

AECO - The Next Digital Transformation

July 30, 2024

Eric DesRoche Director, AEC Business Strategy



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Introduction

AUTODESK





IN FY23*

\$5.01B Total revenue (up 14% year on year)

Total subscribers (up 11.6% year on year)

6.74M

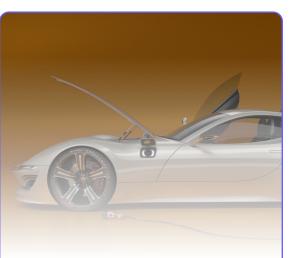
\$1.2B

R&D investment (24% of net revenue)

*Figures are from our fiscal year 2023, which began February 1, 2022 and ended January 31, 2023.









AECO

Architecture, Engineering, Construction & Operations

D&M Design & Manufacturing

M&E Media & Entertainment





AECO

Architecture, Engineering, Construction & Operations

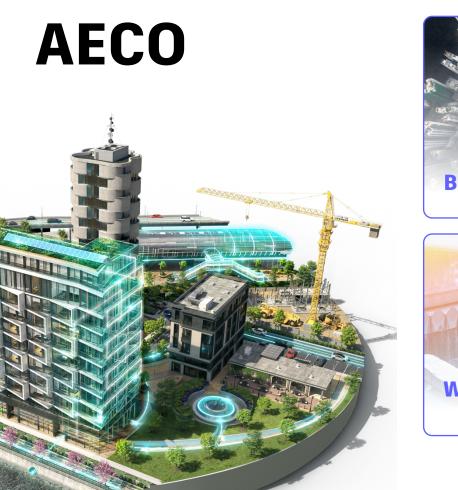
D&M

Design & Manufacturing



M&E Media & Entertainment









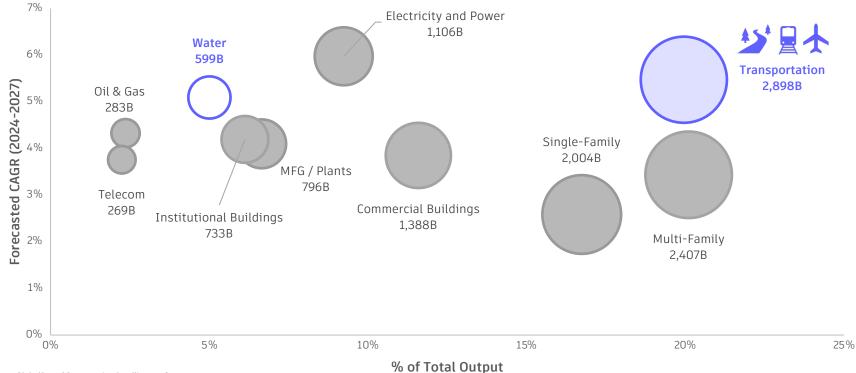




Industrial

Transportation is the 2nd largest \$ fastest growing AEC market WW

Global Construction Spend 2023 forecast by Segment

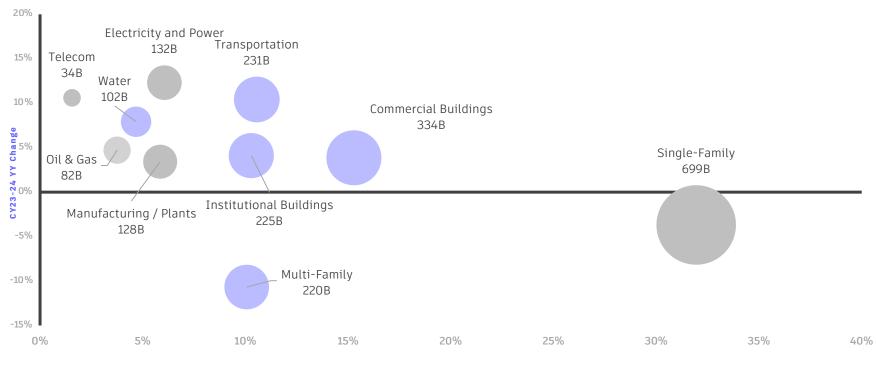


Source: GlobalData / Construction Intelligence Center

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AEC Industry Segments | US Construction Spend 2024

Transportation and water are currently the fastest growing segments



Digitalization empowers global opportunities

65%

of architects and engineers see integrating designs across disciplines as critical to collaboration

The State of Collaborative Design in AEC, Tech-Clarity

79%

of AEC leaders say their companies' future growth depends on digital tools

State of Design & Make Report 2023, Autodesk

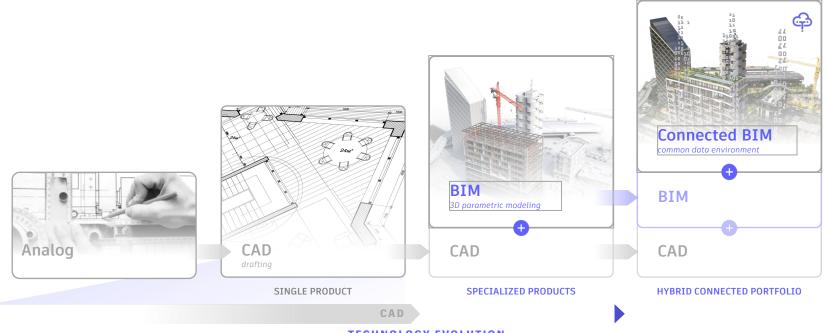
82%

of owners feel they need more collaboration with their contractors

Climbing the Curve, KPMG



AEC Digital Transformation



TECHNOLOGY EVOLUTION

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Guiding customers through digital transformation

Experience

- Understanding & addressing collaboration challenges
- Delivering products that drive customer maturity

Technology

- Harnessing innovation to streamline processes
- Pioneering new technologies for real time collaboration

Trust

- Establishing secure tools for collaboration
- Partnering with customers to grow their business

BIM remains the backbone of Digital Transformation

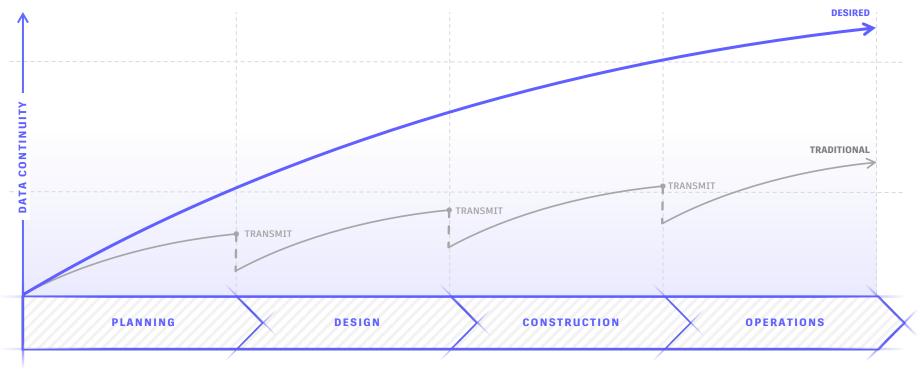
BIM uses **digital models and data** to facilitate the **creation, visualization, analysis, and documentation** of a capital asset resulting in improved **decision making** and **better outcomes**



DIGITAL TWIN DESIGN ONSTRUCTION PLANNING **OPERATIONS** BASELINE OF PRECON OPERATE MATNTATN CAPITAL EXISTING BASIS OF CONCEPTUAL PRELIMINARY DETAILED FINAL CONSTRUCT COMMISSION PLANNING CONDITIONS DESIGN COST & (10%)(30%) (60%) (100%)& HANDOVER COLLECTION SCHEDULE Empowering seamless collaboration, decision making and better outcomes for all stakeholders

Data capture built on a connected experience allowing continuous iteration and improvement

Connected data across the project lifecycle maintains data continuity and preserves critical information

