

STIMULATING THE PRODUCT DEVELOPMENT PROCESS - A CASE FOR SIMULATION CONTENT MANAGEMENT



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Author: Mukul Krishna, Global Director -
Digital Media Practice

TABLE OF CONTENTS

TABLE OF CONTENTS

STIMULATING THE PRODUCT DEVELOPMENT PROCESS – A CASE FOR SIMULATION CONTENT MANAGEMENT	2
MARKET OVERVIEW	2
END-USER CHALLENGES	2
The Cost of Lost or Misplaced Work	2
Knowledge Silos and Lack of Collaboration among Knowledge Workers	3
Workflow Latency	3
TECHNOLOGY TO THE RESCUE	3
MSC Software Solution Brief	5
SimManager Workgroup Edition	5
SimManager Enterprise Edition	6
SIMULATION MANAGEMENT IN ACTION	8
Audi	8
Whirlpool Corporation	8
CONCLUSIONS	8

MARKET OVERVIEW

This decade has witnessed an explosion of digital content fueled by high bandwidth penetration and ever improving infrastructure. Content is being generated in all conceivable forms such as: audio, video, graphics, CAD/Simulation, images, medical imaging, print layouts, animation, text files, presentations and spreadsheets. This ever expanding library of content has generated a tremendous demand for solutions to help manage the ever expanding library of content.

Content created through Computer Aided Engineering (CAE) and Simulation processes are arguably the most important assets manufacturing and engineering organizations have as these assets embody critical corporate Intellectual Property (IP). Thus, the need and urgency to effectively manage this content has become a priority.

Simulation Content Management (SCM), as the term describes, is a solution that enables the ingest, archival, search, management, repurposing, sharing and cross-platform publishing of simulation data and processes. This is done in a seamless, collaborative and secure environment which easily integrates with third party systems further facilitating content management spanning the asset lifecycle from creation to delivery.

END-USER CHALLENGES

The emerging digital landscape challenges knowledge workers across all functional areas. They constantly battle legacy and siloed environments while trying to access and manage content critical for business processes across the enterprise. Especially challenging is the management of ever increasing volumes of design and development content crucial for business competitiveness. This content is highly unstructured and includes CAE assets plus associated media types running the gamut from simple text to video.

The Cost of Lost or Misplaced Work

Most enterprises experience disruptive employee turnover and work in silos. There may be little or no asset cataloging to enable knowledge workers to find the assets they need to work on. Too often, knowledge of crucial assets gets lost or misplaced when an employee who was working on them leaves. This creates an information vacuum as others might not know where that worker stored those assets or what state they were in.

Another issue product development may face is the need to start from scratch because of a misplaced or stolen drive or laptop that effectively wipes out months of pain-staking work. In other cases, a lack of effective communication results in resource waste due to rework and effort duplication. This happens when knowledge workers develop similar product ideas without knowing that there are other workgroups involved in a similar effort.

Knowledge Silos and Lack of Collaboration among Knowledge Workers

As discussed above, many organizations are plagued by knowledge silos which create a problem that can be magnified as the size of the organization grows and its geographic footprint becomes more dispersed. Dispersed product development workgroups need to collaborate on design and product development ideas and work-in-progress data in real-time. There is a serious threat to the entire product development process when different workgroups working on the same product design do not have access to the same information at the same time.

Product development is an iterative and evolutionary process with multiple versions being created for the product design as knowledge workers make modifications and run simulations on the product design at each step. Without effective version control and process management, a product engineer or product development team might work on an entirely wrong version of the simulation asset or improperly perform the work. Without an audit trail, the product manager cannot be assured the engineers on the team have properly completed their tasks or who created/deleted/modified the engineering asset. This could result in delays and cost over-runs to pro forma rework and, in extreme cases, might jeopardize the entire project. Product delays mean serious consequences for both the employees and the company.

Workflow Latency

Time-to-market is critical for every enterprise. With rapid technology development no organization has the luxury of time when it comes to beating competitors to the market with new and/or updated products. Unfortunately, siloed business environments, lack of collaboration and lost/misplaced work constantly put pressure on product development teams to hit ever shrinking product launch windows.

TECHNOLOGY TO THE RESCUE

Fortunately there is technology now available that not only comprehensively addresses the above mentioned challenges but provides much more in terms of the overall value proposition.

Simulation Content Management solutions now enable organizations to effectively manage their engineering assets throughout the asset lifecycle from creation to delivery.

