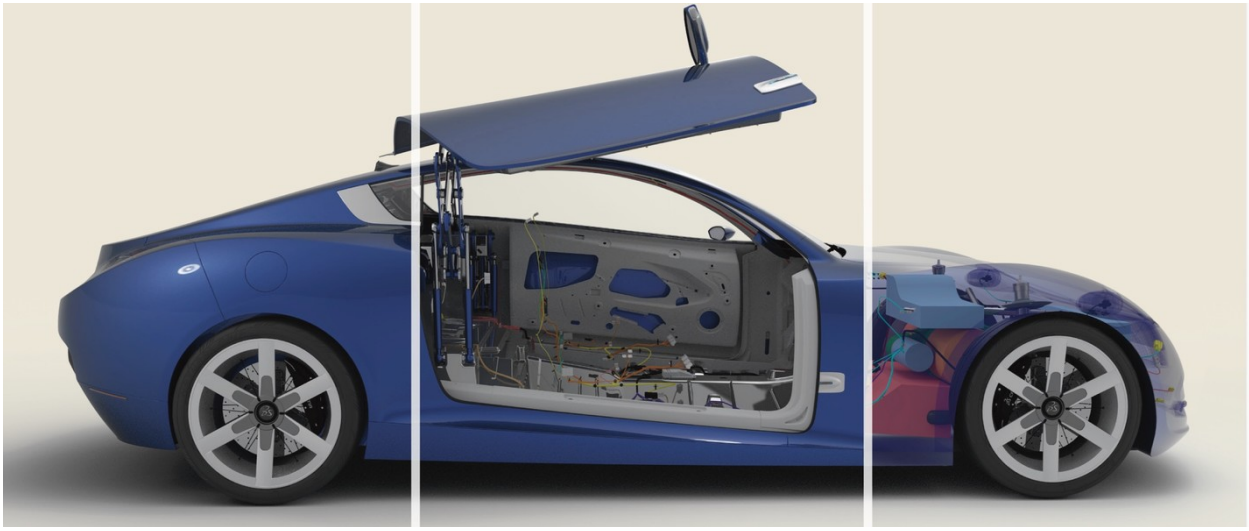

Demystifying POWER'BY 3DEXPERIENCE

[UPDATED AGAIN] In the Dassault Systèmes world, there is a lot of buzz around POWER'BY, but little data on what exactly that means. This post is intended to shed some light on POWER'BY and hopefully help customers and partners understand this strategic topic.

If you have read my previous articles, particularly Demystifying **3D**EXPERIENCE Customization, you may recall that, historically, the **3D**EXPERIENCE platform was derived from the combination of the MatrixOne platform that DS acquired back in 2007 and the VPM V6 platform that DS developed to replace their VPM V5 platform. The result of this merge was the V6 platform, later re-baptized **3D**EXPERIENCE (well, more precisely the 3DSpace component of the **3D**EXPERIENCE platform). There was a big issue however: the rich clients for CATIA V6, SIMULIA V6 and DELMIA V6 were all based on the VPM V6 data model which is incompatible with the ENOVIA V6 apps based on the MatrixOne data model.

So what? you might say. Well, the rub is that the integrations for all CAD software other than the native CATIA V6 code all went through the legacy DesignerCentral adapters which were based on the MatrixOne data model. This meant that the CATIA V5, SolidWorks, NX and Creo data could not be loaded into CATIA V6 and there were two change management processes, two variant configuration systems...two of nearly everything. This was a showstopper for customers that were interested in CATIA V6, but still had a large CATIA V5 or Solidworks installed base. For customers that were using just CATIA V5, they could continue to use the ENOVIA V6 apps as before but did not benefit from the 3D visualization tool 3DLive until a workaround appeared around V6R2012x where these models could be brought into 3DLive for Digital Mockup

(DMU), but only as read-only models without all their attributes and any annotations that were made were not persisted. This situation aggravated many big customers, some of whom, like Daimler Benz, took their business to Siemens-PLM and their promises of openness.