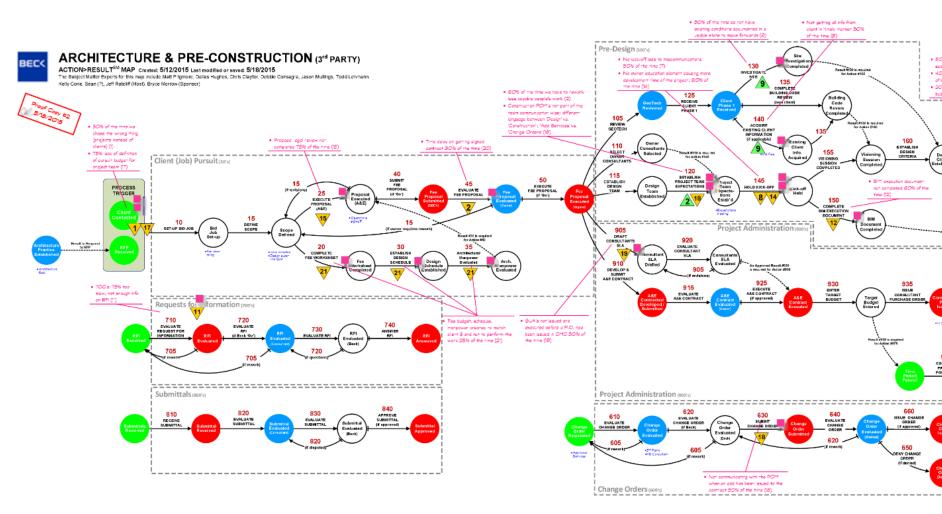


THE LIFECYCLE OF CONNECTED DATA

Unleashing The Power of The Connected Cloud for Digital Project Delivery



Digital Project Delivery utilizes a cloud-based Common Data Environment that optimizes project execution, resulting in new levels of innovation and efficiency throughout the project lifecycle



Analog Delivery

Limitations of traditional approaches

Paper-based processes

Incremental progress over decades

Paper, USB, and FTP for data delivery

Complicated workflows with gaps

Digital Project Delivery

Power of the connected cloud

Integrated digital workflows

Accelerated progress through technology

Real-time, seamless delivery

Streamlined, cloud-based workflows

DIGITAL PROJECT DELIVERY VISION

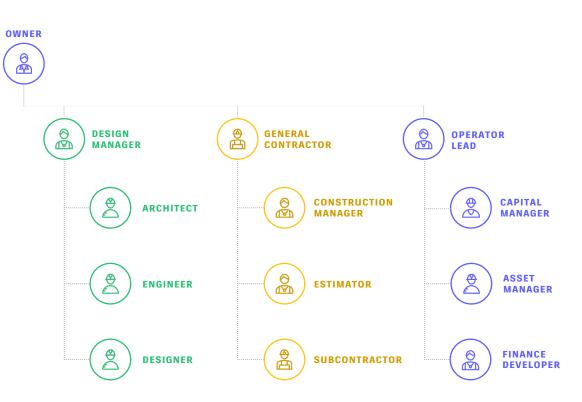
Empower our customers by streamlining design collaboration, elevating design management, and guiding the journey towards a future transformed by advanced digital technologies



Context on Current Project Dynamics

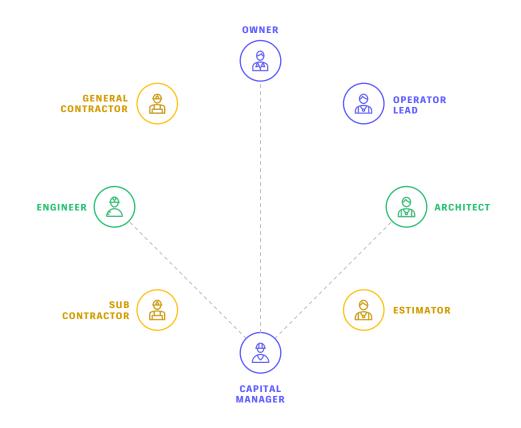
Hierarchy of Engagement

Complicated and disconnected communication flow



Delayed Communication

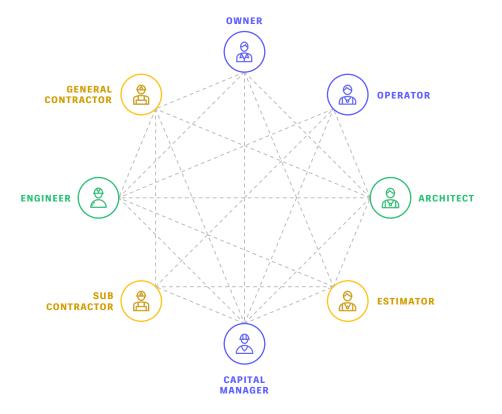
Slower resolution and extended timelines



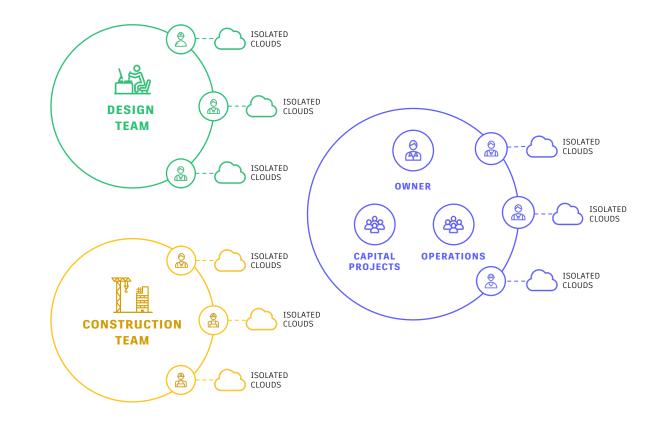
Legacy collaboration

Manual workflows lead to inefficiencies and wasted time

- NO STANDARDIZED PROCESS ENFORCEMENT
- 😣 TOO MUCH FRAGMENTED DATA EVERYWHERE
- 😣 INFORMATION DUPLICATION
- 🕺 LACKING REAL-TIME COLLABORATION



