 - 1 of 1

Issue #1

OPEN

DETAILS | ATTACHMENTS | ACTIVITY

Check for H&S Items in Layouts

Created by Demir Ali (Autodesk EMEA TS) on 18 Mar 2019

Assigned to Demir Ali	Type Design
Due Date Unspecified	Sub-type Design
Location Unspecified	Owner Demir Ali
Location Details Unspecified	Root Cause Code Compliance
Linked document Unspecified	

Description
Review the facility, look for areas that have a H&S requirement. Due to the type of assembly line, access is on both sides of the cells in quite a few locations.

Response
Unspecified

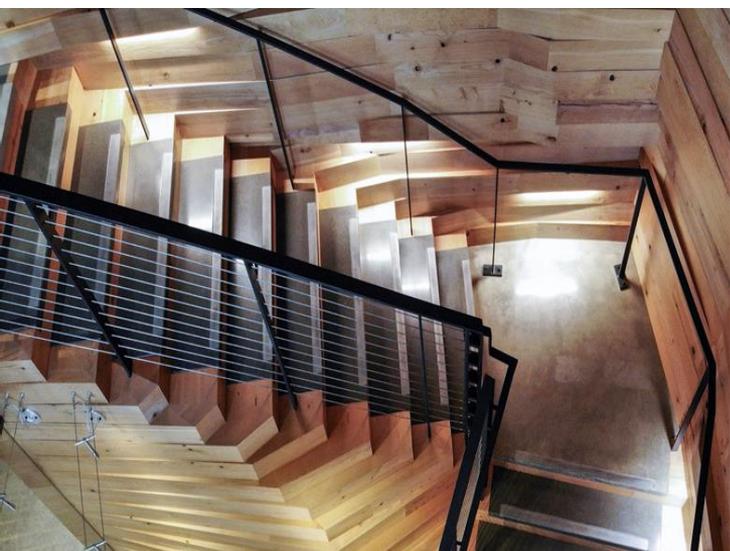
Photos

Downstream collaboration and co-ordination





COLLABORATE



INCREASED DATA & DIGITISED WORKFLOWS

Everyday...

100's of Subcontractors
1000's of Open Issues
Scope Changes

95% of all data captured goes unused in the engineering and construction industries

30%

of data created during design and construction is lost by project closeout.



