COE V6 Discovery Panel
CATIA V6R2013x vs V5

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Executive Summary

This paper summarizes the experiences of the COE V6 Discovery Panel. The goal of this project was to create a virtual company inside the COE organization to enable users to provide feedback on their experience using the latest technology that may not be available to them in their workplace. The panel consisted of COE members from various companies, and industries; panel members were located throughout the United States and Canada. The virtual company was designed to mimic a typical company with various roles and responsibilities.

It was assumed that none of the panel members had prior V6 experience. The panel wanted to measure/evaluate how difficult it would be for an experienced V5 user to make the leap to V6. The following pages provide a brief summary from each of the various disciplines that participated in the project.

The project assigned to the panel was not to create a working product, but to leverage the expertise of his/her knowledge of V5, and to contrast it with the new functionality and processes contained within the V6 environment.

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Scope

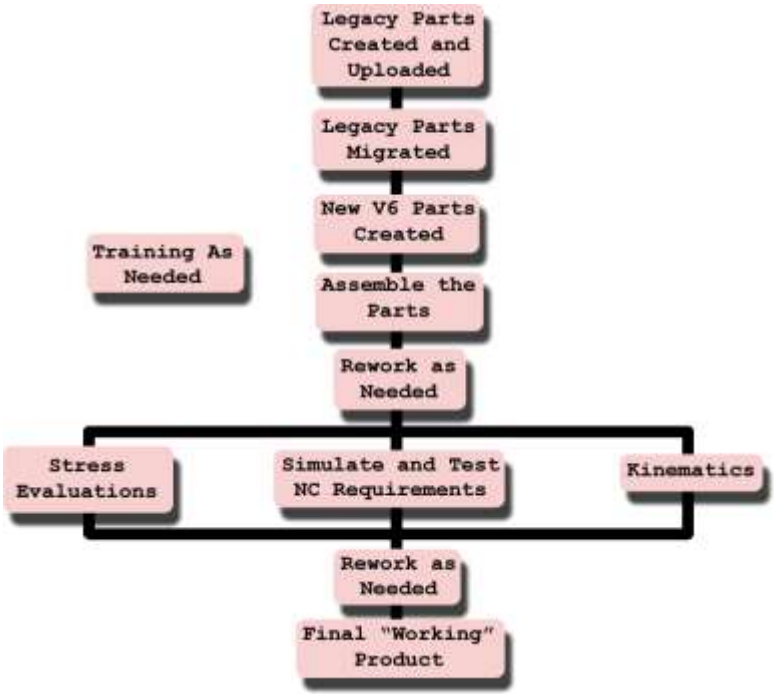
This was not meant to be an exhaustive dive into all aspects of V6. It was meant to be a learning experience focused on the general areas of IT, Training, Part and Product Design, Kinematics, Stress, and Tooling. Each Subject Matter Expert (SME), will contrast V6 experience on the panel with their V5 experence and knowledge.