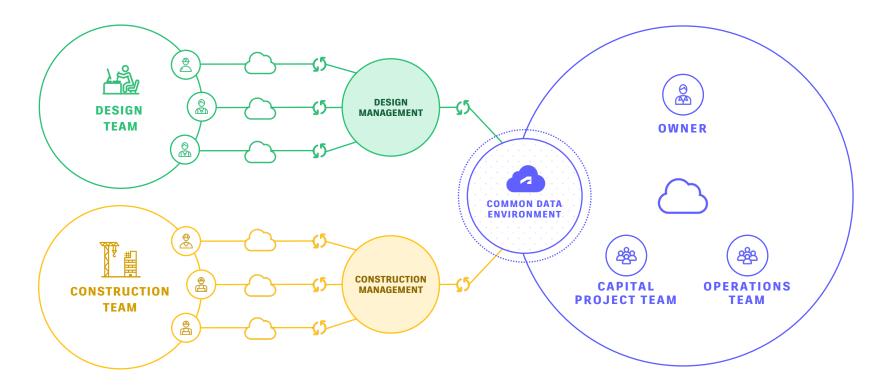
Teams work in many isolated clouds



Furthermore, each team relies on many cloud solutions



Digital Project Delivery is anchored on a CDE



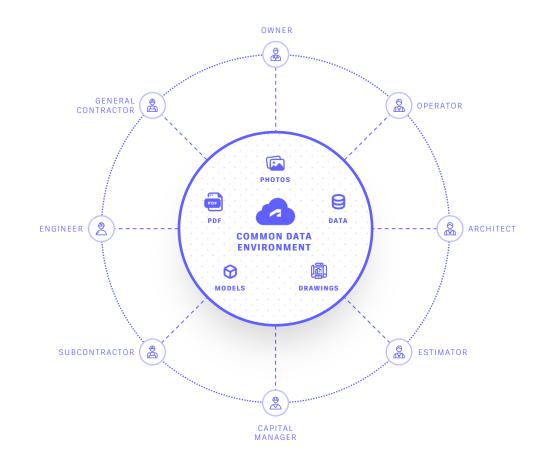
Common Data Environment

Enable a connected project stakeholder ecosystem



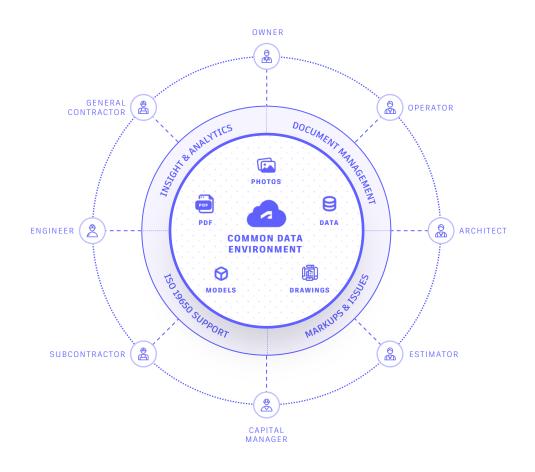
Centralized source of truth

Support multiple types of project files, models, and data



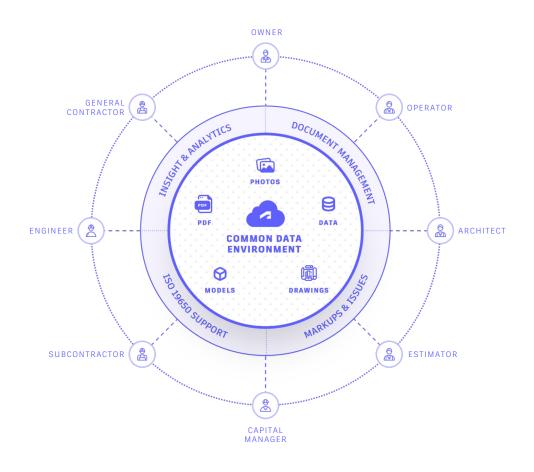
Fundamental collaboration capabilities

Connect people, processes, and data to improve performance



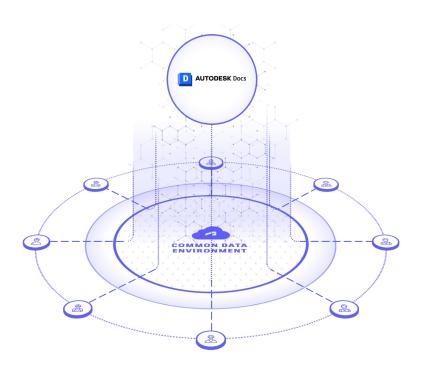
Fundamental collaboration capabilities

Connect people, processes, and data to improve performance



Autodesk Docs is the Common Data Environment

A single, cloud-based solution for storing and managing all project files and data across the lifecycle



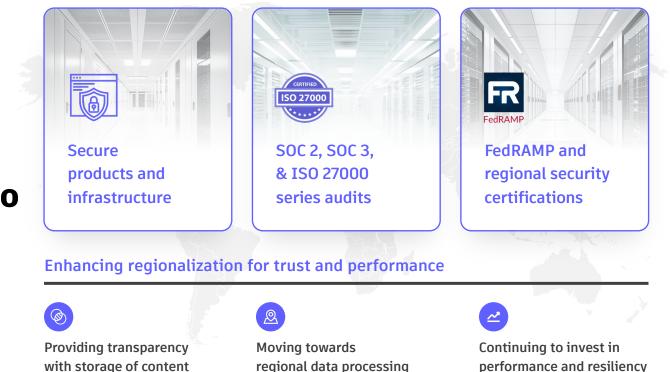
Regionalization

Accelerating future regions

- Increasing investments in regionalization, security certifications, and cloud offerings
- Automating and scaling internal processes common to all platform services
- Streamlining deployment processes and common practices for new regions

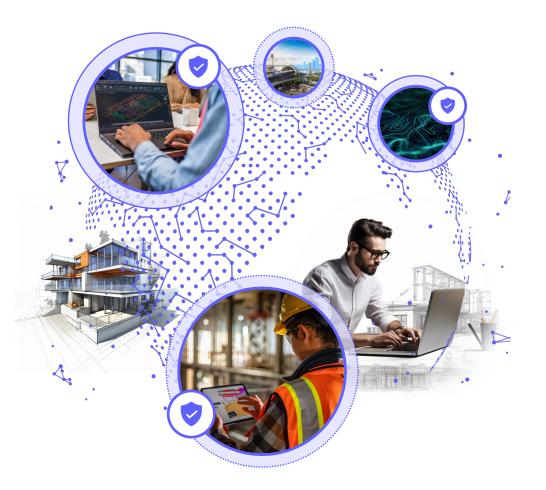


Autodesk differentiates with approach to regionalization



Enable customers to deliver projects without boundaries

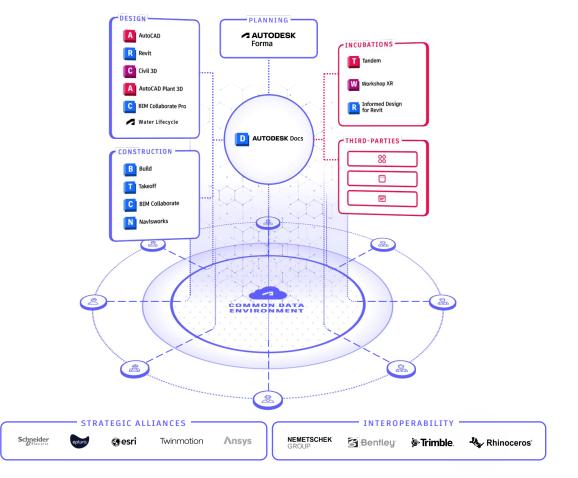
- Seamless access to data anytime, anywhere, and from any device
- Reliable performance and reduced latency
- Support customer preference or requirement for data residency
- Protection of sensitive data and privacy



Project Delivery Overview

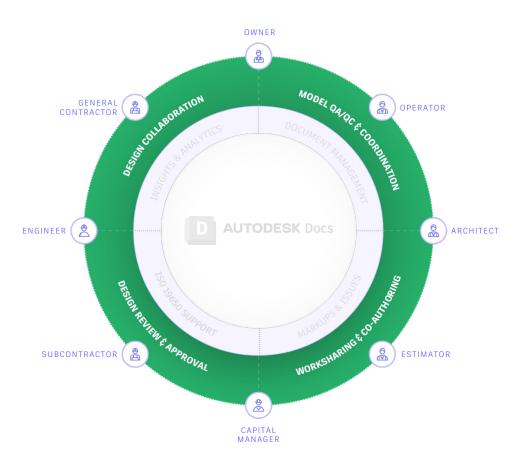
Core design tools connected to Docs

Integration between desktop applications and Docs unlocks design data for cloud applications