COMPLEXITY OF DIFFERENT TECHNOLOGIES

25%

of construction companies use **5 or more** different software applications

6%

of construction companies use software that **all** integrate with each other

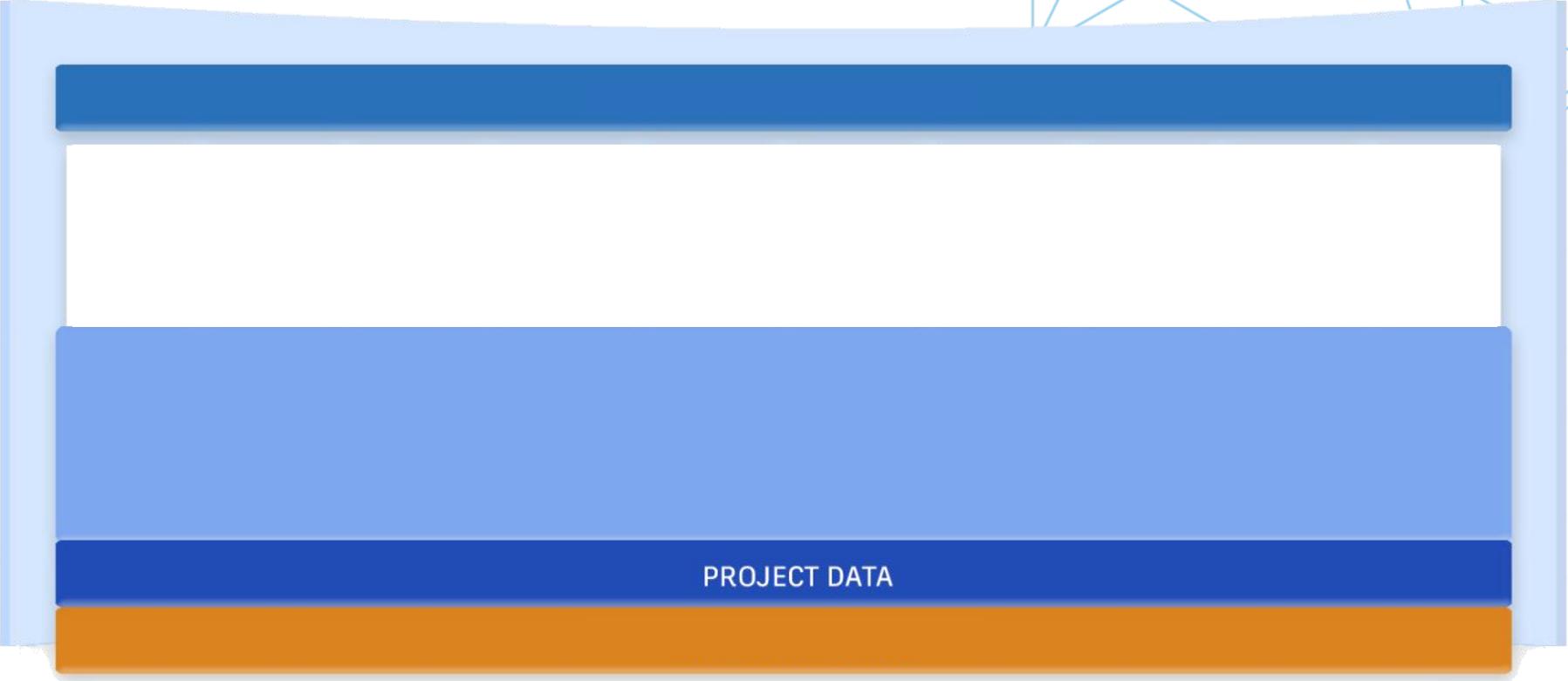
THE BIM 360 PLATFORM