All simulation assets need to be easily searched and retrieved along with other forms of data that are associated with the simulation asset. These linked data types could be any media type from text and spreadsheets to images and video. An advanced metadata schema and relational database is needed where the metadata is part of the overall contextual algorithm, enabling the search function to constantly learn and become more effective the more it is used returning results with ever increasing levels of relevancy.

Such solutions add tremendous value by creating a process to catalog, search, and retrieve simulation assets using metadata. Digital repositories yield tremendous cost savings as organizations save huge amounts of resources in moving from a physical archive to a digital repository, eliminating associated cumbersome and resource intensive maintenance requirements for physical archives. This saves time when it comes to the product development lifecycle as knowledge workers do not have to waste time doing detective work to find the assets they need to work or collaborate on. As simulation assets become easily searchable, they can be repurposed and reused, while eliminating the cost of lost or misplaced work.

A repository purpose-built for all types of product development assets enables product development teams to manage their engineering and simulation assets and track them from a single location. This facilitates collaboration and communication amongst themselves. Added to this are the capabilities to now view, browse, track, annotate, collaborate, check-in and check-out simulation assets and repurpose these assets while having deep integration with third party systems. These systems include dynamic publishing solutions, accounting/budgetary systems, product lifecycle management applications and project management tools among a plethora of others.

Conditional access and version control also provides a level of content security which is not only important from a workflow perspective but also when seen from the perspective of corporate compliance and governance. Role-based authorization to the simulation content enables companies to exert a high level of control on the security of the IP.

Traditional Product Data Management (PDM) systems are challenged to provide this level of functionality as simulation requirements are unique due to the large file sizes and more varied data formats and structure. Simulation data also has unique scalability and performance requirements. All information is valuable within context. A simulation content management solution shall provide all content within context with relevant attribution through asset metadata.

This provides for a fully collaborative workflow enabling engineers and various stakeholders to access and collaborate on the product development process based on defined roles.

The icing on the cake is that SCM solutions that include process management not only significantly accelerate cycle-time and eliminate many costs associated with the product development process but also free up resources that can now be used for increased revenue. Repetitive and manual tasks can now be automated. Established best practices in the engineering process and simulation can be tracked and uniformly rolled out across the organization. A product engineer, for example, can now devote more time towards actual product development rather than mundane tasks like searching for a simulation asset, trying to figure out if that is the correct version of the engineering asset or running multiple iterations of the same simulation task.

MSC SOFTWARE SOLUTION BRIEF

Established in 1963, MSC Software has over 40 years of experience in structural mechanics and multibody simulation. MSC Software has leveraged its deep engineering expertise to bring to market one of the first purpose built content management solutions for the design and engineering market making it a key emerging technology provider in this nascent and high growth potential market. Together, MSC and IBM are combining their technology, infrastructure, and integration expertise to help companies be innovative by providing a total comprehensive solution.

This makes MSC Software a perfect example for this paper to illustrate how technology now enables engineering, design and manufacturing companies across verticals to maximize the monetization on their product development process.

The two key components offered within MSC Software's product portfolio include:

- SimManager Workgroup Edition
- SimManager Enterprise Edition

SimManager Workgroup Edition

The SimManager Workgroup edition provides users with the critical simulation content management functionality detailed earlier in this paper.

The philosophy behind the design of the Simulation Content Management module is that effective management of simulation data requires more than just managing simulation models and files. This module ensures that all relevant information is available, can be easily found, and is deployed to all stakeholders on a real-time basis as it evolves.

Key functionality discussed in this paper such as asset cataloging, simulation model and process repurposing or reuse, meaningful and contextual search capabilities - are all key features enabled by this solution.

Based on a client-server architecture, this web based solution can even be deployed within a matter of hours in many cases and allows easy access to the simulation assets based on defined roles for each user. Scalability is always a concern and SCM solutions like SimManager enable users to scale up or down depending on their needs.