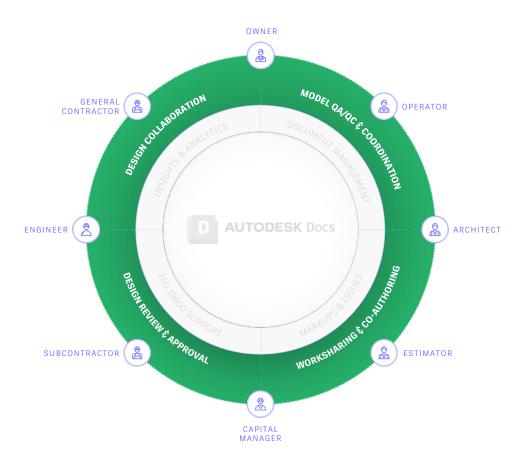
Design collaboration capabilities

Empowering teams through collaborative design development



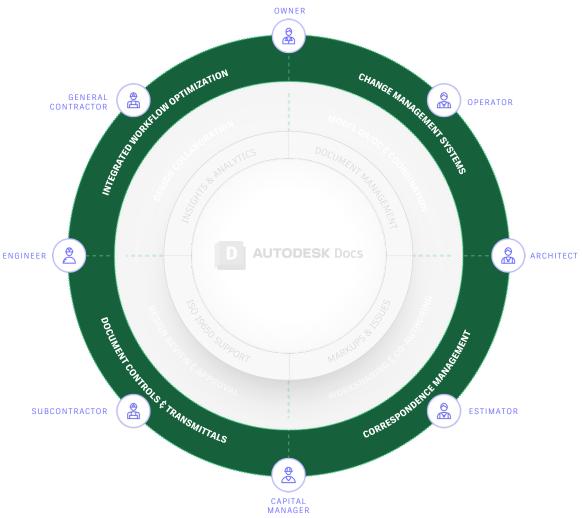
Design collaboration capabilities

Empowering teams through collaborative design development



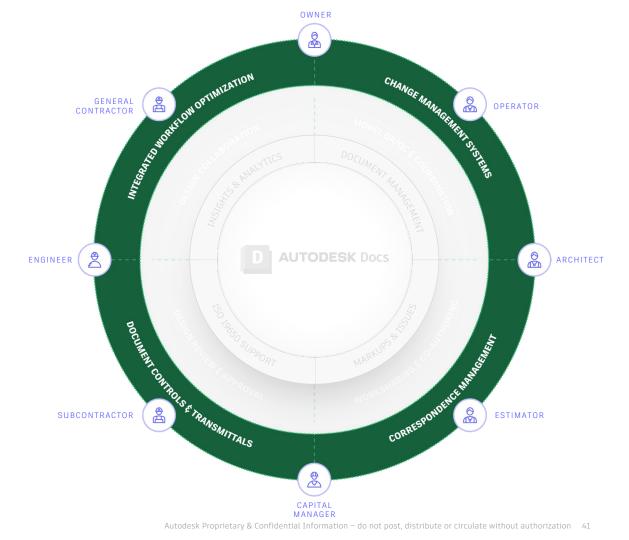
Design management capabilities

Empowering teams with efficient processes and enhanced project controls



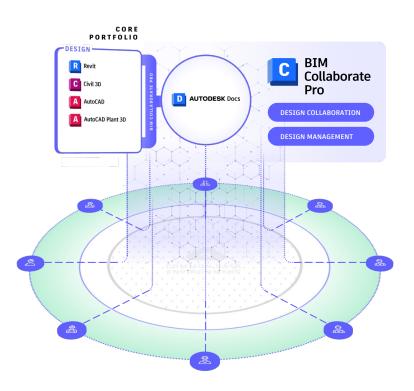
Design management capabilities

Empowering teams with efficient processes and enhanced project controls



BIM Collaborate Pro is the solution for Digital Project Delivery

Scale design capabilities on the cloud – design collaboration and design management for teams working on projects



Design Collaboration

AUTODESK

2023 State of Design & Make

Digitally mature companies report that they are prepared to handle change at higher rates than those from less digitally mature companies

57%

uptick in the consumption of cloud resources by AECO companies in the first year of the pandemic



Digital Project Delivery Strategy



Design Collaboration

Facilitating Multi-Disciplinary Design

- Integrate desktop CAD & BIM seamlessly
- Enable design review & approvals
- Enhance model QA/QC & coordination



Design Management

Managing Information & Processes

- Empower data management & controls
- Facilitate integrated & agile processes
- Leverage data-driven insights



Digital Project Immersion Redefining Design Innovation

- Accelerate outcome-based BIM
- Unleash AI-enabled capabilities
- Cultivate immersive experiences

Collaboration maturity drives project outcomes

We estimate a 50% reduction in the number of mistakes, and in the time needed to complete some project stages.

Jan Cant, Project Architect, Polo Architects, on use of BIM Collaborate Pro



FICIENCY

DIGITAL CAPABILITIES



දී-දී Design Collaboration (Connected Cloud)



Design Management (Advanced Cloud)



Digital Project Delivery Strategy



Design Collaboration

Facilitating Multi-Disciplinary Design

- Integrate desktop CAD & BIM seamlessly
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Design Management Managing Information & Processes

- Empower data management & controls
- Facilitate integrated & agile processes
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Digital Project Immersion Redefining Design Innovation

- Accelerate outcome-based BIM
- Unleash AI-enabled capabilities
- Cultivate immersive experiences

Design Collaboration

Repeatable cloud-based worksharing and reviews leading to collaborative editing, risk reduction, and enhanced performance of design information



Challenges without a connected cloud



Barriers to adopting connected cloud



Cost constraints



Fear of change Resistance due to concerns of disruption



Lack of guidance

Uncertainty about where to start

CUSTOMER ASSURANCE

- Local infrastructure costs more compare to cloud subscriptions
- Connected cloud offers flexibility and resource optimization

- Embracing changes leads to improved collaboration & efficiency
- Change brings enhanced project outcomes & business resilience

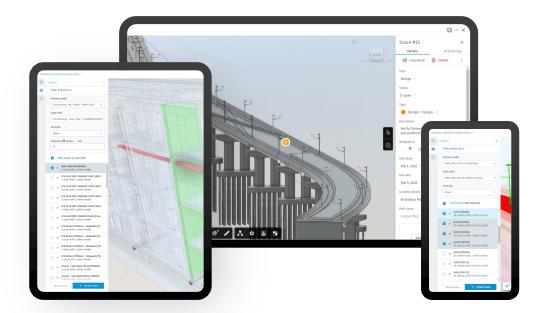
- Effective onboarding guides through stages of adoption of connected cloud
- 40% of AEC reported pandemic spurred finding of new innovations¹

1. Autodesk, 2023 State of Design & Make report



Unlocking the power of Design Collaboration

- Co-author, collaborate, and share project data for Revit, Civil 3D & Plant 3D
- Centralize, organize, and structure design data in a single cloud environment
- Manage issues, coordinate models, and advance project visibility in the cloud



Desktop Authoring

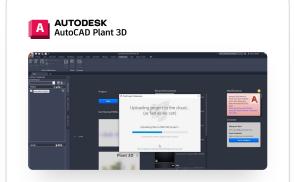
Facilitate worksharing and collaboration from the cloud



Revit Cloud Worksharing

Collaborate seamlessly on Revit models in real time, anywhere, across teams Civil 3D

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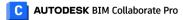


Collaboration for Civil 3D

Quickly workshare Civil 3D files, xrefs, and data shortcuts, from one cloud accessible location

Collaboration for Plant 3D

Securely collaborate on Plant 3D files in a cloud-based environment



Design Collaboration

Enhance teamwork, communication, and design quality to increase performance

Reviews & Issue Management

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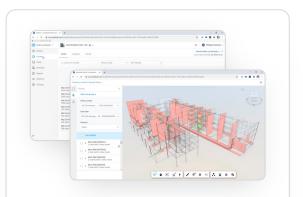
Coordinate quality reviews for many file types with issue tracking while following workflow progress Bridge for Design Collaboration

Secure and automated design file sharing across projects meeting diverse contract deliveries

Model Coordination

Efficiently automate design clash detection and organize coordination issues for resolution to reduce risks





Design Management

Digital Project Delivery Strategy



Design Collaboration Facilitating Multi-Disciplinary Design

- Integrate desktop CAD & BIM seamlessly
- Enable design review & approvals
- Enhance model QA/QC & coordination



Design Management

Managing Information & Processes

- Empower data management & controls
- Facilitate integrated & agile processes
- Leverage data-driven insights

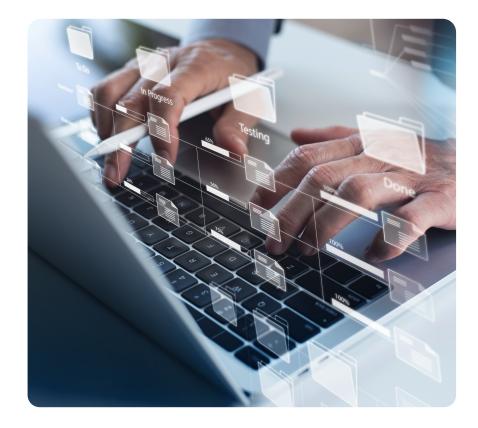


Digital Project Immersion Redefining Design Innovation

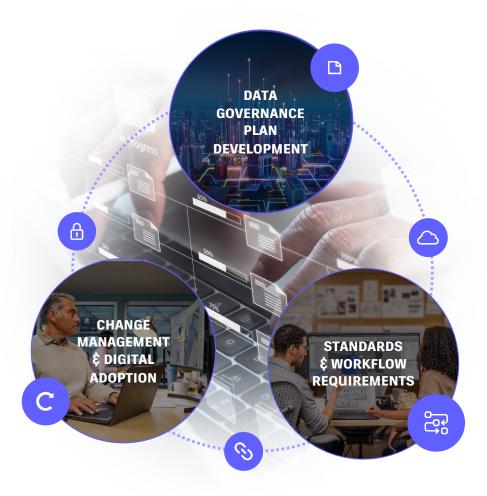
- Accelerate outcome-based BIM
- Unleash AI-enabled capabilities
- Cultivate immersive experiences

Design Management

Flexible cloud-based processes to set up projects and manage communications, milestones, and contract obligations connected to business performance