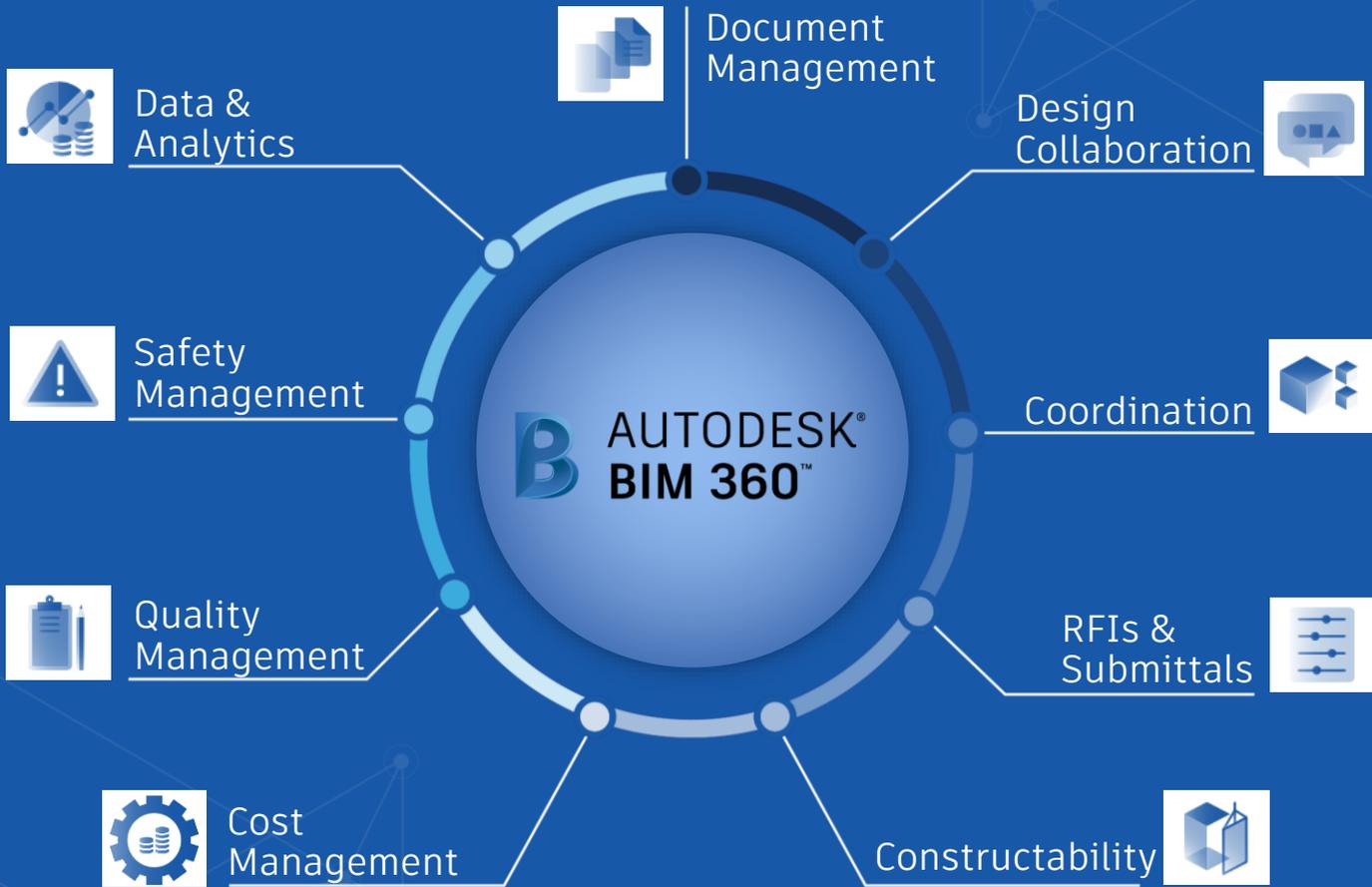




DIGITISE INTEGRATE PREDICT

BIM 360 PLATFORM

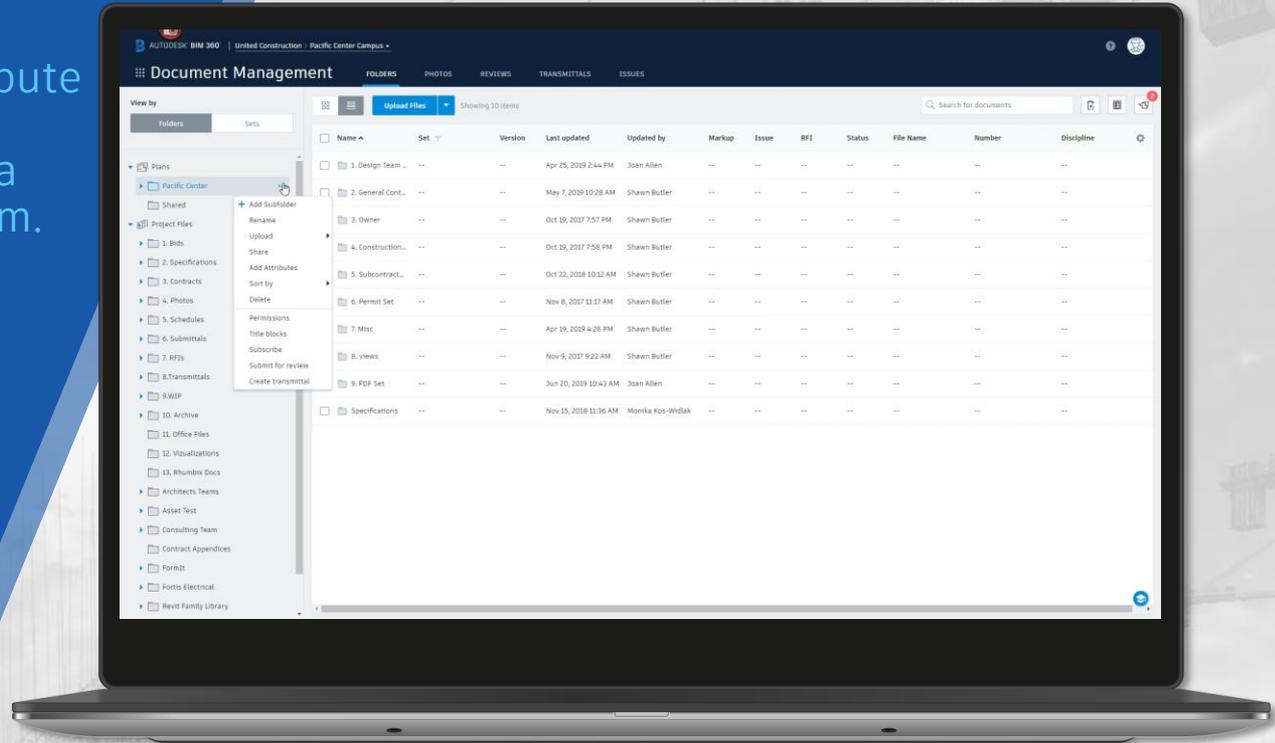




DOCUMENT MANAGEMENT

Securely publish and distribute all construction drawings, documents, and models in a single, cloud-based platform.