Project Management

Project Manager – Bryan Spellman

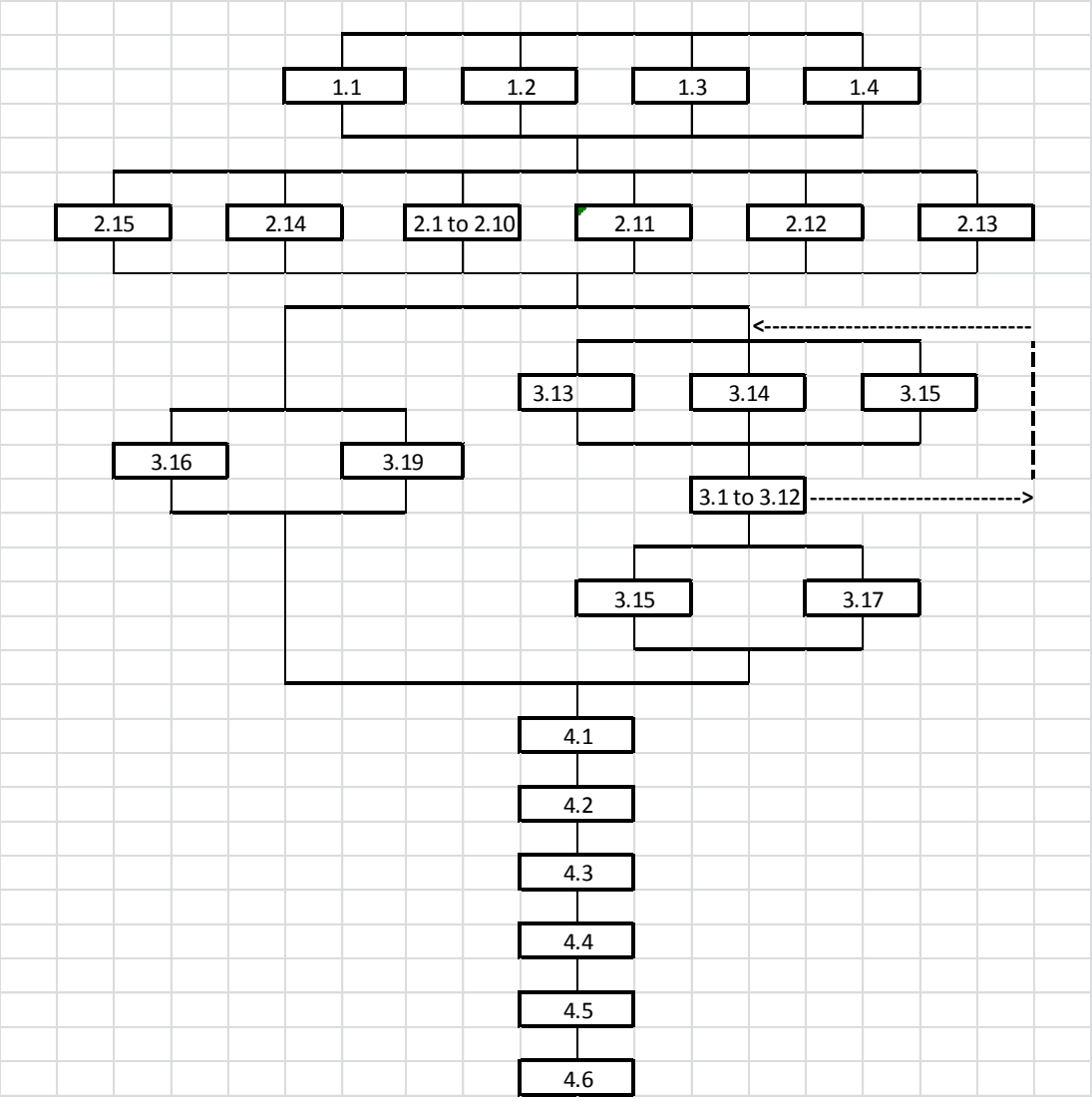
General Overview

The project was divided into four main phases. Phase 1 was the planning phase, as well as the original setup of the servers, design standards, work flows, training plans, etc. Phase 2 was the longest phase, seeing the design initiated, roles adjusted, preliminary work of other disciplines, and rework assignments. Phase 3 was for tooling, manufacturing, kinematics, stress, and part rework as needed. Phase 4 was the report out. The Graphic to the right shows a high level overview of phase 2 and 3.



The project was further divided up into detailed work assignments and work flow. The work flow can be seen below.

Workflow



TASK #	DESCRIPTION	TASK #	DESCRIPTION
1.1	Manage and Assure Installation of Software	3.1	Rework Tail as needed
1.2	Create all roles and responsibilities within ENOVIA	3.2	Rework Tail Gasket as needed
1.3	Create Training Requirements and Schedule for each "group"	3.3	Rework Generator Housing as needed
1.4	Create Reporting Template and Methodology	3.4	Rework Generator Cover as needed
		3.5	Rework Generator Support as needed
2.1	Migrate three files to V6 and import into ENOVIA database. They reside in the current Private community page under "CATIA Files"	3.6	Rework Hub as needed
2.2	Assemble Tail	3.7	Rework Base as needed

2.2-1	Create Tail Gasket	3.8	Rework Nose Cone as needed
2.3	Assemble Generator	3.9	Rework Mast as needed
2.3-1	Create Generator Housing	3.10	Rework Mast-Base Gasket as needed
2.3-2	Create Generator Cover	3.11	Rework Hardware as needed
2.3-3	Create Generator Support	3.12	Modify Assembly as needed
2.4	Create Hub	3.13	Stress Engineers analyze stress and require rework as needed
2.5	Create Base	3.14	Systems Engineer analyze and require rework as needed
2.6	Create Nose Cone	3.15	Tooling Created upon model release
2.7	Create Mast	3.16	ME's continue/complete planning
2.8	Create Mast-Base Gasket	3.17	NC programmers create G-code generation
2.9	Create All Hardware	3.18	Kinematics created (require designer rework as needed)
2.10	Assemble Wind Turbine	3.19	Report on work throughout phase 3
2.11	ME's start preliminary planning and work		
2.12	Preliminary Planning for Stress Engineering	4.1	Formal Review of project
2.13	Preliminary planning for Systems Engineering	4.2	Entire team debrief
2.14	Provide Training as needed for each discipline	4.3	Formal Reports from each discipline
2.15	Report out on work throughout the design phase	4.4	Review Formal Reports
		4.5	Formal Report of experience to COE BOD
		4.6	Formal Review with DS