Effective digital processes through Design Management



Design Management optimizes information flow

Seamless exchange of data across the lifecycle

SOLUTIONS	PLANNING	DESIGN	CONSTRUCTION	OPERATIONS
AUTODESK Construction Cloud	PROJECT MANAGEMENT			
R ReCap	EXISTING CONDITIONS			
AUTODESK Forma	CONCEPTUAL DESIGN			
BIM Collaborate & AEC Pro	DETAILED DESIG	N & DOCUMENTATION		AUTODESK
Takeoff	ESTIMAT	ION & QUANTITY TAKEOFF		Tandem
Collaborate		VIRTUAL CONSTRUC	TION	
B Build		CONSTRUCTION MA	NAGEMENT	
Tandem for AEC	DIGITAL TWIN		HANDO	OVER
		INFORMATION & D	DATA MANAGEMENT	
ALLIANCES ¢ partnerships		🍪 esri 🛛 🍪 🗠	ilding SMART. epturo	▶



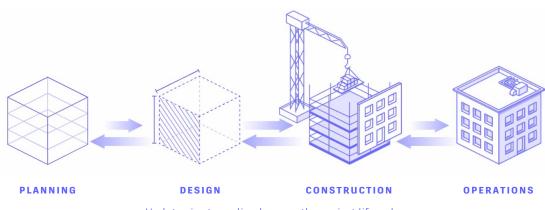
SHARE & TRANSITION BETWEEN STAGES

MANAGE, CONTROL & REUSE KNOWLEDGE & DATA

FOCUS ON EXECUTING W/ LESS RISK

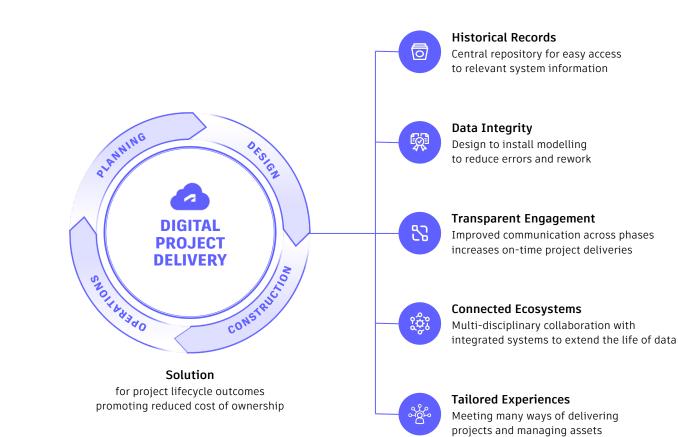
Seamlessly connecting past and future

- The digital thread streamlines changes across teams and phases
- Bi-directional connectivity enables seamless exchange of data
- Integration of data and processes culminates in a digital twin



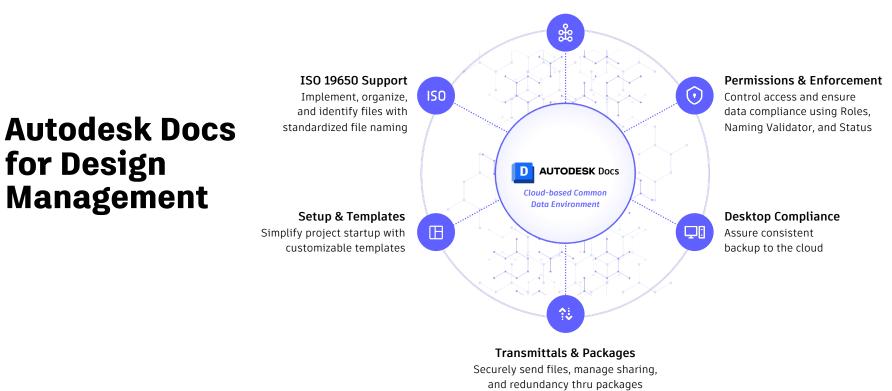
Updates is streamlined across the project lifecycle





Work Breakdown Structure

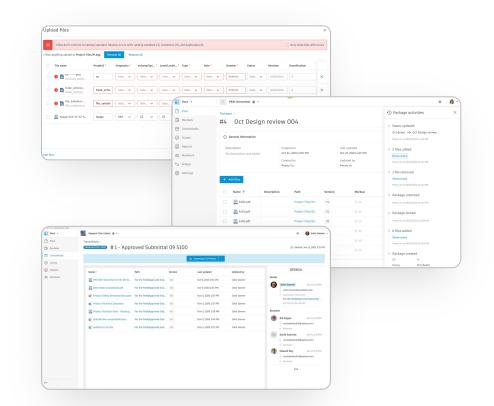
Integrate WBS within required naming standard attributes to support processes



AUTODESK DOCS

Data management in a single repository with robust controls

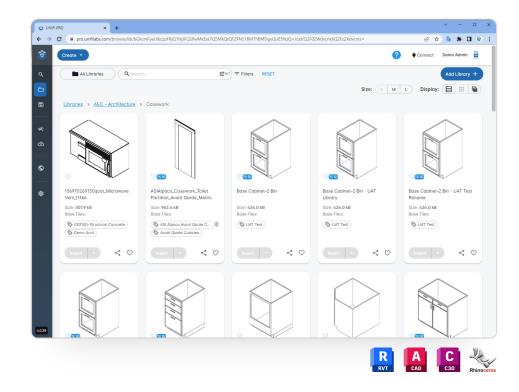
- Control permissions and access while ensuring data compliance using Roles, Naming Validator, and Holding Area
- Assure consistent information management through desktop apps saving to the cloud
- Securely send transmittals, manage sharing, and reduce file storage redundancy through packages



AUTODESK DOCS (NEW)

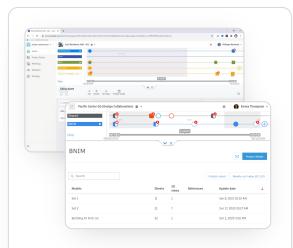
Content Catalog for cloud-based content management

- Maintain component standards by centralizing BIM content on the cloud
- Enable teams to focus on design by reducing time searching & loading content
- Read and write BIM data programmatically through open APIs



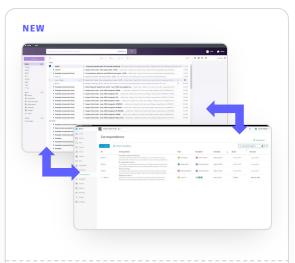
DESIGN

Efficiently Manage Design with BIM Collaborate Pro



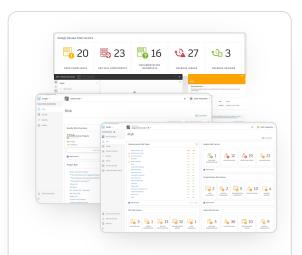
Activity Tracking

View dates and contents of shared designs, managing data exchange on multidiscipline projects



Correspondence Management

Centralized communication from internal and external email sources within your connected project



Observe Insights

Empowering decision-making through predictive analytics and individualized insights

ALLIANCES



Driving BIM & GIS convergence

- Leverages the combined capabilities for improved project lifecycle outcomes
- Geospatial context for engineering projects drives increased collaboration and coordination
- Data connectivity through the asset lifecycle enabling new efficiencies across teams



ALLIANCES

Eptura

Smarter facility decisions through unified design & operations data

- Greater cost savings & predictability from informed designs
- Fewer errors & improved schedules from data-driven decisions
- Unified insights from improved collaboration across project delivery
- Increased efficiency from BIMenabled delivery into operations

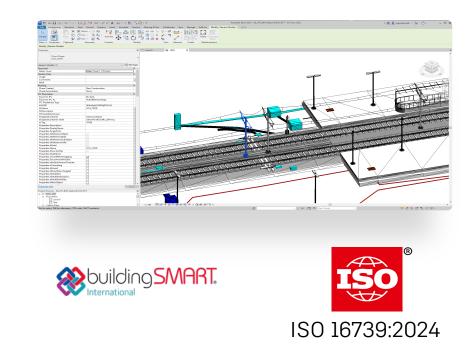


OPEN STANDARDS

BuildingSmart open data standards

Facilitating collaboration and coordination interoperability

- Enhanced, open schema definitions improve industry alignment
- Coordinated models across teams enable seamless delivery processes
- Optimize the project lifecycle by improved data access and sharing



