SimManager
Enterprise Simulation Management

Overview
SimManager is a system for managing simulation processes, resources, and information across an engineering enterprise. MSC calls this Enterprise Simulation Management. A consequence of Enterprise Simulation Management is that simulation data (models, results, files) is captured, stored, organized and protected, however Enterprise Simulation Management delivers measurable and proven value that is far beyond data management.

Managing simulation processes
Within any SimManager system, the pattern or flow of work conducted by engineers is embedded. A simple example is when a simulation model, in the form of an input file, is submitted to a solver to obtain an output file that is subsequently post-processed to obtain key results (values, curves, fringe plots, animations, etc.). A SimManager system built to manage this process enforces the basic pattern or flow of this work, and ensures that each of the steps is done using “best practices”. It also maintains a “history” of the simulation work conducted, such that we can verify the flow of work and that the best practices were in fact used. This history is available within the system for viewing and evaluation.

Managing simulation resources
A number of simulation resources are involved. These include software applications (solver and postprocessor), hardware (the computers that the solver and postprocessor are run on), and personnel (the engineers performing the work). In every step of our simulation process, SimManager is distributing the right input to the right resource to complete its task in the workflow. In the case of software applications, SimManager ensures that the right version of each application is used and helps to make sure that the licenses for these applications are all used to optimum capacity. In the case of hardware, SimManager distributes “jobs” (solving and post-processing in our example) across all available computers, ensuring that workload is balanced and that all are used to maximum capacity. With respect to personnel, SimManager ensures that only authorized personnel have access to simulation information and resources, and provides management with the ability to monitor schedule and performance risk so that

Capabilities
- **Simulation Process Management**: SimManager embeds and orchestrates simulation workflow with capabilities for creation, distribution, and execution of simulation methods (pre-processing, solution, and post-processing) and simulation processes (higher level workflow that can include combinations of templates and actions performed by non-CAE applications).
- **Simulation Process Automation**: Repetitive and time consuming tasks and processes can be executed in a batch or automated manner by encapsulating templates, macros, session files, and scripts into actions that can be invoked from SimManager.
- **Simulation Resource Management**: SimManager enables optimal utilization of simulation resources including software applications, high performance compute hardware, and people.
- **Simulation Information Management**: SimManager stores, organizes, and protects all the information used and created while managing the simulation processes and resources.
- **Simulation Audit Trail and Data Pedigree**: SimManager captures the parent/child relationships of data objects and the association with the actions (methods and processes) used to create data in order to establish an auditable history of all simulation activity.
Managing simulation information
SimManager captures all the information used and created while managing the simulation processes and resources. Once captured, SimManager stores, organizes and protects it. This information includes inputs to processes (e.g. input files, material properties, and loads information), the outputs of processes (output files, values, curves, and animations), and the information (meta-data) that describes these processes, resources used, inputs, and outputs. A critical point is that the input and output data is of little value without the descriptive information that goes along with it (context). For simulation, the contextual information that makes data valuable is related to product structure (what version of a product is this related to), engineering discipline (durability, noise & vibration, impact, CFD, etc.), performance targets/requirements, and the methods and processes used to create it. SimManager presents simulation information in context, providing the ability to audit the entire simulation process and measure its quality and effectiveness. This provides a value that is unique to SimManager among all other systems that strive to “manage simulation data” (e.g. PDM systems like TeamCenter for Simulation) or “manage simulation processes” (e.g. optimization softwares such as Engineous’ Fiper). This value is in establishing a simulation environment that enables continuous improvement. In essence, SimManager is a knowledge management system that can empower “Six-Sigma” simulation.

Benefits
- Automation: when simulation processes and resources are managed, repetitive, manually intensive tasks can be conducted automatically.
- Reuse of Methods: Simulation methods are able to be reused by engineers throughout an engineering enterprise when they are version controlled and distributed effectively. These methods can be in nearly any form, including scripts, templates, session files and macros.
- Reuse of Models: Simulation models can be reused when we can easily find them and understand what is in them and how they were created (context).
- Maximum Leverage of Simulation Resources: When the use of software, hardware, and personnel is monitored and managed, tasks can be distributed to balance workload and get peak utilization.
- Assured Simulation Quality: An auditable simulation process enables continuous improvement of simulation methods and processes, resulting in less rework and correction and confidence to use simulation in place of physical prototypes and tests.

Simulation Information Management

• Automation:

• Reuse of Methods:

• Reuse of Models:

• Maximum Leverage of Simulation Resources:

• Assured Simulation Quality: