**Autodesk®**
**Vault Professional 2014**

# Getting More Value from your BIM Process with Autodesk Collaboration and Data Management Products

Building Information Modeling (BIM) is a process that relies on intelligent models to create and manage building and infrastructure projects. Accurate, accessible, and actionable information in those models empowers project stakeholders to make better-informed decisions and respond quickly to project needs. BIM is a widely accepted process supporting project delivery. According to McGraw-Hill Construction surveys of North American companies, BIM is currently used by over 70 percent of the architecture, engineering, and construction (AEC) industry[1], and 50 percent of firms reported using BIM for infrastructure projects[2]. Moreover, the number of governments—including the U.S., U.K., Singapore, Finland, Germany, France, Brazil, and China—with established mandates or emerging BIM policies continues to grow.

As the use of BIM grows, so does the amount of digital project information. The continuity of this information throughout a project's lifecycle is critical for the fulfillment of BIM's value. With this proliferation of information, companies need a more integrated approach for capturing, managing, and sharing data among increasingly diverse and distributed project teams in order to maximize the business benefits of BIM processes. However, for many organizations, the management of information is nothing more than sharing files using FTP sites and storing project files in networked archive folders or in generic document management systems. These approaches are not well suited to distributed, model-based project design and documentation that accompanies the BIM process.

This paper provides insight about how Autodesk collaboration and data management products support the needs of BIM workflows—enabling multidisciplinary, 3D model–based collaboration in the office and the field.

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1 McGraw-Hill Construction, "SmartMarket Report: The Business Value of BIM in North America" November 2012

2 McGraw-Hill Construction, "SmartMarket Report: The Business Value of BIM for Infrastructure" November 2011

# The need for better management and sharing of information across the project lifecycle

The advantages of using model-based design are well publicized and industry adoption of BIM processes and technologies continues to grow. For example, the surveys cited earlier reported that the use of BIM surged by 75% in the last 5 years, and today almost three-quarters of the North American building industry uses BIM to deliver better-performing, higher-quality buildings. The use of BIM for infrastructure projects is accelerating as well, with 80 percent of engineering service providers and owners reporting they expect to use BIM on projects within the next two years. The benefits of BIM tools such as Autodesk® Revit® software products and Autodesk® AutoCAD® Civil 3D® software are becoming apparent to all project stakeholders—from architects and engineers, planners and civil engineers, to contractors, fabricators, and owners.

The adoption of BIM is also fueling an increase in the amount of digital project data that needs to be managed. Information is at the center of BIM, and as the model is tapped for more and more uses, BIM projects often produce many more deliverables than traditional projects. Deliverables such as existing conditions models and their data sources like GIS or utility records; additional construction drawings containing detailed cutaways and sections; model-based project renderings and animations; results of energy, structural, airflow, water drainage, or cost analyses; construction simulations and clash detection reports; fabrication models and as-built facility models; and digital handover and commissioning documents. This explosion of data strains an organization's ability to adequately manage, share, and reuse project information with all the people who need it.

At the same time, AEC project teams are more geographically distributed and more complex. Integrated teams encompassing designers, contractors, fabricators, and owners are becoming more common. These teams often span time zones and continents. Furthermore, many owners are now requiring the delivery of digital facility data to help them manage their building or infrastructure assets more effectively.

Organizations need to be able to exchange information quickly and reliably with their internal and external team members for improved project quality and outcomes, as well as more timely and profitable project delivery.

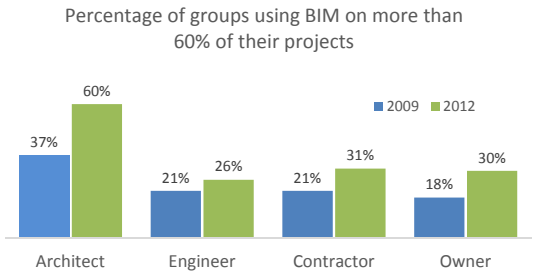



**Figure 1:** BIM is a widely accepted practice for project delivery within the North American building industry.

Source: McGraw-Hill Construction, 2012.

