



Autodesk Vault for the Enterprise; evaluation, implementation, and integration

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[PL3677-P](#) The class provides an overview of the overall process of implementing Autodesk Vault software in an integrated systems environment. Follow the process of our company's journey from the first steps of assessing existing conditions to a final vision of integration with other systems and workflows.

About the Speaker

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Learning Objectives

At the end of this class, you will be able to:

- Evaluate both Vault and company workflow for proper application
- Assess and construct the enterprise architecture to harmonize Vault and all integrated systems desired
- Implement the working environment and workflow processes to function effectively in the new system
- Identify methods to determine integration with other existing systems for a unified environment

The term Enterprise Architecture has several definitions, and no one can seem to agree on which one is definitive. Gartner, Inc. one of the world's leading information technology research and advisory companies defines it as:

“Enterprise architecture (EA) is a discipline for proactively and holistically leading enterprise responses to disruptive forces by identifying and analyzing the execution of change toward desired business vision and outcomes. EA delivers value by presenting business and IT leaders with signature-ready recommendations for adjusting policies and projects to achieve target business outcomes that capitalize on relevant business disruptions. EA is used to steer decision making toward the evolution of the future state architecture.”

So when we begin discussing the use of the Vault as an enterprise Solution, we are not only looking at it from a technological standpoint but how it will fit into the workflow and processes of the organization as a whole. With that understanding you can see why you need to carefully evaluate and understand, not only the product and how it will integrate with other systems, but also how documentation and information are utilized in your collective environment.

I. Evaluate both Vault and company workflow for proper application

Determine your concerns

So what challenges did our company face that needed to be addressed? We were facing an issue both internally and externally. A lack of coordination and collaboration between all of our departments and branch offices combined with the need for better management of our communications and resources outside the company was the driving force. Everything from drawings, purchase orders, to warehouse coordination needed to be streamlined and managed more efficiently. The quick growth of our company in the last 3 years, from 550 or so employees to over a thousand meant that the old ways of doing things just didn't work.

Determine current systems in place

Our system of handling files and communications for our company, while technologically advanced, needed to be evaluated. In addition our communication methods needed to be reviewed to make sure the information we were providing to our clients as well as the internal communications between departments were effective. Since IT Infrastructure is the primary system that all other systems in a company of our nature are built upon, this was our first area for a detailed examination.

The current structure was built on the standard windows file sharing system, with a detailed project folder structure. Actual project files were stored on servers at each physical location. In addition the limited file control could allow individuals to store files on their local machines or in non-work folders which had the potential to create multiple documents in different states, creating confusion at best, if not more serious issues such as issuing the wrong information.

Even using WAN optimization hardware between offices in the states there was still a delay when accessing large file types, in addition if the files were not synchronized correctly it caused collaboration problems between those offices. The networking environment was well designed with direct physical connections between the offices in the United States; however connectivity with our international offices were prohibitively expensive. Additional difficulties come up when you begin to deal with ISP providers

outside your company. This was another spot that caused issues with collaboration between our offices and was a primary concern to us.

Other tools that we utilized, such as FTP, Exchange and SharePoint were likewise technologically sound and the implementation of them in the IT structure was well thought out and optimized. Unfortunately, the utilization of the functionality of these systems was not developed to make full use of their enterprise potential. This was even more problematic because we were limited to using these communication methods to connect to anyone outside of our network, such as our office in Mexico, Clients and Contractors.

Determine current standards and workflow present in your organization

Another thing that needed to be examined very closely at this stage is how your organization handles information. In this case specifically documents. We were creating duplicate documentation in multiple locations; on the files store, in SharePoint and sometimes on an FTP site. This isn't even counting the number of files floating around in various email boxes or on local machines. Workflows built around this were not as optimal as they could be, and in some cases set up potentially dangerous situations as duplicate files in reality are difficult to keep consistent and current.

Also there was the additional work that this entailed. Having to upload the same document from the file store to SharePoint caused workflows that existed simply to ensure no errors occurred when providing the information to the clients and field personal. A secure system that allowed us to ensure there was only one file in existence, eliminating multiple copies of the same file was a high priority.

So what was needed

After looking at how the company actually handled the work, both in workflow and in tools used to support the structure, we needed to create a definitive list of our goals. We needed to determine areas needed to be addressed so we can evaluate Vault and ensure an improved performance.

In order to ensure the ability for all business units to effectively collaborate and have its common elements standardized, we needed some type of Governance plan. We also needed consolidation of work with all branches and remote sites. The immersion of employees and consolidation of the work being done between all departments and sites in a new system would give grant greater control over project quality and performance.