IT, Servers and Setup

IT Leads: Phil Harrison, Evangelos Katsinos

Scope

The IT group, which consisted of two System Administrators, worked in concert with Dassault Systems personnel to Design the Infrastructure, Security, and P&O (People and Organization) roles.

Neither of the System Administrators had prior V6 administration experience, but did have experience with CATIA V5 installation & administration. The format of this project required panel members to perform their own client side installations. All packages and instructions were prepared by the System Administrators.

Environment

Initial Project Server Environment

The initial environment was a virtual server in Dassault Systèmes Waltham, MA US Headquarters. Once the servers were up and running, the System Administrators performed their respective duties of defining People & Organization (P&O) and roles / security in the ENOVIA database. During this setup phase issues were experienced with performance.

All of the users were then allowed to connect to the servers for initial setup, testing, and training. Performance issues were confirmed & analysis by DS confirmed the architecture would not support a project with multiple users accessing the system from multiple locations outside of Dassault Systemes.

Project Server Environment

A partnership was formed between Dassault Systèmes and IBM to develop a new server environment. The team moved quickly to establish a new location in Dallas, TX. After the initial discovery of the performance issues, the creation of the new environment took less than three weeks. Dassault Systèmes was also able to migrate all user and database information to new servers. This saved the administrators many hours of having to recreate the P&O operations.

The new server consisted of an IBM POWER7 model 740 UNIX Workstation running AIX. This server was configured with 4 cores & 24 GB of memory.

The only significant downtime encountered during the project was a firewall issue that got missed during routine maintenance, which lasted a few days. There were other outages, but none that were more than a few hours.

License Server

The DSLS license server must be a physical server (virtualization of the server is not permitted). The project had to be accessible over the internet by end-users distributed around the USA & Canada. It was therefore decided the Dassault Systèmes License Server, would be located at COE Headquarters in Chicago, IL.

Client Installation

This project was different from most commercial enterprises in that end-users had to install the V6 client code themselves, rather than have an IT organization do it for them.

In order to provide access to Dassault Systèmes' CATIA, SIMULIA and DELMIA client code; zip files of the installation media were created by Dassault Systèmes. Given the large size of the zip files, about 8GB, several FTP servers were employed to house the applications. One is at COE Headquarters and another at Dassault Systèmes. End-users could then download this code at their leisure.

Detailed installation instructions were written by one of the administrators and distributed to the end-users by the COE V6 private web community (a private internet forum.) These instructions included details on configuring the license file and the connection strings to connect to the ENOVIA V6 server.

Some users experienced difficulties in connecting to the VPM server. The root cause of this issue was that required ports were being blocked. Users had the options of using their company hardware, as well as their own, provided it met the required specs. Users overcame this obstacle by working with their internal infrastructure to open the required ports. If this was not possible, their personal systems could be used.

Use Cases

The object of the COE V6 discovery panel was to mimic how an enterprise might operate with V6, thus users were given roles such as Designer, Planner, Manufacturing and Stress Engineer, and Analysts.

Roles

ENOVIA User IDs were set up on the server remotely by the administrators; users were then allocated roles in P&O. Each user was given one of four roles: Viewer, Creator, Project Lead or Administrator.

Product Licensing

ENOVIA V6 uses a "Named User" licensing model. Each user was allocated an ENOVIA license as well as CATIA, SIMULIA or DELMIA licenses depending on their role in the project.

Effort involved

It is estimated that the two administrators provided a total of 80 hours of support to accomplish all the tasks in this project. Below is an estimate of how the hours were spent:

- 8 hours for education / coaching by Dassault Systèmes support staff
- 24 hours for setting up user IDs, roles & licensing
- 16 hours for documentation
- 24 hours for general support and trouble shooting
- 8 hours for presentations / reporting

Results

The COE V6 Discovery panel was provided with a stable environment for creating the product. The project highlighted that the system architecture and network configuration are crucial to the end-users experience. In a distributed environment, the infrastructure is paramount to a successful deployment/migration.