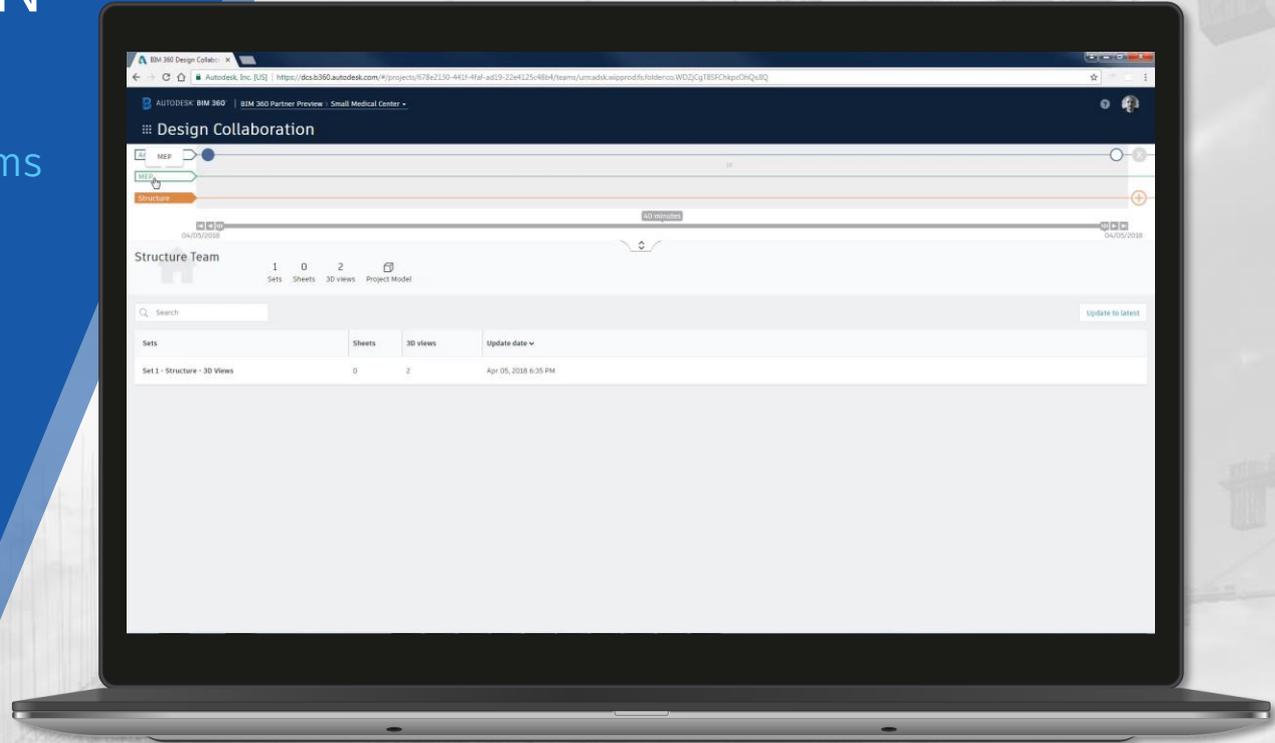
- Document Distribution
- Document Control
- Markup Drawings
- Version Control
- Approval Workflow
- Mobile Access
- Edit O365 Documents



DESIGN COLLABORATION

Accelerate project delivery, reduce rework, and improve productivity by enabling teams to securely co-author BIM designs in real-time and streamline deliverable coordination.

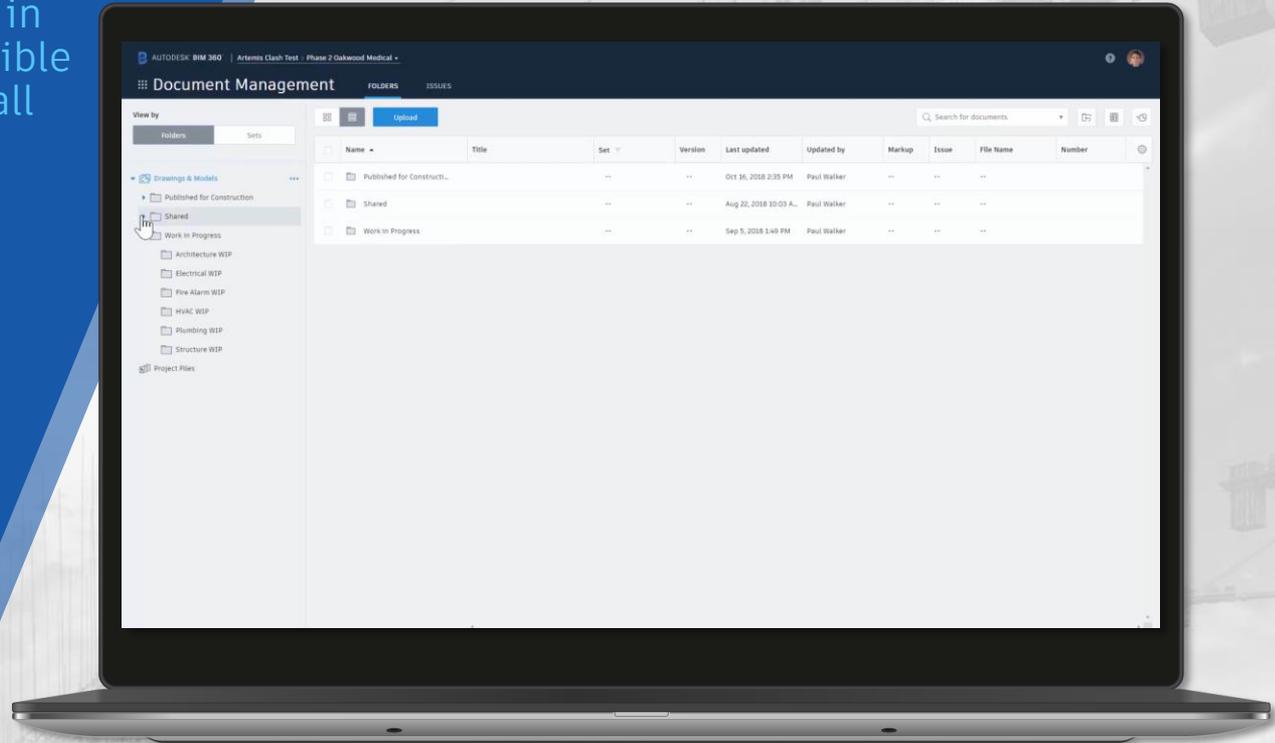
- Revit Cloud Worksharing
- Review Markups & Issues
- Change Visualization
- Publish Document Sets