Lastly, there was an enormous challenge with respect to the EBOM-MBOM transformation. The ENOVIA-based MBOM product was moved into maintenance after V6R2013x and was unable to be connected to either CATIA models or DELMIA Production Plans. This left only DELMIA **3D**EXPERIENCE as the strategic MBOM reference, but with no bridge to the EBOM back in ENOVIA V6. There was no workaround without heavy customization. Therefore, there was a chasm between the EBOM engineering world and the MBOM manufacturing world. The issue was further exacerbated on the cloud because (a) CATIA **3D**EXPERIENCE only handled product structure, (b) only ENOVIA handled EBOM, and (c) there was only one-way synchronization available from CATIA product structure to ENOVIA EBOM, and this without any way to do attribute mapping. You could go straight from CATIA product structure to DELMIA production planning, but without any EBOM.

This meant that users had to choose between (a) working with CATIA **3D**EXPERIENCE product structure and possibly DELMIA downstream for MBOM or (b) using ENOVIA **3D**EXPERIENCE for EBOM with no connection to DELMIA's MBOM and no way to do top-down design with CATIA. In other words, either you used CATIA **3D**EXPERIENCE and worked exclusively with product structure, or you used ENOVIA **3D**EXPERIENCE and did BOM work only, but you could not do both simultaneously on the same product in any reasonable manner.

One company that was rather unhappy with the CAD incompatibility situation was a well-known large Japanese automotive manufacturer. They had both CATIA V6 and CATIA V5 and were close to kicking **3D**EXPERIENCE to the curb unless something was done. And here is where our story about POWER'BY truly starts. Dassault R&D finally decided to solve the dual-model system and move features for external CAD (xCAD in DS lingo) to the VPM V6 data model. This was not an easy task and required many moving parts to get it to work.

The road to full integration of CATIA V5 and Solidworks is still under way. Several other efforts are being made in parallel:

- Now baptized Baseline, the simplification of the modeling of people (users, organizations, roles, etc) and security in the platform is major multi-year effort that was a prerequisite to many of the other changes and evolutions. Alternatively called RACE, TEAM, and OneClick, the idea was to unify the access rules for all platform data by partitioning data into Collaborative Spaces (previously called VPM Projects), assigning ownership of the data via an Ownership Vector (user, organization, collaborative space) and using a Security Context (role,

organization, collaborative space) to control access to the data depending on visibility rules and maturity (read "lifecycle state") of the items. I talked about these evolutions in the aforementioned article on customization. The importance were was to move the majority of tools for customizing (or "configuring") these access rules to web-based widgets rather than C++ or proprietary MQL code changes as well as the unification of access rights for objects previously modeled by either VPM V6 and MatrixOne techniques.

- Unified Typing was actually born before POWER'BY but plays a major role in its rollout. It began to be introduced in R2015x and beyond to insert a layer above the underlying incompatible data models that would effectively unify the objects and behaviors while preserving the underlying data models so that upgrade and migration operations could be done transparently. This was done for the majority of VPM V6 data objects and an increasing number of MatrixOne objects down at the kernel level for both the cloud and the on-premise implementations of the platform. From a customization point of view, this allows for creating new attributes in R2018x both on the cloud and on premises via the 3DSpace Control Center. For sub-typing, specialization, and extension of existing object types, there are specific tools under the Customization and Specialization Administrator (TXO) role which is only available on premises.
- The first product inspired by POWER'BY principles was a web-based navigator that can view CATIA V6 and CATIA V5 data in a 3DDashboard widget which is now called 3D Compose in the Product Architect role (PAU) at R2017x and higher.
- Enterprise Change Management was introduced in **3D**EXPERIENCE R2017x to have one single change management process that covered all objects regardless of whether they were VPM V6 or MatrixOne in origin. This has been fully available on cloud and on premise since R2017x.
- POWER'BY adapters have been released for CATIA V5 and Solidworks so that the data produced by those apps is transparently useable and associable directly in CATIA **3D**EXPERIENCE without translation. [In fact, the name "POWER'BY" was chosen for slogans such as "CATIA V5 is POWER(ed) BY **3D**EXPERIENCE" or something to that effect.] In R2018x, the 3D Component Designer role