The Next Transformation

The world is different today than 5 years ago

Unprecedented demand

- Sustainability and resiliency
- Demographic shifts
- Stimulus packages

Work has changed

- Remote work
- Material supply chain
- Industrialization



- Data and tool explosion
- Digital twins requested by owners
- Automation and Generative AI

DIGITAL TRANSFORMATION

Global Environmental Trends

Buildings & Infrastructure



 Increased regulations to reduce embodied carbon through rigorous Life Cycle Assessment

- and construction waste
- Address existing building stock with circularity principles

• Smart retrofit and renovation is a pressing reality for climate change adaptation and preparedness

Emerging trends in construction



Accelerated Digitalization – drivers for construction

Shortage of skilled labor



Sustained margin pressure

Need for data driven insights



Digital transformation is imperative in AEC

Design collaboration and management are crucial for success

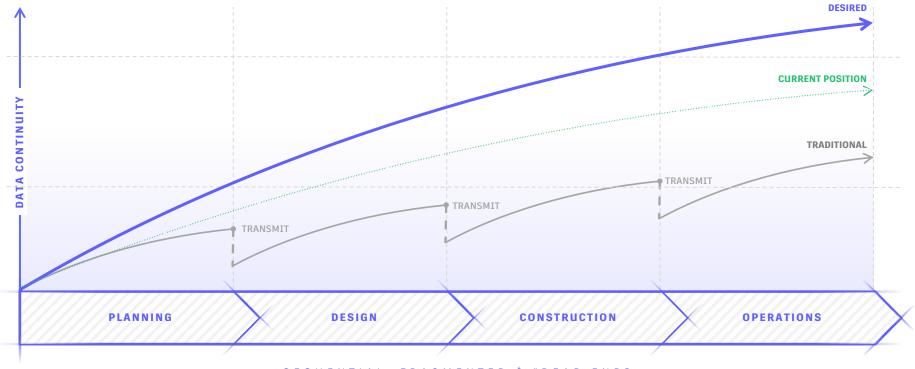
The pandemic accelerated the adoption of digital solutions

Anytime, anywhere access is critical for stakeholders

Accelerated timelines necessitates doing more with less

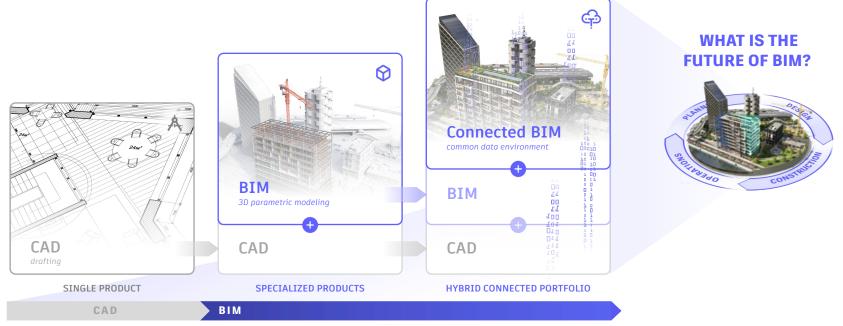
UNLEASHING THE POWER OF THE CONNECTED **CLOUD FOR DIGITAL PROJECT DELIVER**

Connected data across the project lifecycle maintains data continuity and preserves critical information



SEQUENTIAL, FRAGMENTED \$ "DEAD END"

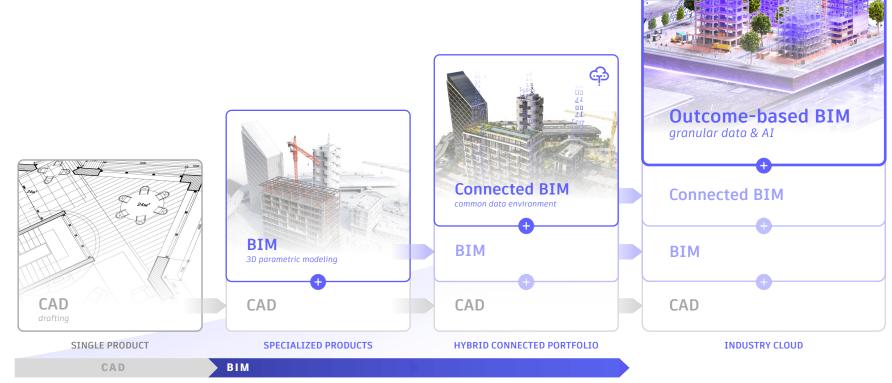
The Next Digital Transformation is coming



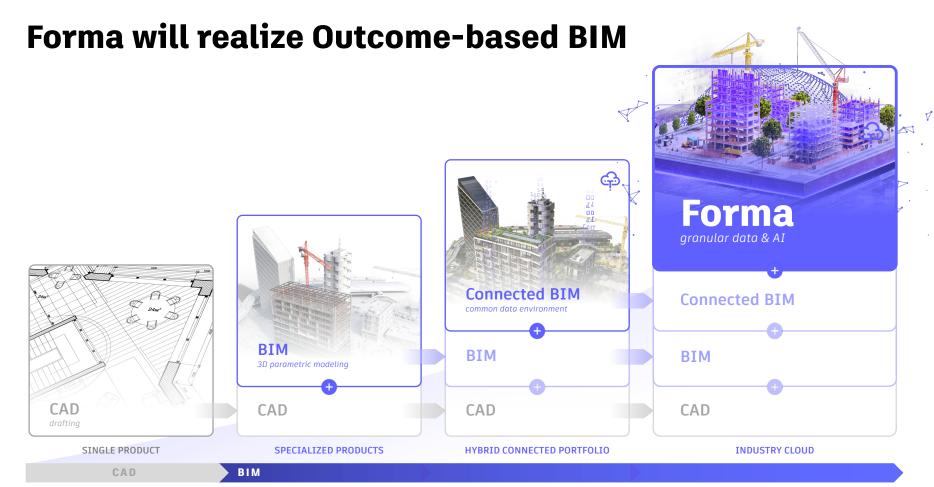
TECHNOLOGY EVOLUTION

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AEC Digital Transformation



EVOLUTION OF BIM

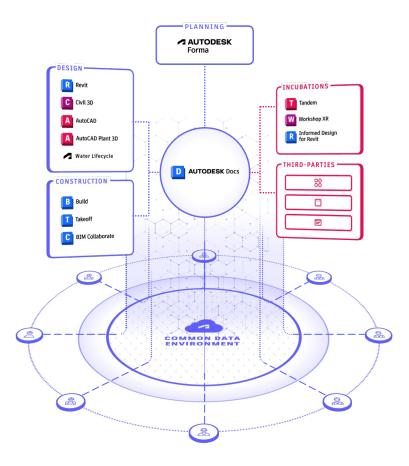


EVOLUTION OF BIM

RECALL

Autodesk Docs is the CDE

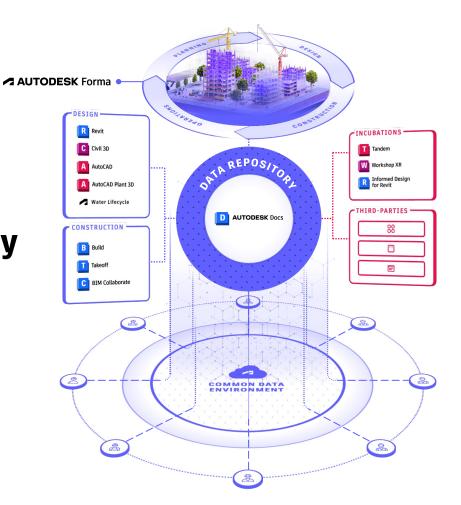
A single, cloud-based solution for storing and managing all project files and data across the lifecycle



Autodesk Docs is Forma's data repository

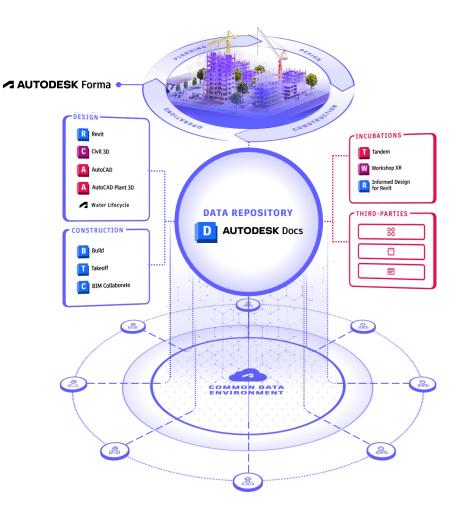
Expanded with more capabilities to support files and granular data