COORDINATION

Keep the whole project team in sync, and get more constructible models earlier, by involving all project stakeholders in coordination and BIM collaboration processes.

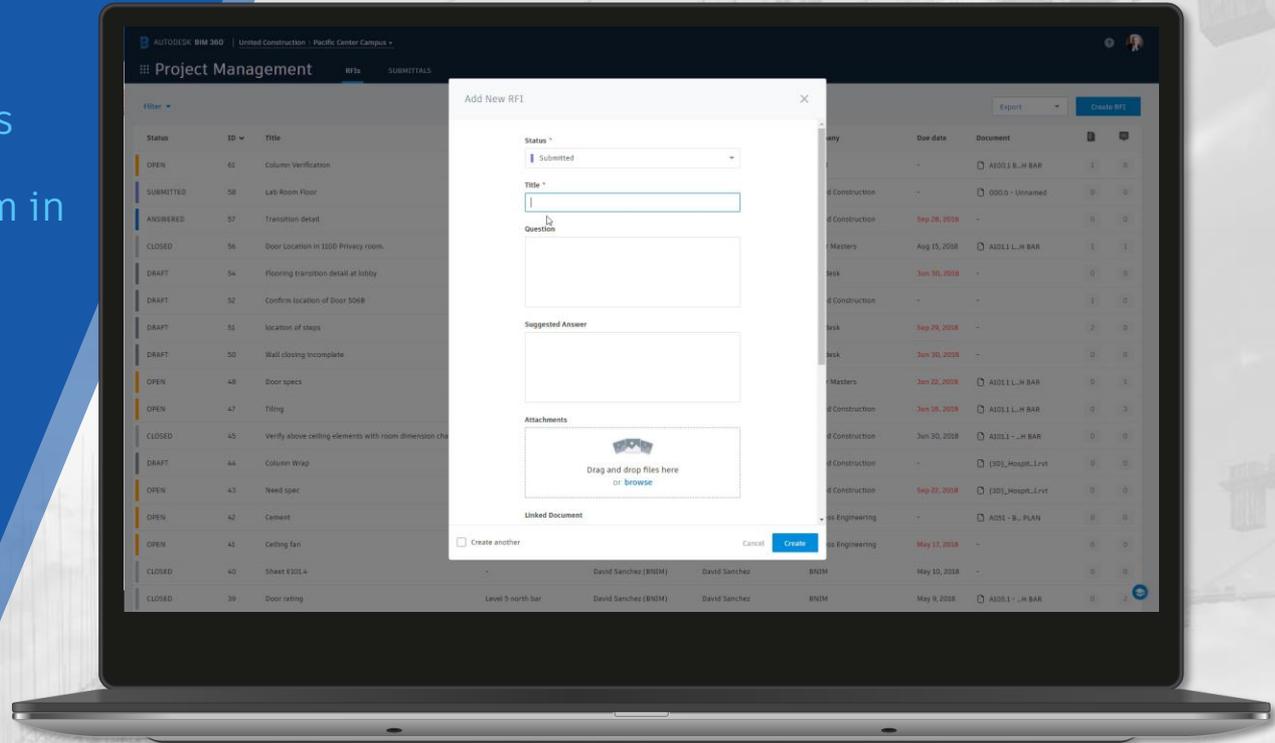
- Clash Detection
- Trade Coordination
- Round Trip Coordination
- Change Visualization



RFI'S & SUBMITTALS

Improve communication and visibility into project controls workflows like RFIs and submittals by managing them in a single platform.

