Open data bridges collaboration

Keys to an open AEC ecosystem

"Digital transformation has gone from a nice-to-have to a must-have across every phase of design and construction."

– Nicolas Mangon, VP, AEC Strategy, Autodesk

In this guide, we share Autodesk's approach to ensuring openness and interoperability in times of digitalization. We seek an AEC software ecosystem in which our customers feel empowered and assured to drive their own digital transformation. In highlighting our ongoing commitment to improving interoperability, we also celebrate connections to the communities, collaborators, and competitors doing their part to support more open and collaborative ways of working.
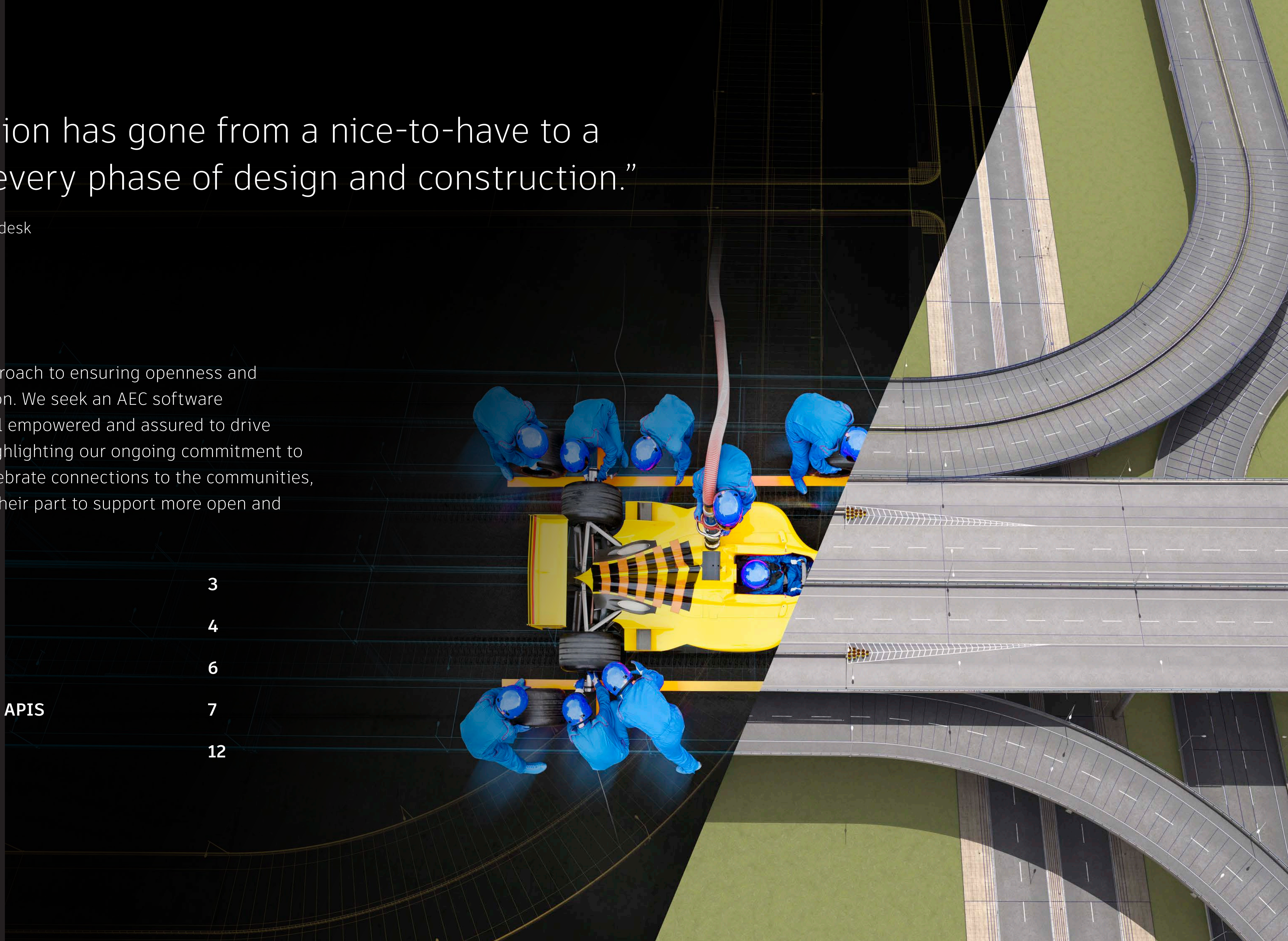
Driving digital transformation

As the Architecture, Engineering, and Construction (AEC) industry pursues digital transformation, a growing Computer Assisted Drawing (CAD) and Building Information Modeling (BIM) software ecosystem presents both challenges and opportunities. The increasing flow of digital data connects tools, people, and processes through all phases of design and construction. The gains for collaboration and innovation lead to better project outcomes for teams and owners and new creative and business horizons for designers, technologists, and engineers.

