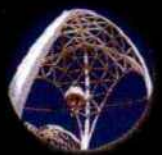


NAFEMS

**Business Value from Simulation
Data Management**
A Decade of Production Experience



Business Value from Simulation Data Management – a Decade of Production Experience

A White Paper from the
Simulation Data Management Working Group

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Record of changes

Issue	Date	Detail of Changes
1.0	November 2011	Pre-release for Munich SDM Conference
2.0	May 2012	Version reviewed and approved by SDM WG

Executive summary

Manufacturers everywhere want to take advantage of the reduced cost and increased fidelity of computer simulations in order to develop better products faster and at lower cost. They want to perform more simulations in traditional areas of the development process and extend simulation upstream into concept development and downstream into virtual testing to ensure that the physical validation of the product is achieved in a timely and predictable manner.

However companies of all sizes are already struggling to manage their simulation data, which is increasing in size and complexity by orders of magnitude as more, and more detailed, simulations are performed every year. Effective management of simulation data is increasingly important as simulation becomes a core business process and organisations rely on simulation results as the basis for business decisions.

NAFEMS set up the Simulation Data Management Working Group (SDMWG) to assist its members with their SDM challenges at the initiative of the NAFEMS North American Steering Committee. The SDMWG first sought to develop a common understanding of the state of the art of SDM and to identify the principal concerns of Working Group participants. The group broadened this consultation to the full NAFEMS membership by organizing a survey of members. The consultation process determined that a key concern of members is how to justify investment in an SDM solution. The survey also indicated a high priority placed upon the management of the engineering analysis process itself and of the associated process data.

The SDMWG therefore created a sub-team to develop this White Paper on the Business Value of Simulation Data Management. The purpose of this NAFEMS White Paper is to provide engineering management and simulation methods leaders with an understanding of the benefits to be derived by investing in SDM solutions, the costs of an SDM solution and to help communicate the potential value of an SDM investment to colleagues outside of engineering.

The Survey also established that fewer than half of all organisations had any experience with SDM and this experience was typically less than 5 years. NAFEMS therefore organised specialised conferences on SDM in 2010 and 2011 where organisations with significant experience of SDM were invited to share their experience. The papers from these conferences represent a valuable body of knowledge for organisations wishing to improve their SDM processes and an important contribution to this White Paper.

The fundamental challenges of managing simulation data include: the number and volume of data files (terabytes) to be managed, the number of information items per simulation of a complex product (hundreds to 10,000s depending on the industry), the visibility of data (need for complex software to browse or visualise) and the traceability of specific versions of data items and the processes/methods used to create them from initial geometry to final results. Whereas PLM solutions have been widely deployed for the management of the change process, CAD data and Bills of Materials, many organisations still rely on manual processes and face to face meetings for collaboration and supervision of simulation activities. These manual processes are increasingly unsustainable as the complexity and volume of data rises. These operational challenges are compounded by distance and by organisational boundaries between disciplines within an organisation and between organisations.

Typical early adopters of SDM are CAE departments in Aerospace and Automotive OEMs developing complex, high performance products. The majority of these early adopters presenting at the NAFEMS 2010 SDM conference had implemented a dedicated SDM system,

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whilst others had implemented a solution based on their PLM platform. In each case, it is the breakthrough capability of the SDM solution to manage the structures of simulation information, including linkages between information items, attributes about information items as well as the information items themselves that delivers business value to these organisations.

Early adopters reported that SDM solutions delivered benefits through more effective processes and by enabling the automation of time-consuming activities. Visionary companies who implemented SDM up to a decade ago have achieved breakthrough improvements in information visibility and traceability, simulation throughput and product performance. They have achieved double-digit improvements in engineering analyst productivity by accelerating access to information and by enabling the automation of laborious, low value-added tasks. They have been able to outsource simulation tasks, distribute work geographically and integrate partner staff in the analysis process. Early adopters of SDM have been able to leverage the operational benefits of SDM in terms of greater product development capacity with their existing staff to achieve important commercial and business benefits including more product introductions. They also achieved a wide range of “soft”, less easily quantifiable benefits of SDM which nevertheless contribute to business performance.

The benefits from the implementation of an SDM solution are dependent on the type and diversity of processes an organisation needs to support. A wide range of potential returns are identified to enable the estimation of potential benefits from an SDM investment. The investment to implement and support an SDM solution also depends on the nature of the processes, the size of the organisation, the Out Of the Box(OOTB) capabilities and maturity of the SDM solution selected and the expertise of the solution provider at implementing SDM. The content and cost elements of an SDM project are detailed to enable total project costs to be estimated.

The paper concludes that the potential value for an organisation with repetitive processes and products with broadly similar geometries, such as an Automotive or Aerospace OEM, is very high and that value for a medium sized analysis department (tens of analysts) can be sufficient to justify investment.

Small analysis departments, with fewer than ten analysts and solving problems with limited opportunities for task automation can nevertheless derive benefits from traceability, auditability, improved quality and collaboration but may find it harder to justify an investment in an SDM solution. The initial cost of an SDM solution can be a barrier to adoption by Small & Medium Businesses (SMBs) and to small analysis departments in larger companies.

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