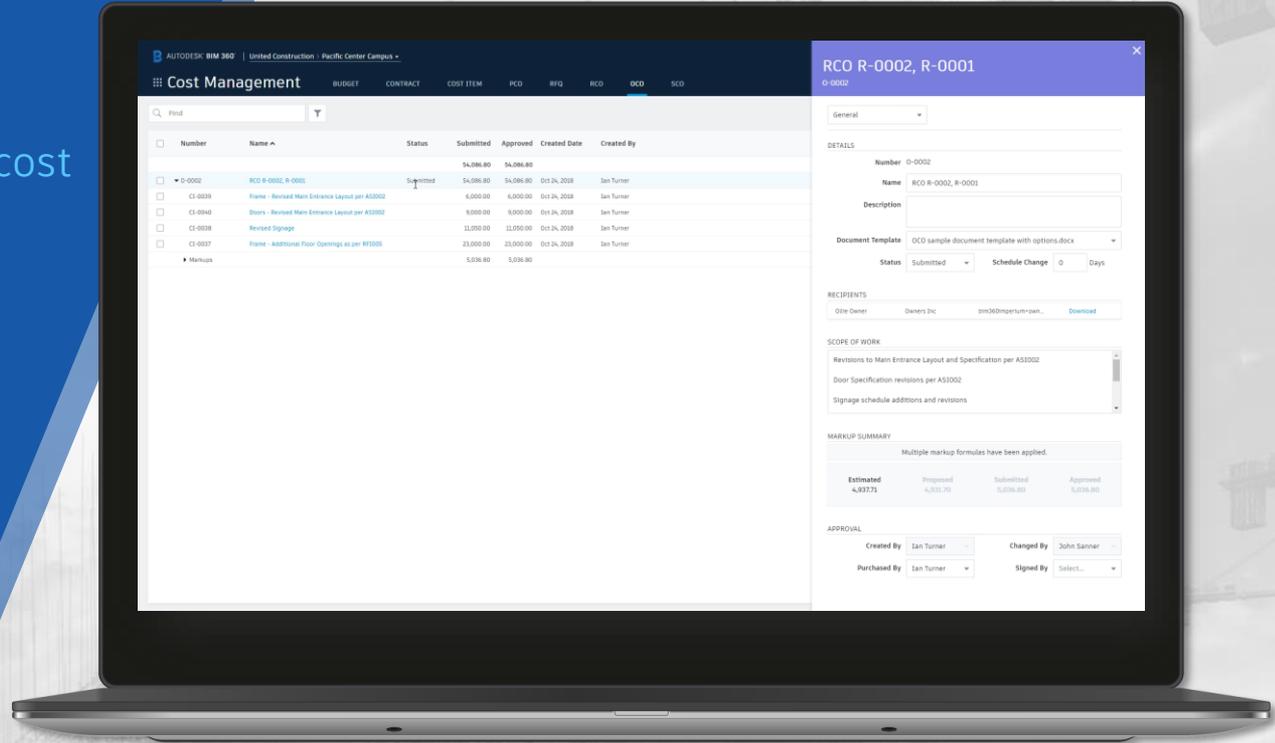
- RFI Management
- Submittal Tracking
- Reporting
- Control Approval Process



COST MANAGEMENT

Maintain transparency and improve cost control organization by centralizing cost information into a single platform.

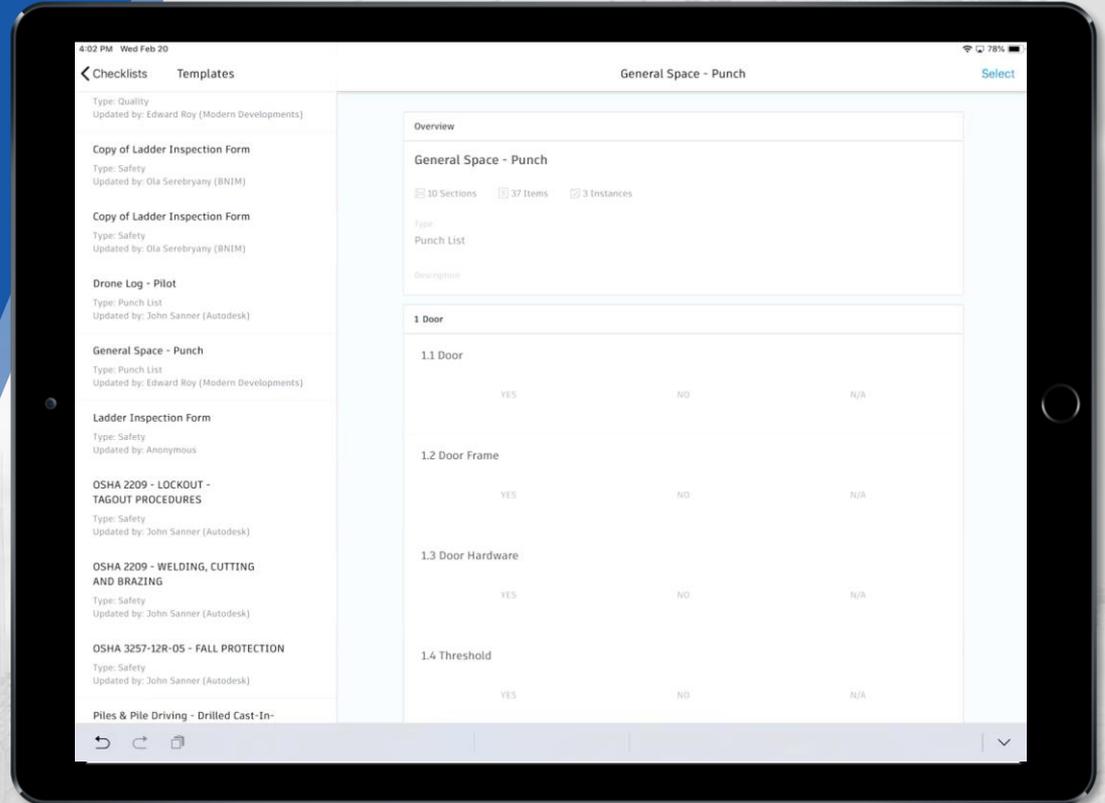
- Full Change Order Workflow
- Flexible Budget Structures
- Contract Generation Tool
- Financial Markups