On the right path if using Autodesk Docs



Expand capabilities with Forma and data

Forma will be the industry cloud for AECO that leverages data stored in Docs to enhance Digital Project Delivery through a collaborative environment that is scalable, open, and flexible

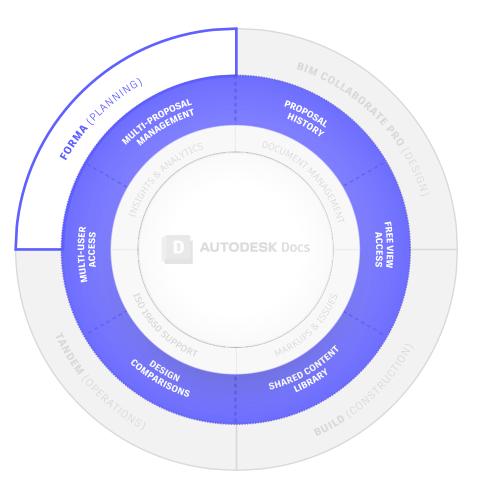


Forma supports the full lifecycle

Driving innovation and advancing cloud capabilities



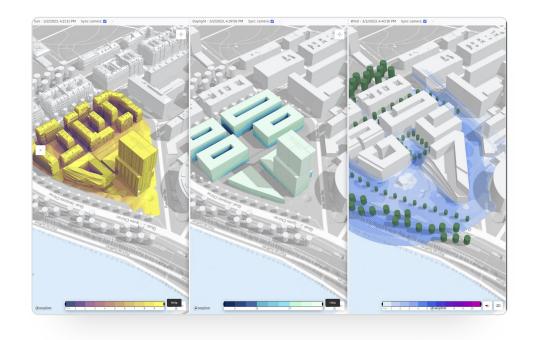
Forma supports collaboration \$ management for the Planning phase



PLANNING

AUTODESK Forma Reimagine early-stage planning

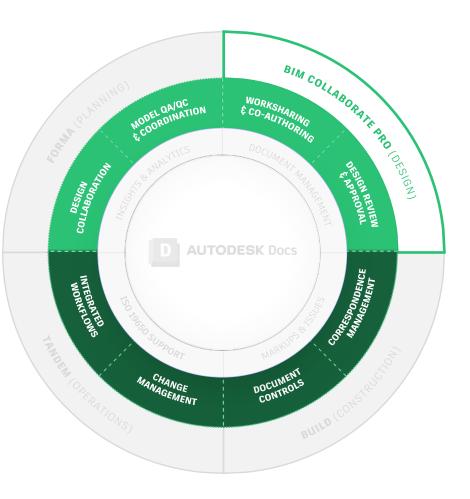
- Accelerate early planning through cloud-based collaboration
- Uncover greater insights through data-driven tools for better outcomes
- Make informed decisions about building performance when it's most impactful



BIM Collaborate Pro enhances collaboration & management for the Design phase

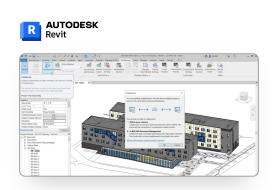
DESIGN COLLABORATION

DESIGN MANAGEMENT



Desktop Authoring

Facilitate worksharing and collaboration from the cloud



Revit Cloud Worksharing

Collaborate seamlessly on Revit models in real time, anywhere, across teams Civil 3D

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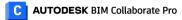


Collaboration for Civil 3D

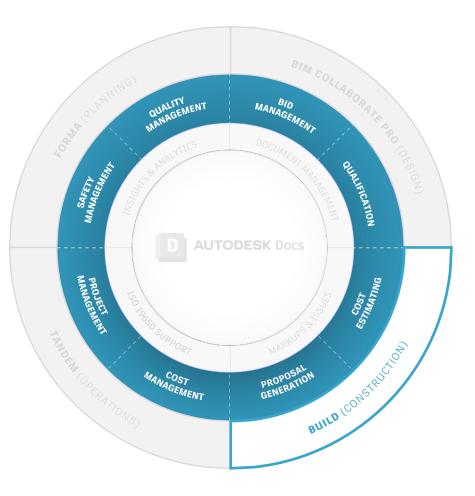
Quickly workshare Civil 3D files, xrefs, and data shortcuts, from one cloud accessible location

Collaboration for Plant 3D

Securely collaborate on Plant 3D files in a cloud-based environment



Build amplifies collaboration & management for the Construction phase

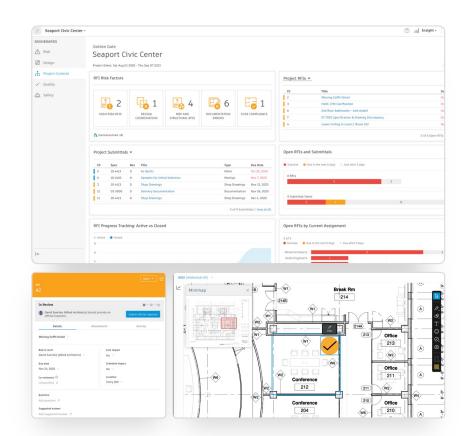


CONSTRUCTION



Connect field and project management workflows

- Enhance project efficiency and collaboration while minimizing errors and rework.
- Drive adoption of repeatable safety programs and foster site-wide ownership.
- Link project data to cost activities for root cause analysis and prioritize risks with Construction IQ



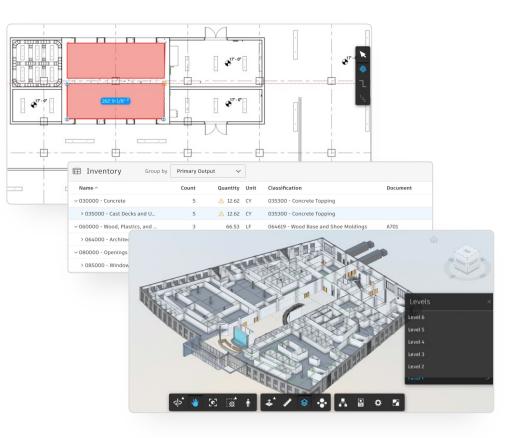
CONSTRUCTION



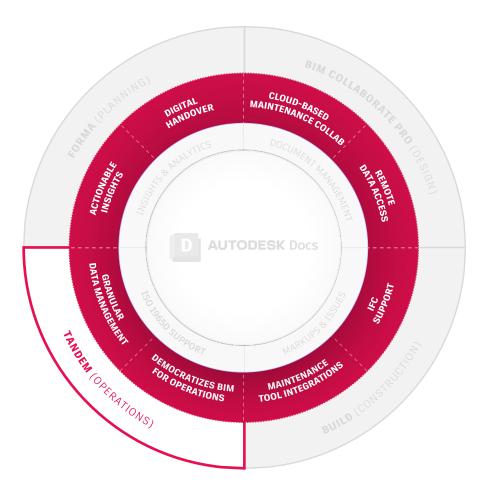
AUTODESK Takeoff

Accelerate bids with accurate 2D & 3D quantities

- Centralized project estimate data for end-to-end visibility and accuracy
- Streamlined, flexible 2D and 3D takeoff process eliminating siloed solutions
- Enhanced risk visualization, repeatable processes, and bid accuracy



Tandem enables collaboration \$ management for the Operations phase



Create digital twins with Tandem for AEC

- Empower AEC firms to build and deliver digital twins for project delivery engagement
- Support building owners early in the lifecycle with operations planning and facilitate handover
- Access through future entitlement with Autodesk BIM Collaborate Pro