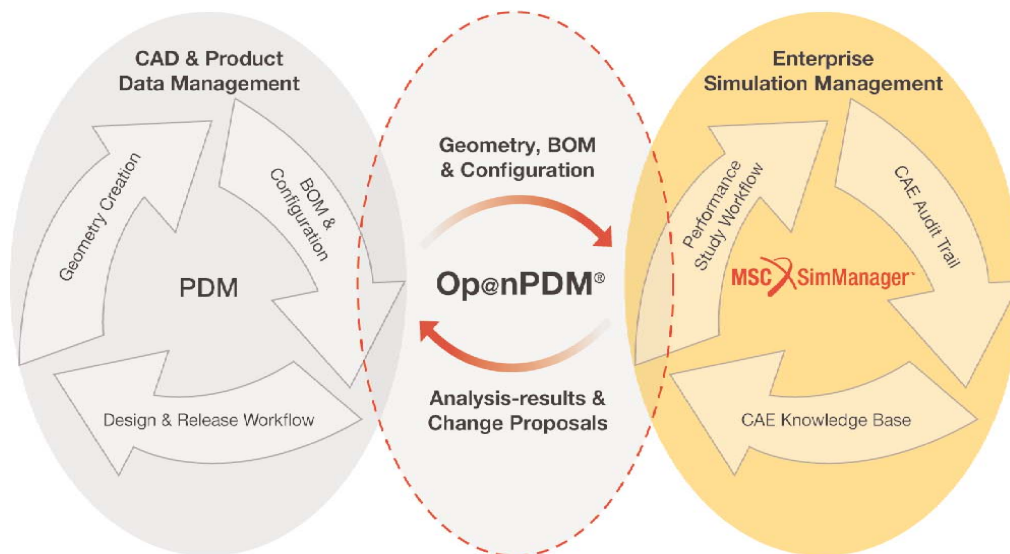
The solution enables a comprehensive audit trail to track the simulation asset through the product development lifecycle down to the user. Coupled with strict version control for the indexed simulation assets such as models, templates, material properties, and virtual test setups, this provides organizations with an accountability system that is paramount when handling sensitive IP as well as for corporate compliance and governance.

Third-party integration is extremely crucial for effective management of simulation assets. SimManager’s open framework architecture enables deep integration with third party and in-house applications and tools such as computer aided design application and product lifecycle management tools.

SimManager Enterprise Edition

The Enterprise Edition for SimManager adds further value through critical modules that enable effective process management and automation over the simulation content management functionality that comes with the Workgroup Edition. The Workgroup Edition is completely compatible with SimManager Enterprise Edition for an easy upgrade path to