We also needed to streamline communication paths between remote sites, departments and external parties. The communication system needed to be utilized in such a way to be more secure and force a standard communication path for information coming in from the outside as well as being provided. This would provide the ability to prevent duplicate documents from existing in the system as well as ensure people were not bypassing standard processes with important information. Marginalizing litigation risk as a result of incorrect information being issued was another crucial need.

And the solution?

The solution was that there was no one solution that could address all of these concerns. What was needed was an enterprise solution, not one that was system specific or project specific, but one that addressed all the elements. The solution needed to take into account the processes used, by all parties, to interface with the technology in the most efficient and accurate way possible. A way to ensure no document existed in two places at the same time, eliminating excess space usage and the risk of out of

date information. The backend technology was already in place and the concept of the workflows that were required to optimize them had been in people's minds for a long time. The solution to the communication issues we were looking to correct could easily be done by SharePoint and several steps in that direction had been accomplished. Still the type of system to handle the documents, at the level we needed wasn't in place.

After examining several document management systems as well as investigating SharePoint itself, it was determined that the way Revit and Autodesk products in general would lose a lot of their specialized functionality if stored solely in such a system. In addition the WAN replication we were so interested in, allowing real-time collaboration between sites wasn't as controllable in other systems. Some WAN systems that exist can even work with the Revit server, but was very limited in use when we compared them to the list of what we needed. We started looking at Vault closer and determined if it would be a system that would help us create the enterprise we needed.

What is Vault

Some points that are very important to keep in mind before you even begin to evaluate the Vault system:

- **Vault is not an all in one solution.**
- **Vault is not a "Turn-key" solution.**
- **Vault requires planning and management at all stages, including day to day administration**

Vault is a very specialized file management/WAN replication system with very powerful tools when utilized not only with Autodesk products but other products as well. Vault enforces standards, provides unified libraries and collections, and full document life-cycling/versioning. In addition, Vault has been integrated into Microsoft office to allow more convenient management of those files as well. On top of that, Vault has the ability to integrate with Microsoft's SharePoint or any system that utilizes a SQL backend.

Vault is designed with Autodesk program users in mind, but if used properly it will also impact other groups. When we began examining the product closer, we determined that several departments who didn't use Autodesk products such as project administration, document control and project control (scheduling, procurement, and construction management) could also benefit from the system at a fundamental level. Understanding how the engineering documents as well as supplemental documents (excel files, word documents) could use the search functionality and meta-tagging to controls for more control was necessary as well.

Like any product of this nature though, to fully utilize Vault in an Enterprise environment you need to understand what it's designed to do. Vault is a document control/file management system. It's not designed to function as a communications platform. This is why you need multiple systems to ensure an enterprise system is correctly established. If you don't understand the Vault's purpose in a business environment you may find yourself frustrated, attempting to make it something it's not.

Evaluating the Vault program itself is easy. It does what it does very well. Once you've determined Vault will be useful to groups in your organization, you need to evaluate other areas as well to determine if it's appropriate to your company as a whole. In our case, with over 500 engineers utilizing several different Autodesk tools all the time, the features it provided at all levels made it the best choice. The fact that we already had a functional SharePoint site and the two programs could integrate with each other was even more beneficial

Determine how Vault can be best utilized in the existing environment

Once we determined that Vault would be a good fit for our enterprise solution, we needed to determine the specifics how to utilize it to make everything more efficient and manageable.

It was obvious that the WAN replication and document life-cycling features would be utilized to create the collaboration connection between our offices we desperately needed. We could even see a benefit of using it between remote offices with a hard connection back to our offices. When combined with the features of Revit server it became even more beneficial, integrating with one of our flagship tools used for building design. Our situation had consisted primarily of being un-able to efficiently share files to remote and/or international sites with limited connectivity where they were being worked on as well, and the Vault addressed those needs.

After further investigation, the need for actual control of the document life-cycle (including versioning) as well as communications with various departments was also needed at all locations. The high definition level of permissions used in vault corrected several potential security concerns related to file access as well as the issuance of documents. The document lifecycle, which is default-specified by a vault category and used synonymously with our departmental groups, specifies what type of access is possible (read, write, delete) for types of documents during specific parts of its lifecycle.

For example, a document “In Progress” has full access to the owning department. Once this document is set to review by project managers, the document is read-only and can only be managed by the specified groups (project managers) as the lifecycle imposes different permissions for different stages of the document until it either progresses in the chain of events or is bounced back to general use. This sets up a structured, standardized and therefore predictable chain of custody for practically any document in the Vault.

