Harnessing BIM to Realize Digital Twins
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Digital Twin
Opportunities and Challenges
What is a Digital Twin?

Simulate
Predict
Inform
Transforming the Built Asset Lifecycle

- Design & Construction Procurement
- Portfolio Planning
- Portfolio Management
- Asset & Portfolio Analysis Asset Knowledge
- Commissioning Handover
- Space Planning & Utilization
- Predictive, Planned & On-Demand Maintenance
- Performance Monitoring & Tuning
- Asset & Portfolio Analysis
- Portfolio Management
- Design & Construction
95.5% of all data goes unused in engineering & construction\(^1\)

58% of owners said they’ve used or plan to use design-build, moving away from traditional design-bid-build\(^2\)

\(^1\) Source: Big Data = Big Questions for the Engineering and Construction Industry, FMI Report
\(^2\) Source: Design-Build Utilization, FMI Combined Market Study
Owners receive this... ...when they need this!
Impact of Data-Driven Digital Transformation on the Return on Capital Employed (ROCE) for Owner-Operators

- Data-sharing infrastructure and capabilities: +1.0%
- Data-centric talent: +1.8%
- Incentive-based contracts: +2.8%
- Combined effect: +1.0%
- Total: +7.2%

Source: Building More Value With Capital Projects, Accenture
**Digital Handover**
Accelerate operational readiness by starting with the end in mind and harnessing the BIM process to handover a digital twin

**Smarter Operations**
Gain operational efficiency and improve the occupant experience by leveraging the digital twin's reflection of your assets, spaces, and systems

**Greater Insight**
Optimize your portfolio and inform future investments based on the operational knowledge and usage analytics provided by your digital twin
Smarter Handover
Start Digital, Stay Digital, Deliver Digital
Digital Handover

Autodesk Tandem enables you to harness the BIM process to make digital twins a highly-repeatable, natural output of the project lifecycle.
Specify
Data Requirements and Operational Outcomes
Specify Data Requirements and Operational Outcomes

CLASSIFICATION SYSTEMS

Select Classification:
[Uniform]

To add a custom classification system:
1. Select a classification template and click Download. This exports an editable template of the system.
2. Open the template in Excel or other spreadsheet application as needed.
3. Click Add Classification to import and save the custom classification to your system.

PARAMETER SETS
Asset Identity Data

<table>
<thead>
<tr>
<th>Name</th>
<th>Data Type</th>
<th>Max.</th>
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</thead>
<tbody>
<tr>
<td>Manufacturer</td>
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</tr>
<tr>
<td>Model Number</td>
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</tr>
<tr>
<td>Serial Number</td>
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<td>Installed by</td>
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<td>Installation date</td>
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<tr>
<td>Warranty Expiration</td>
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<tr>
<td>Warranty Documents</td>
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<tr>
<td>O&amp;M Manual</td>
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<tr>
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</table>

 FACILITY TEMPLATES

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Classification in use</th>
<th>Parameter sets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital Template</td>
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<td>Masterformat</td>
<td>Defined - 17</td>
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<tr>
<td>Data Center</td>
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<td>Categories - Short</td>
<td>Defined - 2</td>
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<tr>
<td>Demo Template</td>
<td></td>
<td>ELU Specs</td>
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<tr>
<td>Demo Set</td>
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<td>Categories - Short</td>
<td>Defined - 3</td>
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<tr>
<td></td>
<td></td>
<td>Simple Group Sample</td>
<td>Defined - 2</td>
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</table>
Capture
Asset, Space, and System Data During Design and Construction
Capture

Asset, Space, and System Data During Design and Construction

Asset Type

Asset Parameters as specified in the Facility Template
Verify Completeness and Accuracy of Asset, Space, and System Data
Autodesk Tandem’s – Asset Information Model
Outcomes of Digital Handover

Accelerate operational readiness through easy access to detailed facility information

Transparent collaboration between all stakeholders
Enabling Owners
Transforming the Built Asset Lifecycle
Smarter Operations and Greater Insight

Autodesk Tandem provides the context to connect operational data and systems. With these connections, you can answer and visualize complex questions like:

- If this component fails, what spaces are affected?
- Where are these assets and how do I access them?
- How does the built asset perform against my desired outcomes?
Connect
Operational Solutions and Data

Access
Operational Information through a Single Pane of Glass
Predict and Inform

Analyze data for a single facility or data across your portfolio to predict insights and inform decisions.
The Road to Digital Twin Maturity

Source: Verdantix - Smart Innovators: Digital Twins For Buildings, June 2020
### Planned Workflows and Personas

<table>
<thead>
<tr>
<th>Tandem Platform</th>
<th>Autodesk Tandem</th>
<th>Autodesk Tandem Pro</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Integrate</td>
<td>Specify</td>
</tr>
<tr>
<td>Power a digital twin ecosystem via open access to asset and space information built on Autodesk Forge</td>
<td>Setup and manage classification, data models, and permissions</td>
<td>Aggregate, view, query, update, and normalize object and asset data</td>
</tr>
</tbody>
</table>

#### Personas

- **AEC Project Team Persona**
  - BIM Manager
  - Engineers
  - Architects
- **Owner/Operator Persona**
  - Facility Manager
  - Operations Manager
- **Developer Persona**
  - Facility Manager
  - Maintenance Technicians
  - Occupant
  - Enterprise Developers
  - 3rd Party Developers
  - 3rd Party Developers