QUALITY & SAFETY MANAGEMENT

Standardize on a proactive QA/QC and Safety process with construction quality management software that enables the whole team to participate.

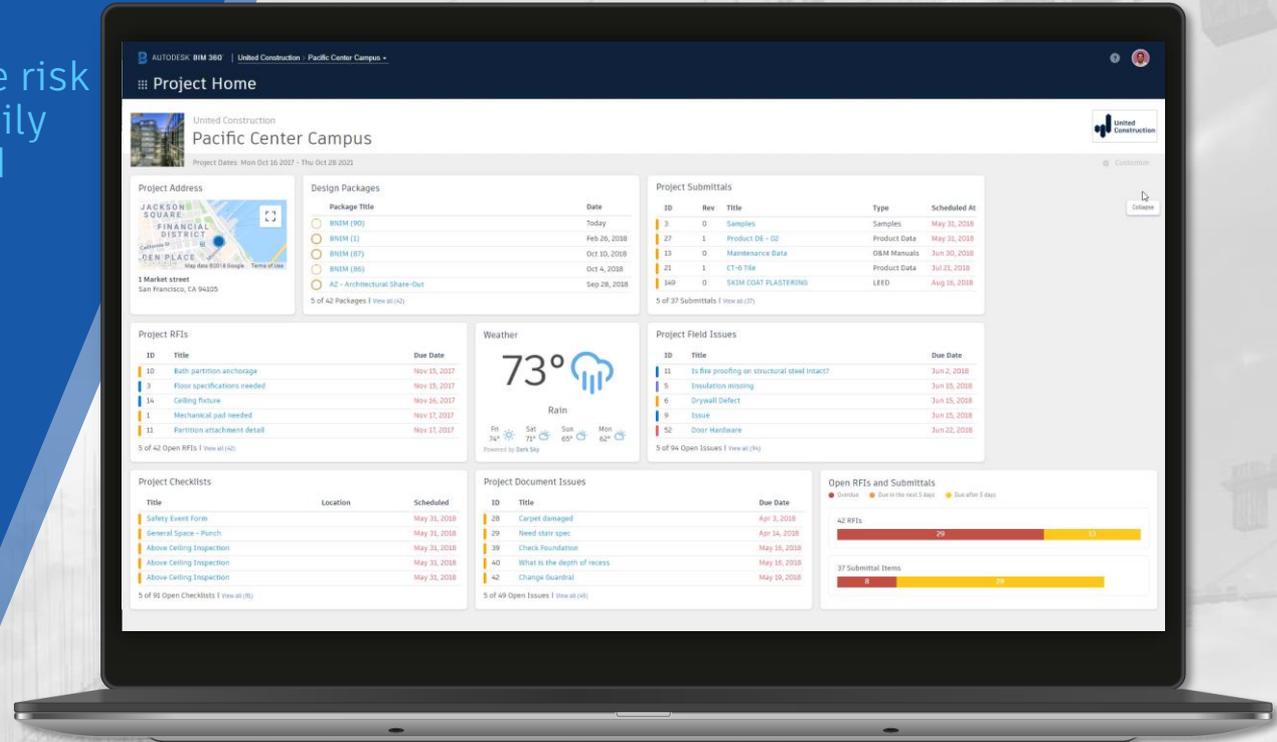
- Quality and Safety Checklists
- Issue Management
- Safety Checklists
- Daily Logs
- Signatures
- Reporting