We had our communications solution mapped out and beginning to be implemented with SharePoint. With the addition of Vault we had the beginnings of a solid enterprise solution for the whole company. Now we needed to build out the enterprise system to determine which system would do what to what type of information.

Before Vault Implementation – Determine the Current State

II. Assess and construct the enterprise architecture to harmonize Vault and all integrated systems desired

It bears repeating that Vault is not a “Turn-key” solution. Several requirements determined during the previous phase now needed to be addressed, during which the following areas need to be monitored closely. To make sure you don’t miss any key points, creating a map of your existing system and how the new system will operate is important. However, the planning should not be so detailed that you are unable to make changes to its structure as needed. This should be the first thing done once you begin to assess and develop the new system.

How do you determine what needs to be done?

Vault is a technological solution, though it impacts workflows that are not technology specific. When you begin to use a system like Vault, or any type of enterprise system, you need to understand how both the infrastructure functions, as well as how it’s designed. In addition, you need to understand how the

infrastructure handles all the other systems you will be use and how it should fit into potential workflows used in your business on a day to day basis. In our situation we looked at all the various systems we used and broke them into two categories; Primary and Support. Primary systems are the ones that handle the majority of information used by the company, mostly in document form, such as file stores and controlled systems like SharePoint. Since Vault was to replace our file store system for all new projects going forward, it was classified as a primary system.

At the same time as determining how to handle the Infrastructure system we needed to ensure we understood how every department used these systems. We also needed to also understand how every department does their work. We engaged all departments ensure the design of the enterprise system took everyone's concerns and needs into consideration. This was a long and difficult process, but the end results of the investigation was provided to all departments for review and feedback. We wanted to ensure that the problems we were seeing were the same ones everyone else in the organization was seeing.

From this we developed our two stage implementation process for the new enterprise structure. The first stage was the development and implementation of the primary systems, in this case SharePoint and Vault. Stage two was the integration of the support systems into the enterprise environment, most likely utilizing a data warehouse solution. We then broke the first stage into phases to make it even more focused and controlled. The three-phase implementation process; Phase 1 – document control and standardization, Phase 2 – data integration of all systems, Phase 3 – field integration, paperless workflows.

Series of diagrams of "how we could manage files"

Who is going to build it?

Who is going to make it work?

The basis of Vault is the IT Infrastructure. Because of this IT and MIS need to be involved in the adoption of Vault from the start. What they have built and maintain is the foundation that all systems sit upon. Several items that only IT can assist with (for example, determining if bandwidth to remote sites is at the level it needs to be) need to be examined at the initial stages of planning. This, for example, can prevent long delays from impeding deployment due to unforeseen upgrades being needed.

This is one of the most overlooked areas when implementing and integrating a system like this. It makes the entire process go much more smoothly when you have everyone working on the same page. Making sure you engage the group that is managing the paper that page is written on should be a top priority. In our case we had an advantage in this area, because the IT department was the group that proposed the creation of an enterprise system.

Who is going to authorize it?

Implementing an enterprise system, even for some feature like WAN replication, will be a large change for everyone in the company and how they do their work. In order to have a system put in place like this and ensure adoption, you need to make sure there is executive level buy-in. Without support of this nature, you could build the best system in the world but it would be hard to ensure adoption. And adoption is something that is required for an enterprise solution to be implemented.

Who is going to determine the specifics?

Once you have the authorization and the overall agreed on plan on how you are going to build your enterprise solution, you need to start determining the specifics. This includes things such as mapping out working requirements for the systems. We needed to determine the type of folder structure we were going to use. Our existing one was massive, but utilizing categorization and meta-tagging we were able to reduce the number of hard folders significantly, creating virtual folders that would help prevent duplication of files.

Another specific that needs to be defined before building the actual system was the system permissions. In our case both the SharePoint and Vault utilize Active Directory, and allow a “High-Resolution” level of permission control. Utilizing this system you can define what each user in the system can do, down to not only individual documents, but various lifecycle stages of those documents. This level of security requires careful execution and it has to be mapped out well in advance and heavily controlled.

Define the Standards and Organization

Now is the time you also begin to develop new procedures, workflows and datasets to take into account Vault and any other systems. In our case we had already begun to some of this standardization with the SharePoint; folder structure, workflow between administration and document control and other elements. Then we needed to analyze the libraries, document life-cycle, storage structure and communication paths that didn't exist already and were not defined yet. In some cases we had to throw away entire processes and determine new one.