Nevertheless, a growing body of research suggests inadequate software interoperability can impede project success and become a source of frustration for project teams and a real risk for owners. A 2018 study by FMI and Plangrid[1] looked at digitalization in the construction sector and found that 52% of all rework was caused by poor data and miscommunication, leading to $31.3B in costs for firms working in the U.S. alone. In an average week, "construction employees will spend 14 hours—roughly 35% of their time—looking for project data or information, dealing with mistakes or rework, and handling conflict resolution."[2] Ensuring the availability, access, and interoperability of project data, no matter the source, is crucial to reaping the full rewards of digital transformation.

[1] Plangrid is an Autodesk portfolio company. http://pg.plangrid.com/rs/572-JSV-775/images/Construction_Disconnected.pdf

[2] Construction Disconnected: The High Cost of Poor Data and Miscommunication [Report] Available at: https://blog.plangrid.com/2018/08/fmi-plangrid-construction-report

Committed to open data standards

As BIM mandates mark the transformation of the AEC industry, the prospect of eliminating data-sharing bottlenecks and creating more seamless ways of collaborating comes closer to reality.

Autodesk has a long history of developing more open ways of working through BIM, chief among them an embrace of open data standards for better software interoperability and project team collaboration.

Back in 1994, Autodesk was part of a founding group of companies that prioritized the creation of an industry collective to define and progressively advance open, vendor-neutral data standards for working collaboratively in BIM. Today, buildingSMART International® supports the advancement of openBIM® and the implementation of open standards through a focused set of services and programs, from advocacy and awareness to training and software certification to thought and technical leadership.

Now, as a member of the buildingSMART International® Strategic Advisory Council, Autodesk is active in the technical debates that shape the evolution of openBIM® from a file-based method for data exchange toward a modern, cloud-based data management infrastructure.

LEARN MORE >

"More than ever, we need to work together across teams, tools, and industries to tackle the challenges of our collective future. This is why Autodesk is committed to an open and interoperable software ecosystem defined by seamless data connection."

– Amy Bunszel, EVP AEC Design Solutions, Autodesk

Screen dataset courtesy of BNIM

Data in a common language

As part of our long-standing commitment to cross-platform interoperability, we continue to ensure that our portfolio of products meets the rigorous certification standards defined by the openBIM® process.

IFC4 Export Certification

Autodesk Revit has received dual IFC4 Export Certification for architecture and structural exports, making it the first BIM platform to earn both certifications. We are committed to supporting IFC across all disciplines, including the IFC 4.3 schema, now in pilot implementation for infrastructure.

The buildingSMART International® Strategic Advisory Council

As a member of the council, we help support openBIM® standards and adoption through technical and strategic guidance and in conversation with the global community of openBIM® adopters and advocates.

Open Design Alliance

Our partnership with Open Design Alliance gives us access to ODA's IFC toolkit, allowing us to integrate new versions as they become ratified.

Helping AEC BIM workflows with free Autodesk add-ins

In addition to open data standards, Autodesk provides and maintains free add-ins to support better data exchange between architects, engineers, contractors, and owners working in BIM.

LEARN MORE >

Common data for all

As the AEC industry becomes increasingly complex and data-driven, managing complexity through effective collaboration within project teams is key to streamlining design and delivery.

Common data environments harness the full collaborative potential and productivity of AEC project teams from design to construction. A CDE ensures that project and design data are available, accessible, and interchangeable to project stakeholders and contributors by unifying and standardizing BIM processes within a framework of rules and best practices. And not only can a CDE improve data and communication flows for project teams, but it can also assist owners and facility managers by providing a comprehensive record of the project at handoff and a rich dataset for the building, bridge, or road starting the next chapter in operation.