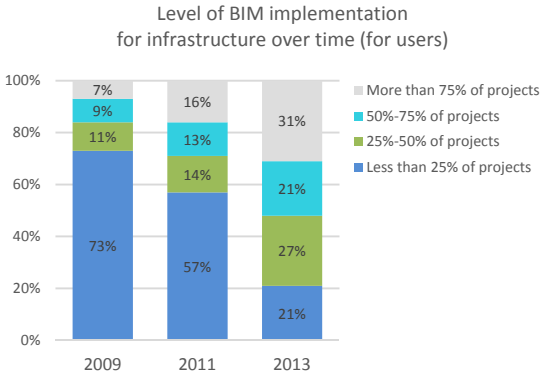



**Figure 2:** The use of BIM for infrastructure projects continues to accelerate.

Source: McGraw-Hill Construction, 2012.

# Best-in-class collaboration and data management for BIM teams

To fully realize the value of the information that is at the center of a BIM project, organizations need collaboration and data management solutions that can securely store and effectively distribute project information (including the changes to that information) for continuous collaboration across the lifecycle of a project. Best-in-class solutions should manage

project content as well as project files, should be oriented around a project versus an individual company or organization, and should be available as desktop solutions as well as web and mobile applications.

**Content-based**: Although construction documentation and drawing files are still essential deliverables on any building or infrastructure project, BIM project team members are interested in far more than the version of a file or who was the last person to update a drawing. Although they want to make sure that they are working with up-to-date project information, their real interest is the content of a model or drawing or document. How deep is this gas line? What is the cost of this air-handling unit? Is there enough space between the wall and this pump for maintenance access? This requires the ability to locate and access content buried within project files.

**Project-oriented**: On building or infrastructure projects featuring integrated project teams—where the major project stakeholders are working together from the outset—the collaboration and data management system has to accommodate all these groups. Therefore, the reliance on legacy file-based or unintelligent makeshift system is often impractical. Even if a corporate system can be configured to accept participants outside the company's firewall, issues such as IT management, cost burden, and security risks will undoubtedly arise. In these situations, more and more projects teams are implementing data management solutions tailored to a unique project, where the software is priced and licensed accordingly.

Autodesk collaboration and data management products for building and infrastructure projects complement and enhance the value of BIM by delivering more complete, accurate, connected, digital information across the project lifecycle to whoever needs it, whenever they need it, wherever they are. These Autodesk products include:

- Autodesk® Vault Professional software for on-premise data management
- Autodesk® Buzzsaw® software as a service (SaaS) for external, cloud-based collaboration
- Autodesk® Revit® Server software for sharing Revit projects between distributed teams

In addition, Autodesk® Navisworks® software products complement these products by providing whole project review, coordination, and planning.

# Managing project data

At the heart of Autodesk's collaboration and data management solution is Autodesk Vault. Based on mature data management technology, Vault enables centralized storage and management of any type of project data, including models, documentation, specifications, contracts, change orders, emails, schedules, videos, and photographs.

Vault was specifically built to help project teams organize, manage, and track project data and related information. It is tightly integrated with a number of Autodesk's BIM applications, including Autodesk Revit software products, AutoCAD Civil 3D, and Navisworks software products, as well as other Autodesk products commonly used by the AEC industry, such as Autodesk® AutoCAD® and Autodesk® 3ds Max® Design software. Vault recognizes how these applications work and how project data created by these applications relate to each other. These integrations are non-disruptive, meaning that Vault data management tools have been embedded within the user interfaces of these applications, enabling users to capture project data naturally as part of their workflow. For example, a designer using Revit can click on a button in the Revit toolbar to quickly find and reuse design data (such as Revit families) stored in Vault, or store project documentation to Vault for it to manage approval processes and project history.

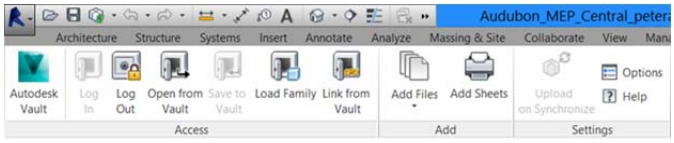



**Figure 3:** Vault data management tools are embedded in the user interface of a number of Autodesk BIM applications such as Revit Autodesk Revit software products as shown here.