(CDR) was introduced to allow for this integration into ENOVIA business processes and it included integrations for both Solidworks and for CATIA V5-6R2015 SP6 and above. This also means that inside CATIA **3D**EXPERIENCE, users can connect CATIA **3D**EXPERIENCE, Solidworks, and CATIA V5 structures and manipulate them together in terms of placement, tolerances, etc. If geometry needs to be modified, the external app (CATIA V5 or Solidworks) can be launched from inside CATIA **3D**EXPERIENCE making for a relatively seamless experience for CATIA V5 and Solidworks customers. It is expected that POWER'BY adapters will be forthcoming for Creo, Inventor, and NX and other CAD platforms. The long-awaited news for customers was the availability of the CATIA V5 and Solidworks adapters on the cloud in R2018x. Also, because the integrations via POWER'BY of CATIA V5, CATIA **3D**EXPERIENCE, Solidworks and other CAD products all co-exist on the same product structure, the downstream processes handled by SIMULIA and DELMIA apps can consume and reference this data transparently and without any data translation required allowing for end-to-end associability and thus for digital continuity.

- The new Unified Product Structure (UPS) in R2018x via the Product Release Engineer role (XEN) and above brings Engineering Items as the first piece of the solution to the EBOM-MBOM issue I mentioned above. The Engineering Item is a Physical Product (in the VPM V6 world) and can include other Engineering Items, 2D and 3D CAD representations, engineering attributes, and associated documents (Word, Excel, etc). It is essentially the new UPS-based EBOM, but fully associable to the product structure as never before.
- In R2018x, the Engineering Items, that were introduced for mapping to the CATIA **3D**EXPERIENCE product structure, can also be associated to an existing DELMIA object for MBOM called Manufacturing Item. This is important because the DELMIA native client can already author Process Plans consuming Manufacturing Items and linking to Resource content as well as build the MBOM based on Manufacturing Items. DELMIA introduced Manufacturing Item Manager (MFN) for MBOM management as a web-based app in R2018x and will release in the near future a Process Planning web app. These new apps will exploit specifically the new paradigm directly from 3DDashboard both with

somewhat less functionality than the native client, but at a significantly lower price point. This will democratize access to Digital Manufacturing on the platform via these lighter web apps while allowing full access through the native client.

Is this enough? Not necessarily, but it is a great start. Some issues remain to be resolved:

- Because the Engineering Item is a new concept, it is yet not widely implemented in the field and there may be some surprises due to a lack of maturity. This, of course, extends to the connection(s) with Manufacturing Item(s) and thus end-to-end integration using CATIA V5 and Solidworks data which remains to be proven as robust and sufficiently flexible in production.
- More crucially, there are significant undocumented gaps between XEN and Engineering BOM Manager (BOM) such as missing Quantities on the derived EBOM, the lack of Alternate, Substitute or Manufacturing-Equivalent parts on Engineering Items, the lack of hierarchy among them, etc. Unsurprisingly then, the legacy ENOVIA Manufacturing BOM Manager role (MBO) still exists because the BOM role is totally incompatible with DELMIA processes and does not offer equivalent functionality. Similarly, the BOM will continue to exist until UPS covers the full functional specification of the legacy Engineering Central product.
- Equally important, the lifecycle is still limited to 5 states, the last of which freezes the data which hurts Service Lifecycle Management (SBOM) scenarios and potentially some MBOM scenarios.
- Customers also need to see a full portfolio of POWER'BY adapters for the other major 3D MCAD and ECAD providers both on premises and on the cloud.
- They need more robust ERP integration (especially on the cloud).
- Lastly, they need the full scope of TXO tools for sub-typing, specialization and extensions on the cloud.

In the meantime, customers will have to choose between :

- The BOM-centric approach without immersive CAD integrations in this case leveraging the BOM and MBO roles using the X-CAD Designer (CDR) role for CATIA V5 and Solidworks legacy Designer

Central integrations with no connection of the geometry to the roles in the SIMULIA or DELMIA portfolios but with the full power of the advanced features of the old Engineering Central -or-

- The model-based approach (albeit with some limitations on the EBOM) using the XEN role with the 3D Component Designer role (XCD) for the CATIA V5 and Solidworks UPS-base integrations and taking advantage of the new tools coming with the Product Architect role (PAU) including 3D Annotation Insight, 3D Compose, 3D Review and Product Structure Editor as well as the full power of the SIMULIA and DELMIA portfolios.

All that being said, POWER'BY and its associated technological transformations in **3D**EXPERIENCE are an important and significant step forward for the platform in attaining its dream of being truly able to model experiences end-to-end in a centralized, transparent, upgradable, cross-discipline manner for model-based design and engineering unique in the PLM world.