CAD - CAE Integration using OpenPDM®

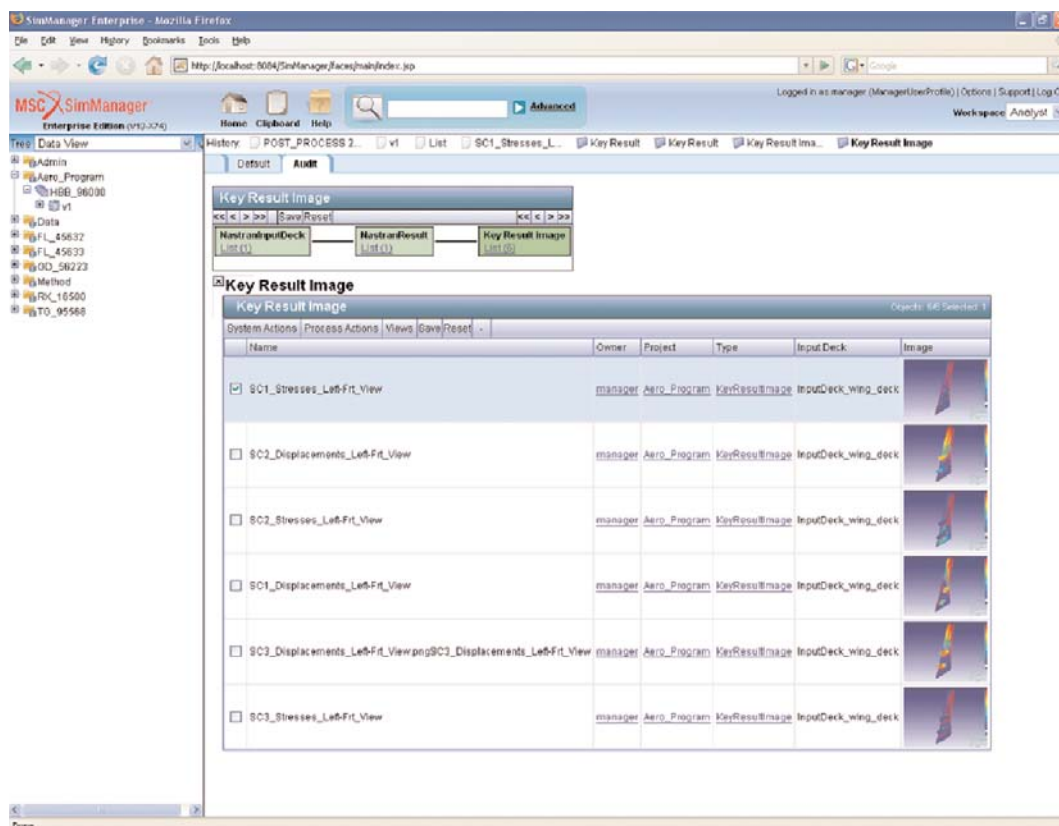


Enterprise Edition provides PDM integration via OpenPDM technology to synchronize design and analysis communities. It provides compatibility with any other CAE application through a web-browser interface including ANSYS, Abaqus, Hyperworks, Matlab and other popular tools. The solution leverages existing investments in high performing computing, CAE tools and methods as SimManager complements existing CAE infrastructure.

Process management capabilities enable the organization to identify best practices and establish these as standard, repeatable simulation processes. This also enables the automation of repetitive tasks for greater reliability and uniformity across various product development teams, workgroups, and enterprise scale project teams. These best practices in pre and post processing, virtual test setup, and reporting can be used consistently throughout the organization regardless of geography. This enables all knowledge workers to truly collaborate without the pitfalls of lost, misplaced or old data using a uniform process and thus freeing up resources through the automation of repetitive and traditionally manually intensive tasks.

The solution also enables engineers to manage and track evolving simulation assembly models over the lifecycle of a product development program. The audit and tracking feature allows product development teams to analyze various influencing metrics in the design process.

Instead of searching for data and wasting effort on repetitive, non-value added activities, SimManager allows engineers to invest more of their effort on the improvement of design through simulation. The overall benefit realized by the customer is the development of higher quality products with an accelerated time-to-market. These benefits can be seen at companies like Audi and Whirlpool Corporation that have chosen to implement SimManager.



SIMULATION MANAGEMENT IN ACTION

Audi

The SimManager system deployed at Audi highlights the scalability of Simulation Management to support the simulation requirements of a global engineering enterprise. The results at Audi show an increase in the through put of simulations by 35 percent with the same amount of people. The SimManager Enterprise deployment at Audi currently manages

more than 180,000 simulations, with up to 850 new simulations created per day and enables collaboration amongst 400 internal and external users on all new vehicle multi-discipline programs, for Crash, Pedestrian Safety, Occupant Safety, Head Impact and NVH engineering disciplines.

The system provides secure, managed access currently to over 20 million simulation content objects and provides an audit trail for each one of those objects, documenting how they were created. Manually intensive tasks such as model assembly, post-processing and report generation are now automated in SimManager, allowing Audi to run more simulations per vehicle and effectively use CAE to improve vehicle performance and innovate.

Whirlpool Corporation

Whirlpool Corporation standardized on the SimManager Enterprise platform. Whirlpool's integrated virtual product development tools use detailed digital product models to simulate and verify every aspect of product from functional performance through shipping and installation. This empowers Whirlpool to globally make and track critical design and packaging decisions while also communicating and coordinating product development with all points within the enterprise, thus driving product innovation and quality to new and competitively sustainable levels.

CONCLUSIONS

This paper has outlined how Simulation Content Management is now able to address and solve some very significant issues that have plagued the manufacturing and engineering markets. The beauty of these solutions is that they not only help in significant cost reduction but now we have tangible evidence of these solutions going further to help in generating added revenue through resources savings and reallocation, standardizing engineering best practices and automating repetitive tasks. Functionality that till now was in the domain of the larger enterprise can now be effectively used within the critical product development area enabling greater monetization.

The value proposition of Simulation Content Management is no longer merely a "leap of faith" but a "must-have" for enterprises looking at gaining process efficiency throughout the product development lifecycle.

CONTACT US

Beijing
Bengaluru
Bogotá
Buenos Aires
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Oxford
Palo Alto
Paris
San Antonio
São Paulo
Seoul
Shanghai
Singapore
Sydney
Tel Aviv
Tokyo
Toronto
Warsaw

Silicon Valley
2400 Geng Road, Suite 201
Palo Alto, CA 94303
Tel 650.475.4500
Fax 650.475.1570

San Antonio
7550 West Interstate 10, Suite 400,
San Antonio, Texas 78229-5616
Tel 210.348.1000
Fax 210.348.1003

London
4, Grosvenor Gardens,
London SW1W 0DH, UK
Tel 44(0)20 7730 3438
Fax 44(0)20 7730 3343

877.GoFrost
myfrost@frost.com
<http://www.frost.com>

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