Vault stores project data in a common, secure, and centralized location inside a company's firewall. But given the increased reliance on teaming arrangements, integrated project teams also need quick and reliable data exchange

beyond firewalls. Autodesk Buzzsaw enables teams to automatically mirror data stored in Vault out to the cloud, enabling distribution of information beyond the enterprise to external parties, across the web and mobile devices. in a managed and more secure manner. Autodesk Vault includes tools to share and synchronize project data as required between its on-premise data vault and the cloud-based Buzzsaw vault.

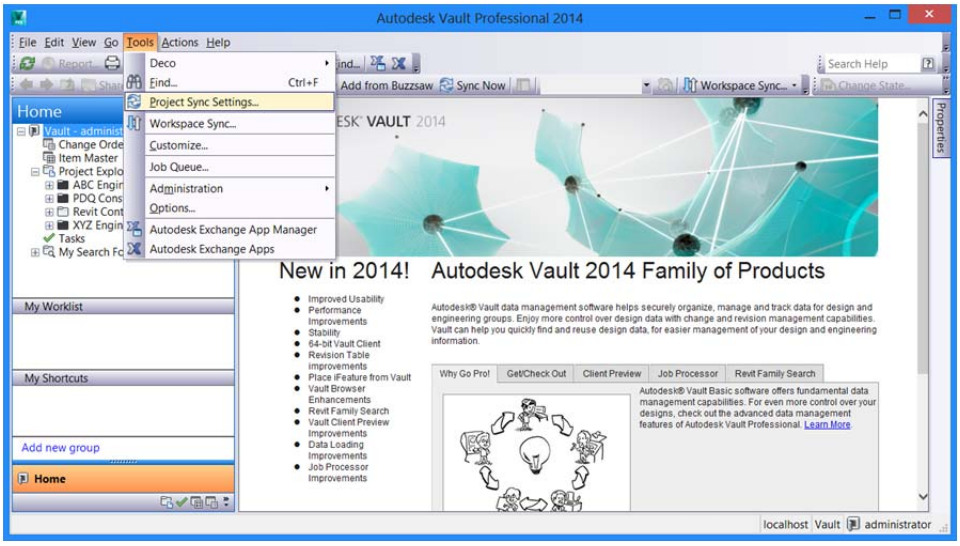



**Figure 4:** Autodesk Vault includes tools to share and synchronize project data as required between its on-premise data vault and the cloud-based Buzzsaw vault.

Vault is also scalable across globally distributed sites and for project-based implementations. With file and database replication features, Vault supports project collaboration and file sharing of all types of project data between global team members. Installations can be configured to the needs of any type of project team, from a single site to multiple sites. Replicated files and metadata are used to help overcome latency issues (i.e., the amount of time it takes for a response to return from a request), which can be painfully slow across the wide-area networks (WANs) used by global project teams. The pricing and licensing of Vault and Buzzsaw help make the solution affordable and practical to implement on a project-by-project basis.

In addition, Vault integrates with enterprise applications such as Microsoft® SharePoint®, Outlook®, and Office. As a business collaboration platform, SharePoint is specifically built to help business users access the resources they need to collaborate, improving productivity and decision-making. Linking Vault to SharePoint means that nontechnical project stakeholders can use SharePoint to easily find and work with project data stored in Vault. In addition, because Autodesk Vault is directly integrated with the familiar ribbon interface in Microsoft Office software—including Microsoft® Word, PowerPoint®, Excel®, and Outlook—teams can more quickly and easily organize, manage, and track all documents, presentations, spreadsheets, and email communication related to a project.

# Project collaboration

Many of today's complex projects are developed by multidiscipline teams that are geographically distributed across several firms and even multiple continents. The transparent flow of information through these distributed teams is critical for project collaboration and informed decision-making. It is also critical that the team's project data and multidiscipline models be shared on a regular basis for project coordination, design review, and analysis. In addition, the project data needs to be organized and accessible; secure yet available to the right people, in the right context.

## Sharing design content

Vault provides a secure and centralized location behind a firewall for storing a project team's design data and manages access to that data. To prevent more than one team member from editing the same file at the same time, information is

managed with check-in, check-out, and version control. When changes are made to files, a complete version history of all changes is maintained. In this manner, team members can work collaboratively without fear of overwriting one another's data. When team members need to exchange design information with people in other companies or outside Vault's firewall, Buzzsaw software provides easy and more secure information exchange with robust permissions and version control—but delivered as a SaaS solution, with quick setup and without the need for IT involvement.