We also had to determine how existing systems, (support systems) that were not part of the active scope until phase two would eventually be integrated. Even though we didn't touch those systems they had to be examined to ensure the system wouldn't need major redesign when phase two begins, critical items that need to be done prior to implementing the Vault. If you do not pay attention to these elements it will cause confusion if not at the beginning, somewhere down the road. This will make it hard (if not impossible) to create a fully integrated solution later.

You need to plan with these elements in mind, but at this stage you only want to define those elements that will be carried across every project and every system. If every project has a “Project Number,” for example, then the format for that needs to be defined as a standard and cannot be deviated from. Elements that are not going to be standardized across the company need to be kept open for future clarification. This is an area we spent a lot of time focusing on due to the Database Warehouse implementation we want to do at the start of stage 2, it was also the most difficult part of this process to complete correctly. Ensuring various organizational elements agree on specifics such as these is a challenge, but a necessary one.

Set Scope and Milestones

In order to prevent scope creep it's important to create a project plan with specific milestones and definitions. Not all features can be implemented all at once so you have to determine which ones are the most important, and which ones can wait. This allows you to manage the project effectively. Designing systems with varied datasets, workflows and functions takes a long time if done correctly. The proper planning can allow you to schedule implementation of specific components of the system when ready. We've managed to do this with SharePoint by bringing up small applications developed with tools out of the box. Defining and enforcing the Scope can allow you to do this with minimum risk. Ensuring the scope is set correct and not painting yourself into a corner at this stage (i.e. trying to define a standard for every last property on a drawing) will help in this area.

Be prepared for unexpected complications

Implementing a system like Vault may impact you in ways you don't think about. We encountered licensing issues with operating systems and databases. We also decided to optimize our hardware environment and increase performance by upgrading our server farm. This did require additional time that we hadn't expected, but we made the decision early in the schedule so it didn't impact our overall timetable. Some issues that did occur that did require some redesign were caused by the release of new versions of Windows Server, SQL and SharePoint. The changes to these systems, SharePoint mainly, required new training. The resulting minor alterations and increased learning curve resulted in a delay in integrating Vault with SharePoint. Keeping your project well defined but simple while planning in extra time for issues like these will help out immensely

III. Implement the working environment and workflow process to function effectively

Compared to the previous steps, this one is much easier. Easy that is if you clearly defined your use of Vault, how you were going to utilize it, determined the standards used in all systems, engaged all parties involved on the backend as well as end users and made sure all of their input was vetted, ensured the technology and workflow was there to support the changes, and kept your scope in check and learned to tell people no.

Obviously easy does not mean quickly.

Even then there are some key items to pay particular attention to at this stage.

Scope Creep

One of the biggest project killers out there is the infamous scope creep effect. You start out doing one thing and then you see something to add to it, and then another group wants to use it but they need it set up slightly different, and then we need this one features up and running before all the others because this one group needs it first, and... it just gets out of control and your initial plans are thrown to the side.

We have several departments who are very interested in all of the features the enterprise solution will provide. The systems they use though are supporting systems such as Primavera, P6 and Hard Dollar. These programs are all based on SQL so will have the ability to integrate with both SharePoint and Vault. Unfortunately attempting to get all of these systems to work with each other right away is potentially dangerous if not outright destructive. These groups have been told that we will examine integration of those systems in the first quarter of 2014. While this doesn't make them happy, it has to be done. Otherwise everyone will be very unhappy with the rushed system.

This area must be managed very carefully, and is one reason you need executive level buy-in. Without the ability to explain to people they need to wait and be able to enforce that decision, you can lose control of the project. The end result of that is the scope running out of control and either a project abandoned, or crippled in functionality to the point it doesn't make the impact

Adoption

Anytime you make a change to a workflow, especially with the results creating more accountability, you will have to deal with how easily the users will adopt the new system. We tested out this functionality in our environment before even considering Vault with our upgrade and implementation of SharePoint 2010.

We used SharePoint since the 2003 release but it wasn't till the 2010 implementation we began to use it for something more than a glorified FTP server. The changes we made in the use of SharePoint impacted all departments in as well as how we communicated with clients and employees in the field. While there were some incidents and we didn't manage to implement all the features we wanted to at the time, the employees eventually embraced the new system and have modified their workflows and behaviors. Implementing the Vault and creating an integrated system for the enterprise will attract all sorts of attention. Some users may not want any change in the way they currently work and manage documents; they may see the system you are trying to create as unnecessary or over complicating the situation. They may simply grumble about the changes or they may take an active response and refuse to even utilize the new system. All these things can be mitigated with the proper planning.