Autodesk Docs provides a cloud-based common data environment that can support standard information management processes such as ISO-19650 across the complete project lifecycle. ISO19650 defines effective information management for working in BIM collaborative processes for multi-disciplinary project teams and owners.

LEARN MORE ABOUT CDE IN AUTODESK DOCS >

A community of cloud innovators

As we continue to evolve our portfolio of tools, we are inspired by the developer community that grows with us, an ecosystem of solutions and service providers who leverage Autodesk's cloud-based and desktop APIs to extend, customize, and scale new BIM capabilities.

AUTODESK **FORGE**®

CLOUD APIS AND THE FORGE COMMUNITY

Cloud-based APIs on the Forge platform allow developers to build applications that augment and integrate design and engineering data, connect existing software systems, and create all-new workflows, helping companies work faster, smarter, and in the cloud.

We cultivate a network of 8,000+ third-party developers who unlock new experiences and new value by extending the capabilities of software solutions using cloud-based APIs. Robust coding samples and resources are released regularly, so there is never a need to start from scratch. Even if you are without in-house developers, Forge Certified Systems Integrators work with you to build Forge-powered applications that meet your needs. Autodesk has a team of dedicated experts and engineers that are available to support companies along the way.

MORE ABOUT FORGE >

"Forge's interoperability means everything to us. It saved us the many months it would have taken to find workarounds for so many data formats and accelerated time to market for our product."

- Zak MacRunnels, CEO, Reconstruct

LINK TO STORY >

APIs extend BIM innovation

An ever-growing community of product experts and professional programmers customize Autodesk products by creating add-ins that enhance productivity. Even writing just a few simple utilities to automate common tasks can greatly increase team or individual productivity. Both the APIs for developing add-ins and extensions and the resources for using them are public and available for anyone to use.

THE AUTODESK DEVELOPER NETWORK

Many professional software developers rely on the Autodesk Developer Network (ADN) to support software development and testing and help market their solutions. The ADN, moderated by Autodesk software engineers, offers blogs, forums, and events to support the growing app developer ecosystem. The Autodesk App Store features content libraries, e-books, training videos, standalone applications, and other CAD and BIM tools built by this professional development community.

LEARN MORE >

AUTODESK AEC INDUSTRY PARTNERS

A key benefit of Autodesk's support for developers is the emergence of a vibrant community of Autodesk AEC Industry Partners. Autodesk AEC Industry Partners are third-party technology and service providers that work with Autodesk to deliver discipline-specific regional solutions, extending out-of-the-box software capabilities to help solve targeted business challenges.

LEARN MORE >

Open source in action

Dynamo

Dynamo is a visual programming language that democratizes access to powerful development tools. It empowers its users by allowing them to build job-, industry-, and practice-specific computational design tools through a visual programming language that can be less daunting to learn than others. It brings automation to CAD and BIM processes and builds connections between workflows, both within and outside the Autodesk portfolio of solutions. Dynamo Player, available with Revit and Civil 3D, allows for the sharing of computational design scripts for use by non-coders. Dynamo is powered by the ingenuity and passion of its user community. Their contributions of code and documentation and their embrace of an open-source ethos have expanded the horizon of what is possible in BIM computation.