Training

Lead – Rolando Garza

Training Goals

The purpose of training was to provide programs that matched the needs of the team. This involved developing, implementing, and delivering programs of varying levels for the different groups and roles required. It also involved continuously evaluating procedures to monitor and analyze the effectiveness of the training courses.

Structure

CATIA- V6 Fundamentals Part 1	
V6 Question and Answer	Sep. 9, 2013 03:36 PM
V6 Major Versions	Sep. 11, 2013 03:03 PM
V6 Intro 1	Sep. 11, 2013 03:05 PM
Navigation Layer - "Silver Layer"	Sep. 13, 2013 04:27 PM
V6 Creating Objects & Project Structure	Sep. 20, 2013 03:41 PM
V6 Creating & Attaching New VPM Documents	Sep. 20, 2013 03:42 PM
V6 Discovery Panel Design Guide - Rev00	Sep. 23, 2013 01:48 PM
UserIDs & Initial Passwords on ENOVIA V6 Server	Sep. 30, 2013 04:32 PM
V6 Client Installation Instructions by Angelo Katsinos	Oct. 3, 2013 01:48 PM
Team Collaboration: VPM Folder Management	Oct. 23, 2013 10:42 AM
Delmia Training Session	Oct. 23, 2013 04:20 PM
V5 to V6 Tool Catalog	Oct. 28, 2013 10:01 AM
Simulia Training Session	Oct. 29, 2013 01:25 PM
COE V6 Pilot: Engineering Connections	Oct. 30, 2013 10:32 AM
V6 Pilot: Importing NC Objects into V6: QnA Session	Oct. 30, 2013 02:13 PM
3DLive to Composer for V6	Nov. 8, 2013 12:44 PM
V6: Importing Coexisting	Nov. 8, 2013 04:59 PM
COE V6 Pilot: 2nd Round of Kinematics	Nov. 12, 2013 09:25 AM
V6 Simulation Landing Gear - Simple Analysis	Nov. 14, 2013 11:05 AM
How to Convert V6 to V5 using Export	Nov. 15, 2013 09:03 AM
3DVIA Composer PDF Template Creation	Nov. 15, 2013 03:34 PM
Kinematics Part 2	Nov. 20, 2013 01:51 PM
V6 Discovery: Intro to Systems Engineering	Dec. 18, 2013 11:08 AM
MLPlayer	Jan. 9, 2014 11:01 AM
Life Cycle Topics: Versioning & Maturity Status	Feb. 28, 2014 10:38 AM
V6 Processes Discussion	Apr. 1, 2014 03:44 PM
V6 Pilot Stress Team Follow Up	Apr. 8, 2014 03:29 PM

The training sessions were planned at about 15 minutes, but tended to take closer to an hour with student questions. The recorded sessions were added to the library on the COE website private forum.

A few days after each session, the training coordinator would review the amount of work done in the database and send out follow-up emails as needed to evaluate further training needs.

The graphic to the left shows a sample of the training courses that were offered.

Users were also able to use Dassault Systèmes's Companion software for self-learning. Many took advantage of this.

Dassault Experts

Dassault Systems made the following subject matter experts available for training: Barry Langston, Tim Horsch, Kandarp Patel, Mark Griffin, Thomas Teter, Greg Albrechtsen, Srikanth Santhanam, and Deidra Donald.

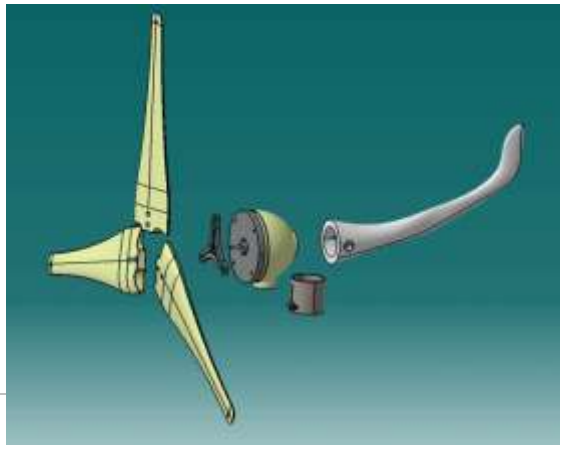
Part and Product Design

Design Lead – Cathleen Kennedy

Part and Product Assembly Lead – Rick Marickovich

Product Overview

It was decided that the product would be a moderately sized Marine style wind turbine. This is something out of the normal experience of



the various team members and their companies. Although this project had design elements from different manufacturers, the product was completely nonfunctional by design. It was not intended to produce a well-engineered product.