While you can simply force the system on everyone it would be better to get everyone to want to adopt the new system. Sometimes simply explaining the overall purpose of the Vault and integrated systems would be enough. Other times you may need to have specific detailed discussions with individual departments on how the changes will impact them specifically.

Training

One of the easiest ways to get adoption from employees is proper training to show how the system makes their work easier and less error prone. We have decided to leverage the new SharePoint and other technologies to help with this, in ways we've never done before. We are looking into utilizing SharePoint as an internal site that has our training documentation and standards located in one location, accessible worldwide. We are looking into custom created training videos to not only show how the software is utilized and workflows are handled. A system for live training at the user's desk will allow us to have training with employees in North Carolina, Tucson and Mexico at the same time, with screen sharing so everyone can get help right on their screen and allow all the others to watch as well.

Training is something that needs to be started as soon as the system is functional, and well before you start using it in a production environment. Making sure everyone is comfortable with the system, will give them the feeling you are setting them up for success and not throwing them into the fire.

Managing Systems and New Requirements

As you're finishing the development and testing of the system you need to establish who is going to be responsible for the day to day management of the systems as well as tracking changes needed and errors reported. Once a system is released to multiple groups of users, it is very likely that errors and new requirements will arise. It is important to establish a procedure to manage changes so they are aligned with the overall system requirements, and to record errors and bugs in a place available for the whole team of developers. A system to manage this should be designed in mind for the enterprise system and as such we have begun to develop an internal site to handle this process. In order to establish a communication process we have decided to utilize SharePoint, integrating it into our internal portal site.

You also need to establish a group to manage these changes from an enterprise workflow aspect as well. There needs to be a clearly defined path to implementing changes into an enterprise system of this nature. Without that control over the changes in the system, there can be no assurance that newly implemented systems will work with the technology, or even the workflows of other departments. We have strived to create an enterprise committee in our company who can analyze all requests and ensure they align with the overall company goals and not one or two specific groups. One lesson we have learned from this, is this group needs to be kept fairly small and needs a chairperson. The nature of these

changes and effect upon the workflow of the company's business require fewer people to filter the requests and determine the direction.

IV. Identify methods to determine integration with existing systems for a unified environment

The final step is to determine how the integration of other systems will be done. You want to future proof what you are building as much as possible and lay a solid foundation that can be built on and developed as it grows.

Future Additional Systems

Back in stage 1 we defined the systems that Vault was going to interact with primarily and their requirements. Where will you be with these systems in 5 years? Is the same accounting system still going to be in production? What about the software that the scheduling department is using? How do you leverage that with the Vault to do 4d or 6d scheduling? What about future uses of the Vault features at remote construction sites?

You don't want to plan these out in stage 2 like you did with systems you'll need to interact with initially but you want to plan ahead on how these systems will utilize the information in Vault or how Vault will utilize information from those systems. Vault is built upon a SQL database foundation and utilizing the SQL and Vault reporting tools can provide a whole new slew of information previously unavailable. When you combine the Vault SDK and API and you can create custom applications utilizing information within the Vault and any other system that it can interface with.

The most important thing to remember, though, is that the initial defined dataset cannot be changed. If vault defines a project number in a specific format and you want to interface with a system that defines the project number in a different format, then you need to determine if there is a way for them to exchange information at all. Getting people to understand this concept, possibly one of the most important ones, has been hard. We've been able to make significant progress in this area in a relatively short time by limiting the number of

Future Additional Uses

Similar to the last section, you need to look at potential future uses of the Vault/integrated system, not in a technological sense but in an organizational workflow sense. You have all of this documentation now stored in the Vault, but how do you leverage this to streamline the productivity and accuracy for all departments. What's the next step now that the system is up and functional?

The growth in this area should be driven by the end users. The daily users will see what the program can do and push for advancements that will help them do their job. Those requests must be examined against the work being done by other divisions or departments to ensure any change made does not impact their work as well. Implementing an integrated system into an enterprise environment means you will be responsible for changes to workflows not just for one group but for the company as a whole.

The one thing you want to avoid is the use and direction of an integrated system being dictated by a single group or individual who does not understand the impact on the company as a whole. In order to create and manage an integrated system, you must understand all of the systems you plan on integrating. More importantly, you need to understand the people and groups that use those systems and what they are doing with them.