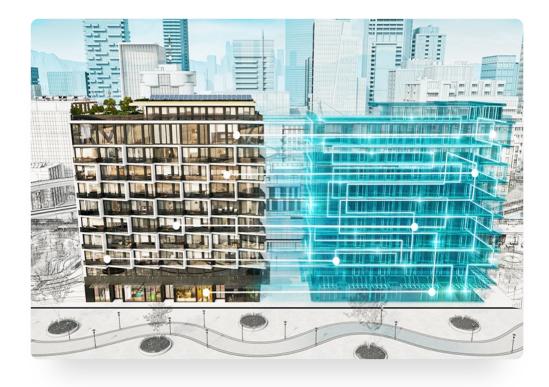
OPERATIONS



AUTODESK Tandem

Harnessing BIM to realize Digital Twins

- Leverage Digital Twins for business innovation & growth
- Simulate, predict, and inform with connections to operations systems & data
- Path to comprehensive and autonomous twins



Digital Project Delivery Strategy



Design Collaboration Facilitating Multi-Disciplinary Design

- Integrate desktop CAD & BIM seamlessly
- Enable design review & approvals
- Enhance model QA/QC & coordination



Design Management

- Empower data management & controls
- Facilitate integrated & agile processes
- Leverage data-driven insights



Digital Project Immersion

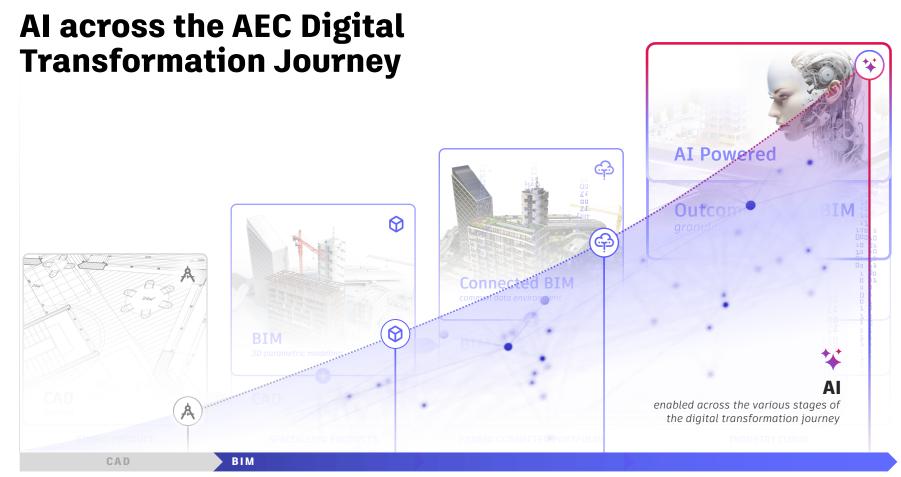
Redefining Design Innovation

- Accelerate outcome-based BIM
- Unleash AI-enabled capabilities
- Cultivate immersive experiences

Accelerate Outcome-Based BIM into Future

BIM-based processes continually optimize workflows using real-time data for better outcomes, pair with advanced computational design techniques to push boundaries of innovation





TECHNOLOGY EVOLUTION

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3-pillars of AI





AI Augmented Design Collaboration

An AI assistant in virtual design meetings can generate 3D models in real time to visualize design changes and improve collaboration.



Al Automated Design Management

An AI-powered design review tool streamlines collaboration by catching errors, suggesting improvements, assigning tasks, and generating reports, all to ensure faster, more accurate, and efficient design processes.

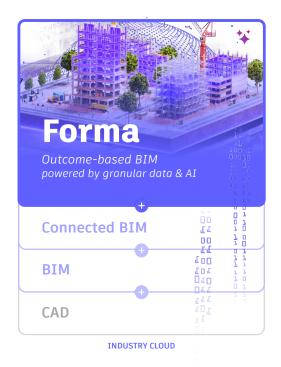


Immersive Design Collaboration

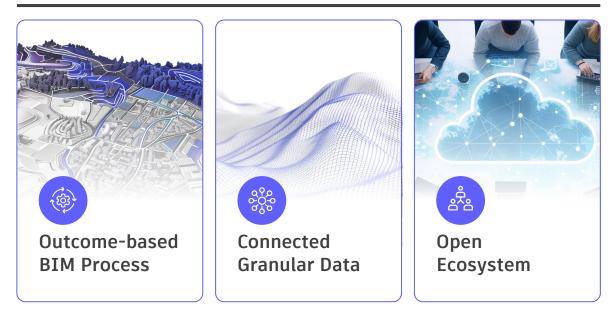
Global construction teams using holographic technology and AI can collaboratively design buildings in real-time, optimizing costs, schedules, and sustainability.



Forma will enable new ways of working

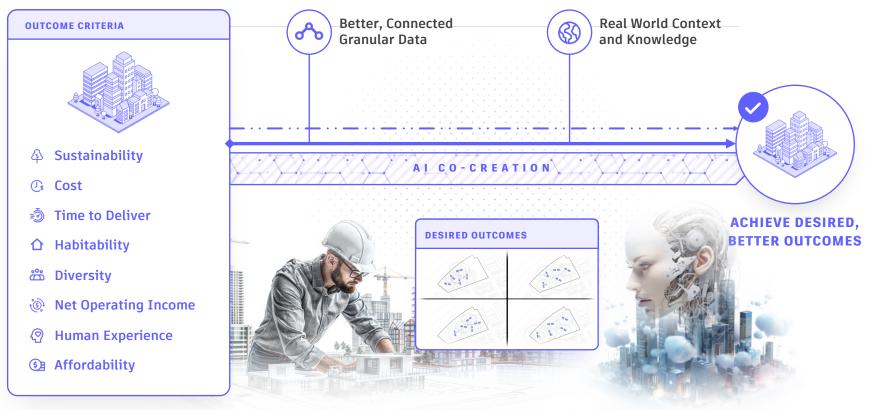


HARNESS THE POWER OF DATA AND AI TO DO MORE WITH LESS



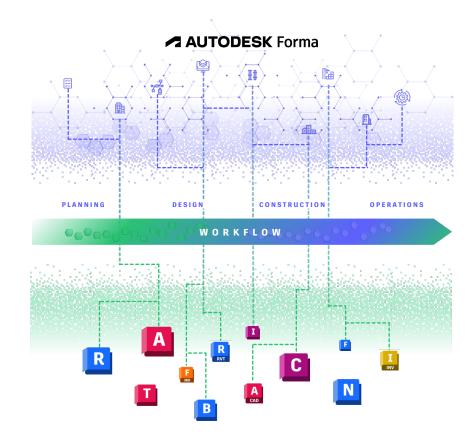
Outcome-based Approach

Start the design process by focusing on the outcomes for the users, community, & environment



As we expand, Hybrid Workflows will continue to be key to bring along our base

Enabling customers to work in a hybrid environment with existing products and workflows augmented with Forma capabilities for others



Summary

Digital Project Delivery



Design Collaboration

Harness the power of the connected cloud to enhance teamwork & efficiency



Design Management

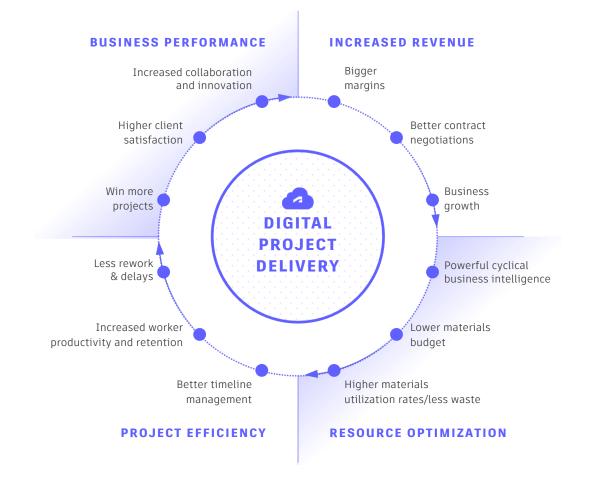
Leverage advanced cloud to manage information & streamline processes



Digital Project Immersion Embrace design innovation to shape the future of digital project delivery

Value Drivers

Across the project lifecycle, the connected cloud drives innovation, automation, and performance to achieve greater outcomes with less



Unleashing the potential

Elevating design collaboration and design management into the future

Outcome-Based BIM Processes

✓ AI-Driven Optimization

Immersive Visualization





Power of Digital Transformation

- Digital transformation requires changing mindsets & processes
- Adapting to change is crucial for success with digital project delivery
- Preparing for the future means staying ahead of emerging technologies



DIGITAL TRANSFORMATION

The time is now, seize the opportunity to revolutionize digital project delivery with innovation



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