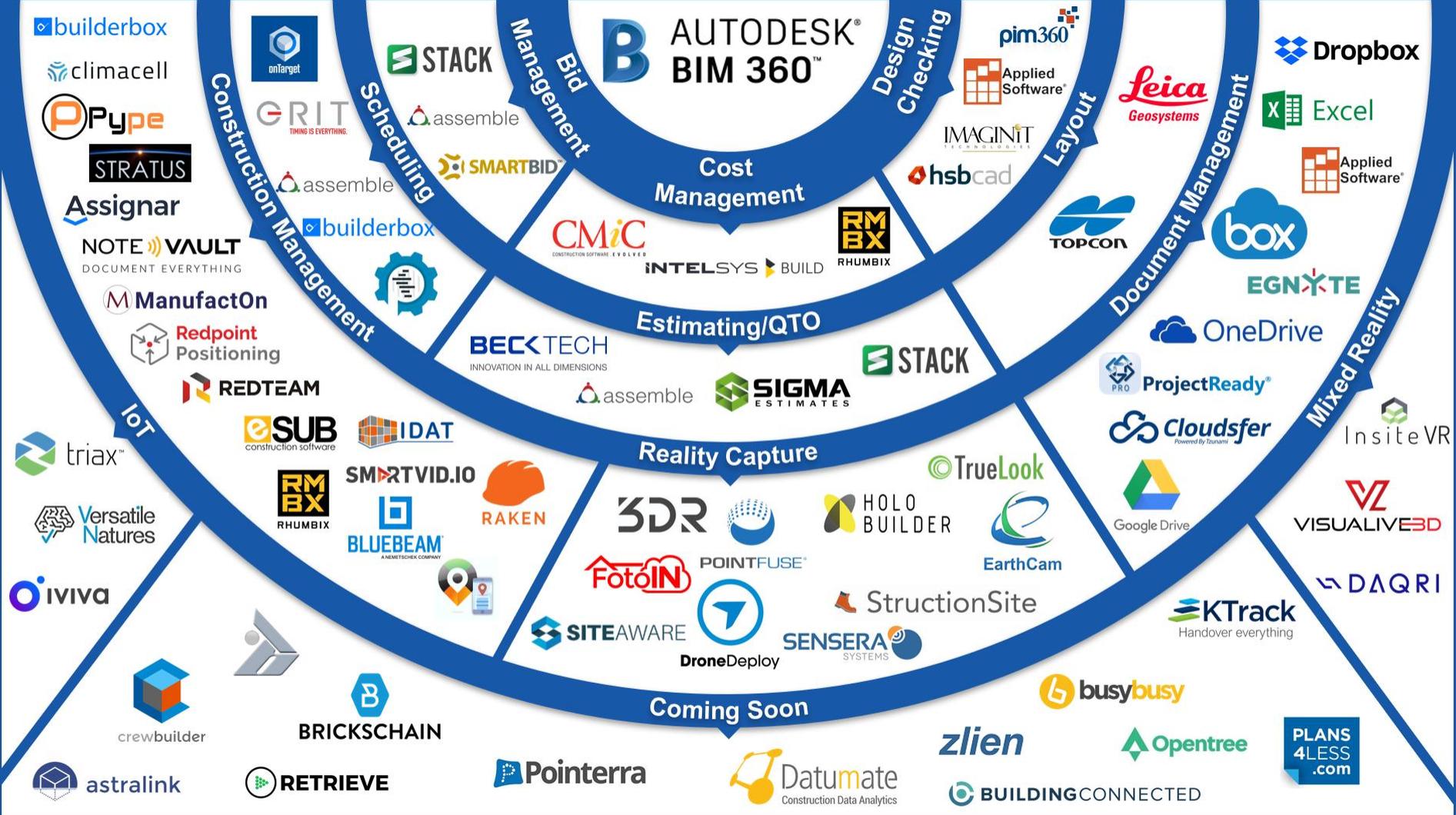


DATA & ANALYTICS

Predict, prevent, and manage risk with instant visibility into daily priorities, project health, and company-wide performance.

- Project Home
- Insight Dashboards
- Reporting
- Partner Cards
- Construction IQ

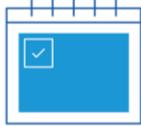




Activities supported by BIM360



PROVEN, POWERFUL BUSINESS RESULTS



65%

Reduced
Project Schedule



50%

Reduced
Coordination Time



23%

Faster Layout
Preparation



50%

Reduced
Layout Costs



88%

More Productivity
per Work Week



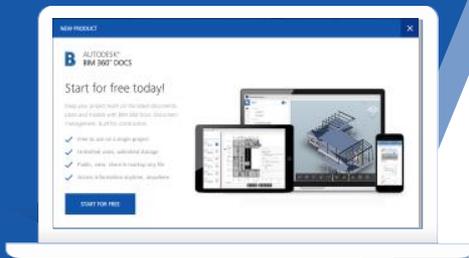
20%

Productivity
Gain

NEXT STEPS...

1

Get a Demo



2

Pick a Pilot Project



3

Work with the Autodesk Success Team





AUTODESK®

Make anything™