LEARN MORE ABOUT DYNAMO >
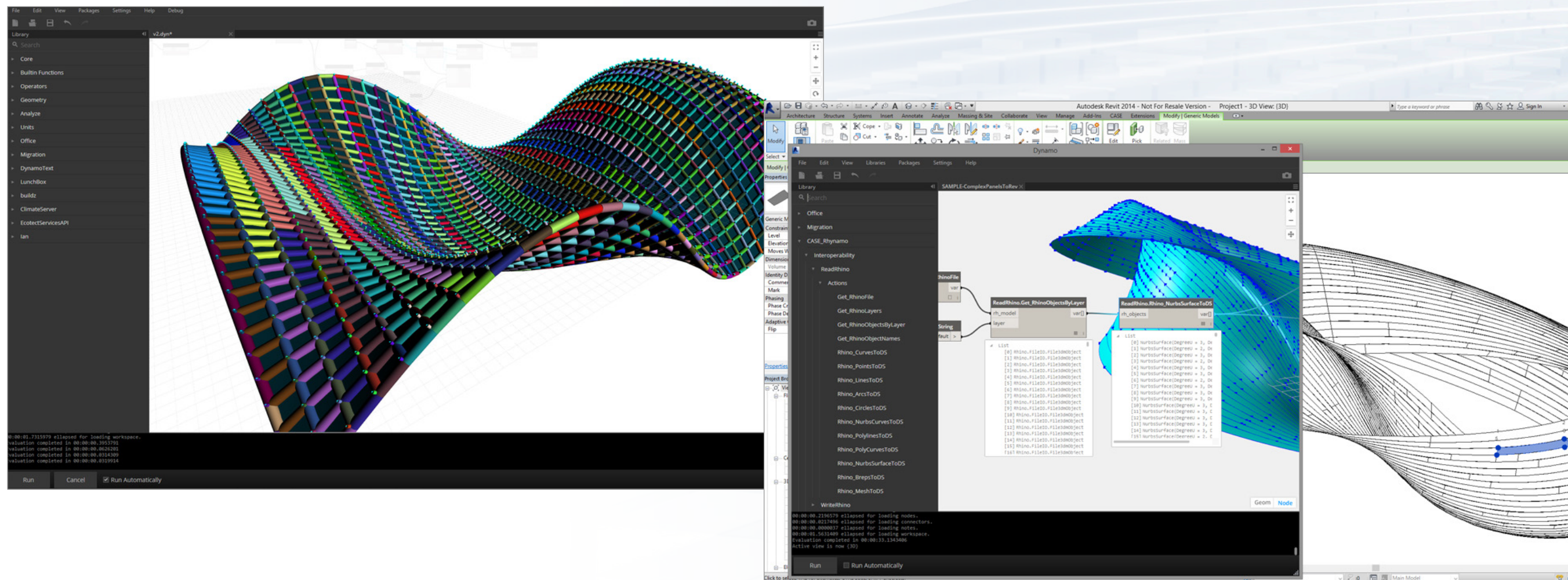
Collaboration across platforms and industries

For better interoperability, there is no going it alone. Partnerships allow bonds to build, ideas to get tested, prototypes to launch, innovations to accelerate, industries to converge, and people to work collectively to make an impact.

ESRI

We're working with ESRI to integrate BIM and GIS processes, enabling a more efficient exchange of information between horizontal and vertical workflows, minimizing data loss, and enhancing productivity with real-time project insights.