Vault and Buzzsaw also provide model management, helping teams overcome the logistical challenges of multiple parties working simultaneously on shared models. Model-based design content—such as Revit and Civil 3D project models, Revit families, Civil 3D project templates and objects, and archived copies of Revit central models—can be securely stored and shared using Vault and Buzzsaw, which also provide access control and version control for this model content. When users check models out of Vault for editing, those models are locked until they are checked back in. Models for very large projects are often divided into discrete subsections, such as the architectural model of the second story of a skyscraper or the underground utility lines for a transportation infrastructure project. In these situations, users can either check out the design elements or objects for direct edit or link them to their own model for reference during their design efforts. If the master copy of the project object (the model of an underground gas line, for example) is updated, team members who referenced the object are automatically notified of the update and can refresh their copy to see the changes.

***Sharing Revit models***

For project teams using Revit design software, Revit worksharing enables multiple team members to access and modify the same Revit building model at the same time by using a central model (which contains all building model data) saved in a shared location on a local area network (LAN) so that more than one person can work on that project. Individual users save a copy of this central model to their local workstation, which enables them to work independently in their local model. This local model acts as an interface mechanism for synchronizing local changes with the central model. Revit Server extends this by facilitating the Revit central model to be shared across multiple physical locations via a central server, enabling integrating of Revit architectural, structural, and building system models across a wide area network (WAN).

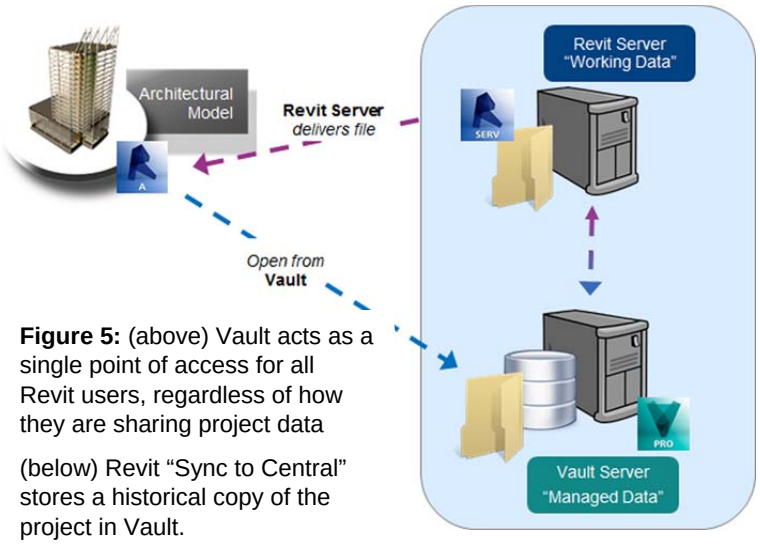
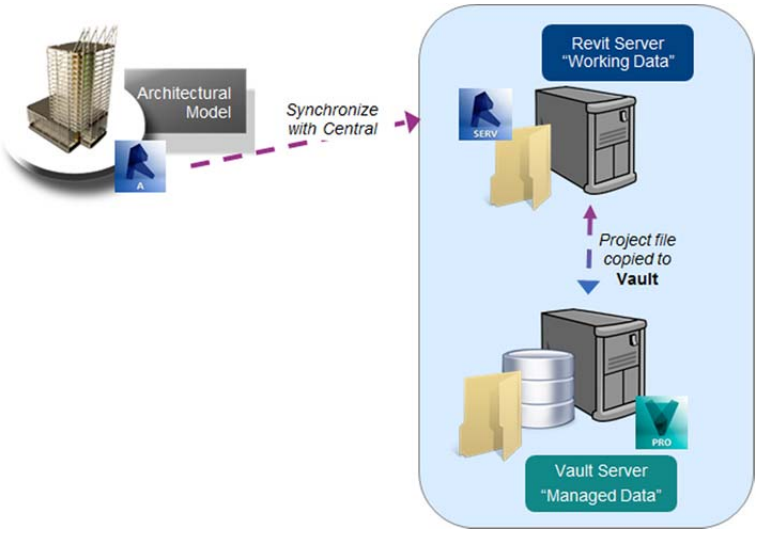



**Figure 5:** (above) Vault acts as a single point of access for all Revit users, regardless of how they are sharing project data

(below) Revit "Sync to Central" stores a historical copy of the project in Vault.