The parts were intentionally designed to require changes after assembly, such as hardware, holes, and the way the parts fit together. This was done to allow us to get a feel for how the change process would work.

Each member created their parts and saved them into ENOVIA. These parts were assembled, and rework was sent out as needed based on the original plans of the design lead. This gave the team a good feel for how change orders and rework would be done within the V6 environment.

Transition from V5 experience to V6

The main purpose of this panel was to determine the effort required for an experienced V5 user to make the transition to V6. None of the panel members had any prior V6 experience, and that was by design. This virtual company was created inside the COE organization, which consisted of members from many different industries. Panel members from Aerospace OEM's worked with members from contact lens manufacturers. The industry was not the focus, but rather the expertise that each panel member had for his/her discipline.

As stated at the beginning of this document, because of the flexibility required for each panel member, client installs were left to their own resolve. It was assumed that this would be a time consuming task, as this is outside the normal discipline. To our surprise, it was not. This was because of the excellent documentation provided from the Systems Administrators, and that this V6 installation was an "out of the box" install.

Each panel member was given a formal walk through of the V6 interface. Then each panel member received training in his/her discipline. All formal training was provided by Dassault Systèmes experts for each particular field. All training sessions were recorded and placed on COE's private Discovery Panel web site for reference at later times. Panel members also had full access to Dassault Systèmes Companion training material. This was a great resource aid, as the training sessions could not cover all material. The team had many training courses available. There were three fundamental courses and three introduction courses for new V6 users. After going through these six courses (roughly four hours total time required) a V5 user should be ready to create V6 geometry. Other courses were focused on advanced work tasks such as engineering connections and importing V5 data.

Communication between panel members was paramount. Since the team was spread across USA and Canada a resource was needed to provide seamless and timely communication. It was decided to leverage COE's web site. A private section of the COE Users Forum was used as the vehicle for communication to all panel members, as well as a single repository for all documentation and source material. Dassault Systèmes personnel also had access to the forum, so question/concerns could be addressed in a timely fashion, and shared with all panel members.

Once the applications were up and operational and the training was complete, the users were ready for database access. All of the V6 project data was stored in ENOVIA V6 on a server supplied by IBM. Logging into ENOVIA and searching for the project data proved to be a non-issue. It actually was quite simple to explore or open the data files especially after going through the training courses. This was true even for users who had spent their entire CAD careers in a file based system.

The modeling in V6 can be summed up in in a statement from one of the panel members: "If you are a V5 user then you are a V6 user". The V6 modeling techniques, workbenches, toolboxes, and icons are essentially the same as V5. The graphic user interface is slightly different, but a V5 user will feel right at home in the V6 blue (authoring) window. This was probably the easiest transition for the V5 users of the entire project.

New V6 functionality proved to be more effective and easier to use than its V5 counterpart. Engineering Connections were a perfect example of this. All of the many different V5 connections/joints were combined into one tool in V6 (Engineering Constraints). After taking the 30 minute training course and using the tool for a few minutes, it became readily apparent this was going to be easy and fun to use.

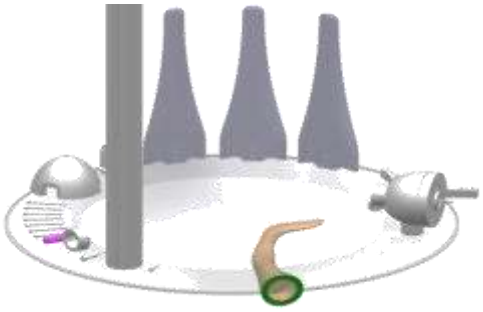
We noted some differences between Version 5 & Version 6 when it came to modeling methods. For example Version 6 requires the user define Materials to parts & to apply constraints to parts & assemblies. This ensures that design intent is captured & can be used in downstream applications such as Stress Analysis (for materials) & Kinematics (for constraints.)

Part Designers participating in the project were relatively inexperienced in Product Data Management; however we found modifying a part and storing it back in the database was a simple task. Actually the part is propagated (there is no "FILE" icon) for storage in the database.

Versioning the part in the database was initially problematic; The Designers users could not version their parts (major or minor) or change the Maturity State past "WAITAPP". Role changes were required for users to successfully set the maturity state and version their parts. The user roles can be switched in the "Security Context" panel when logging in. A few user roles were added to permit users to modify and version other user parts. Once the user roles were added and switched for certain users, the versioning worked well with the old versions being replaced with the new versions. This showed the value of P&O in the PDM system, allowing modification to other's data only where authorized through the user profile security context.