LEARN MORE >

UNITY

By integrating Unity's 2D, 3D, VR, and AR technologies with Autodesk design tools like Revit, 3ds Max, and Maya, AEC professionals can quickly create, collaborate, and launch real-time simulations from desktop, mobile, and hand-held devices.
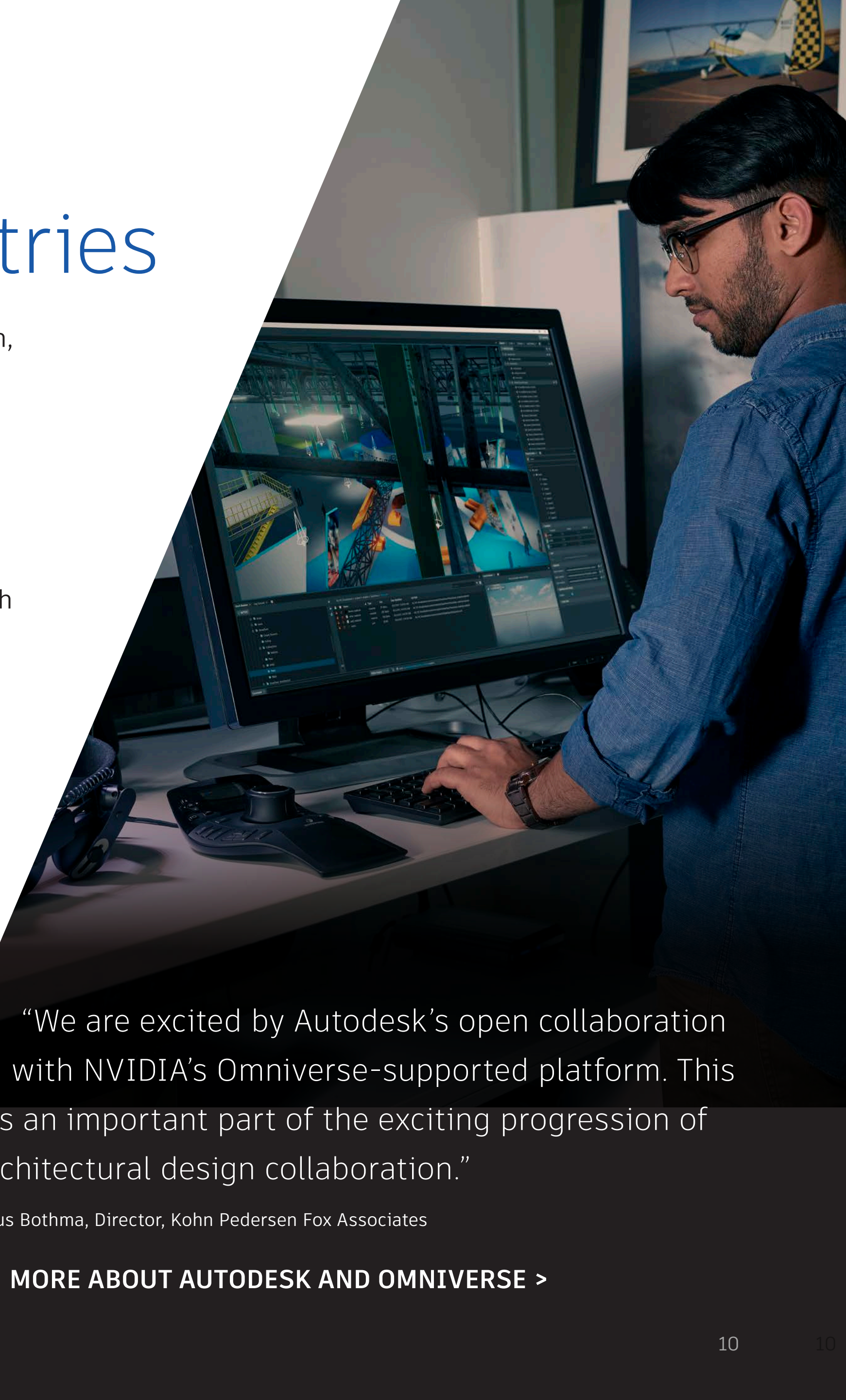
LEARN MORE >

NVIDIA OMNIVERSE

We've joined forces with leaders across design, business, and technology to explore and create within NVIDIA's Omniverse. Built on Pixar's open-source Universal Scene Description format, it provides real-time simulations and cross-industry collaboration in design and engineering production pipelines.

LEARN MORE >

"We are excited by Autodesk's open collaboration with NVIDIA's Omniverse-supported platform. This is an important part of the exciting progression of architectural design collaboration."

- Cobus Bothma, Director, Kohn Pedersen Fox Associates

LEARN MORE ABOUT AUTODESK AND OMNIVERSE >

Moving interoperability forward

Since developing the DXF open file format in 1988, Autodesk has worked to realize an open and interoperable software ecosystem. We continue working to develop platform solutions that are open, secure, and seamless for project teams delivering buildings and infrastructure, now and into the future.

MORE RESOURCES >

1988
Autodesk develops DXF, an early open file format

2002
Acquires Revit and begins developing the predecessor to IFC

2008
Autodesk and Bentley sign interoperability agreement

2011
Autodesk makes Revit's IFC import/export toolkit available as open source

2014
IFC4 is released and integrated into Revit

2017
Announces partnership with ESRI, integrating GIS and BIM processes

Announces partnership with Unity to better integrate design and simulation

2020
Joins Open Design Alliance

Receives IFC4 export certification for Revit for Architecture and Structure

Announces collaboration with NVIDIA on Omniverse

2021
Autodesk Docs extends support for ISO 19650 Common Data Environment (CDE) workflows

1994
Co-founds buildingSMART International® in partnership with other industry leaders*

2005
buildingSMART International® establishes openBIM®

2010
Adds STL export in Revit and releases open-source STL plugin

2013
Revit adds COBie Extension

2016
IFC is integrated into Autodesk Inventor®

Autodesk and Trimble® sign interoperability agreement

Autodesk Navisworks adds COBie Extension

2020-2021
Autodesk and others pilot implementation of IFC4.3 for infrastructure workflows

* Founded as "Industry Alliance for Interoperability" and renamed "International Alliance for Interoperability" in 1996 before coming buildingSMART International® in 2006.

AUTODESK

Make anything.