Revit Server and Vault are integrated so that Revit users can use Vault as a single common interface to access all their Revit project files no matter where their location – individual workstation, LAN, or WAN. When opening from Vault, Vault communicates with the relevant Revit Server to deliver a local copy of the project file to the user. This ensures users have a consistent experience opening Revit files regardless of whether it is a standalone file or a project file on a Revit server.

Vault also provides the ability for a snapshot of the project file to be backed up when a synchronization to the central file occurs. In this workflow, a user performs the synchronization as normal and Vault communicates with the Revit Server to obtain a copy of the file which is placed in Vault for versioning, recovery purposes or downstream delivery of the file.

## Project coordination

Navisworks software products enable project teams to integrate multidiscipline models for whole project coordination, visualization, and review. These aggregated models serve as the basis for formal clash detection, virtual project walk-throughs, and 4D (time) and 5D (cost) construction planning and simulations, depending on which Navisworks product you are using.

Like many other Autodesk products, Navisworks is tightly integrated with Vault, and both Vault and Buzzsaw provide a secure and easy way to gather and centralize models from geographically dispersed teams, external companies, and different modeling tools. Vault also enables reliable data management of the individual discipline models and aggregated Navisworks models. For example, when a new version of an individual discipline model is checked into Vault, the software automatically updates the aggregated model when it is next opened in Navisworks. If the discipline model is updated while the aggregated model is being used, the Navisworks user is notified through Vault browser status icons that there is an updated version and can simply refresh the model from Vault, even when one of those models might be contributed by external team members via Buzzsaw. In addition, Vault provides data management of other project information created or used by Navisworks, including project schedules, 4/5D construction simulations, clash detection reports, and saved animations of project walk-throughs.

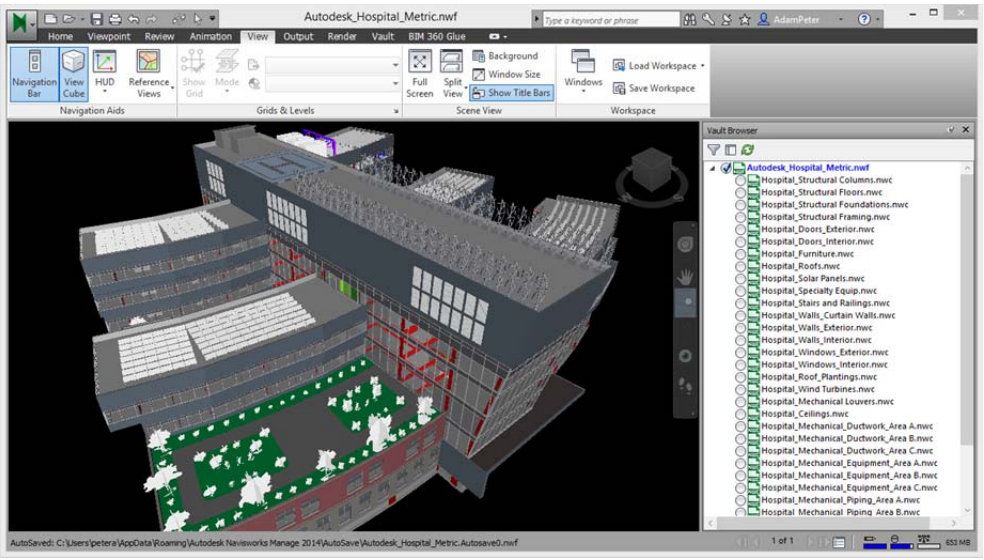



**Figure 6:** Navisworks is tightly integrated with Vault, and both Vault and Buzzsaw provide a secure and easy way to gather and centralize models from geographically dispersed teams, external companies, and different modeling tools.

# Summary

As a recognized leader in Building Information Modeling and its enabling technologies, Autodesk is committed to helping project teams manage, use, and share the information that is critical for realizing the full benefits of BIM.

Autodesk collaboration and data management software is part of a proven, comprehensive, interoperable portfolio of BIM solutions that help maintain data consistency and context—and support more efficient processes—across the project lifecycle. These solutions deliver desktop, cloud, web, and mobile products to support getting the right information to the right people, at the right time—helping firms to innovate, compete, and better anticipate and respond to change.





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