Conclusions

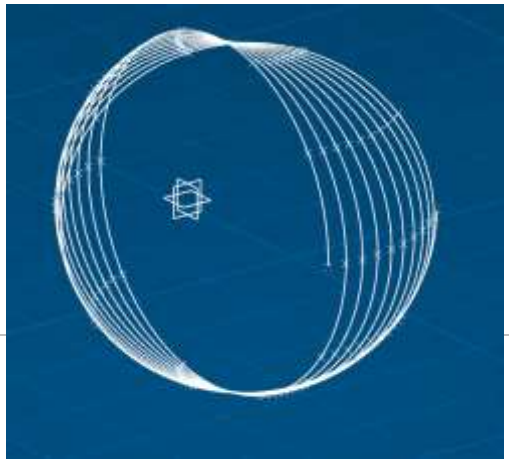
- V5 to V6 modeling is an easy transition.
- A minimal amount of training is required.
- Some new V6 functionality was a good improvement over V5.
- Working from a database was not an issue.
- User roles need to be well-planned and thought out.



Kinematics

Kinematics Lead – Eric Neuville

Training included several online sessions, including Engineering Constraints and Kinematics and the DS Companion Kinematics training.



The intent was to create a 5 second trace of the tip of one blade when the fan is turning at 120 rpm and the body of the fan rotating on its axis at a speed of 2 rpm, using the skeleton methodology, linking designer models with product level publications.

V6 Kinematics is more user friendly than V5 because, unlike V5, it will work even if you have errors in your assembly. It offers the ability to combine sub mechanisms and to simulate even if DOF ≠ 0.

Stress

Lead – Omar Garcia

Use Cases

Analyze a wind mill assembly using V6R2013x stress analysis tools and compare them to the tools that are available in V5R20.

The DesignSight tool was chosen for the wind mill analysis.

Effort involved

CATIA V6R2013x has several stress analysis tools that are not available in CATIA V5R20. DesignSight, in the stress analysis workbench, was used to define initial conditions to the Wind Mill Assembly, then to apply loads to the assembly. The DesignSight tool creates the mesh based on user's selection of what is a "Good", "Better", or "Fine" mesh. Von Mises stress analysis was used to check whether the design will withstand a given load condition. In addition, the use of DesignSight offered active yielding, safety factor and realistic thermal and structural contact interactions and enabled users to understand how parts influence each other within an assembly.

Conclusion

In General CATIA V6R2013x has more analysis tools than V5R20 and it handles linear and nonlinear analysis due to the ABAQUS add-on.

CATIA V6R2013x is a better tool than CATIA V5R20 when it comes to stress analysis, and from the tools that were tested. It was easy to use and modify boundary conditions. There is a need for additional testing to explore the available tools that were not included, such as the nonlinear analysis capabilities.

Tooling

Due to time constraints, the tooling phase of the project has not been fully evaluated. Given the importance of the section, and functionality, the COE Board has decided to move this phase to its own Discovery panel. In 2015, specific test cases will be developed, and a deeper dive into what this module has to offer, will be examined/evaluated.

Final Observations

Setting up a virtual company was the best possible way to achieve our goals. As stated above a very detailed analysis of the hardware and infrastructure requirements should be considered. This team was setup like many companies are today with members in very different geometric locations, so collaboration and communication was paramount. It was assumed that the installation requirements would be an issue and cause a delay. To our surprise, through the aid of great documentation, this was not the case.

The phases of the project were designed to mimic the structure that may be seen in any company, regardless of the industry. Having guidelines for each phase helped ensure scope creep was not an issue. The training each member received, along with the support from DS North America, was excellent. There were some performance issues, but they were quickly resolved.

The big take away from the design phase was that if you are a V5 Designer, then you are a V6 Designer. That was very important for our membership to learn because that is what our member companies want to know. What is it going to cost to move to V6 and what are the advantages? There are a lot of misconceptions around getting users up to speed on V6. This panel consisted of many members that had not interacted with PDM before. This was not an issue as the process had a very short learning curve.

This was the first time COE has attempted a project of this nature, and the results were a benefit to the membership. The focus was put on the design side of V6. The upcoming COE Discovery Panels will have a narrower focus in order to concentrate on specific features/enhancements that V6 has to offer.

There were a lot of lessons learned on this project, and the overall feedback has been positive from the COE membership, as well as Dassault Systèmes representatives.