simulating REALITY™

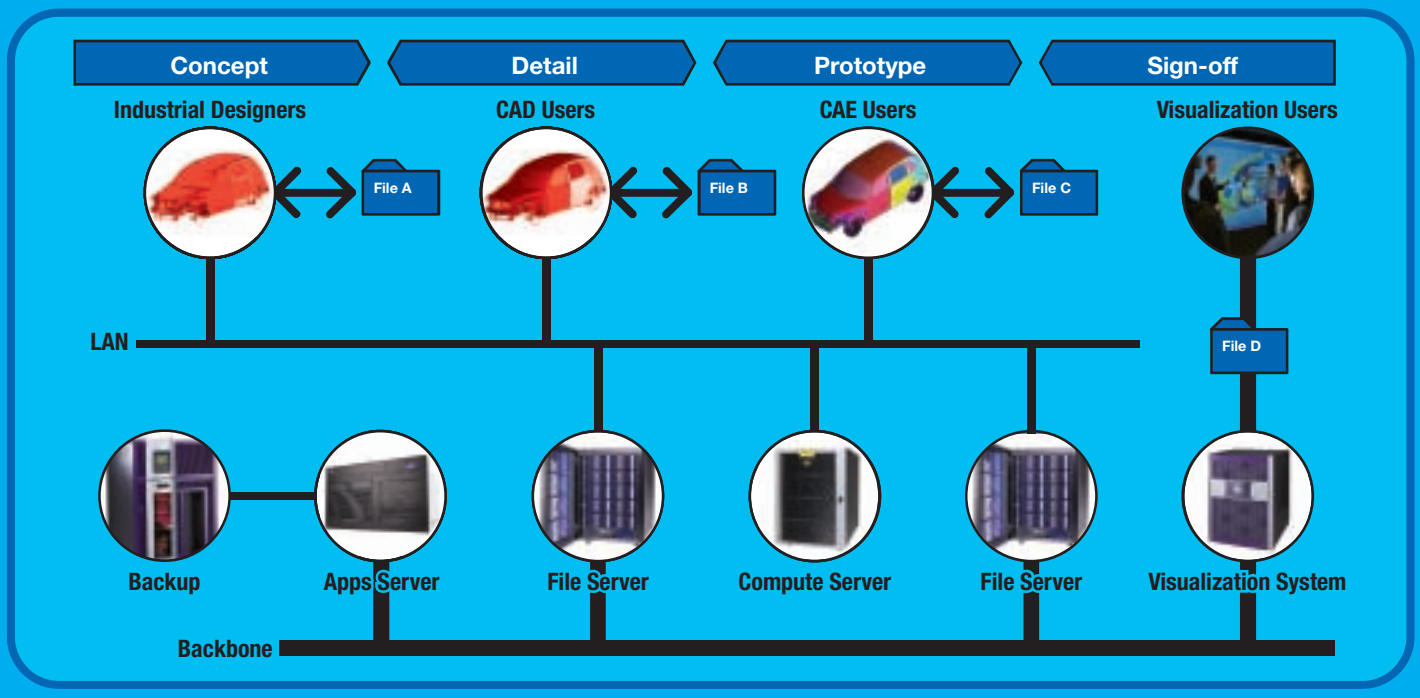
sgi intel MSC SOFTWARE®

Product Development Acceleration for Noise, Vibration & Harshness

Enhancing innovation, managing risk, and accelerating products to market

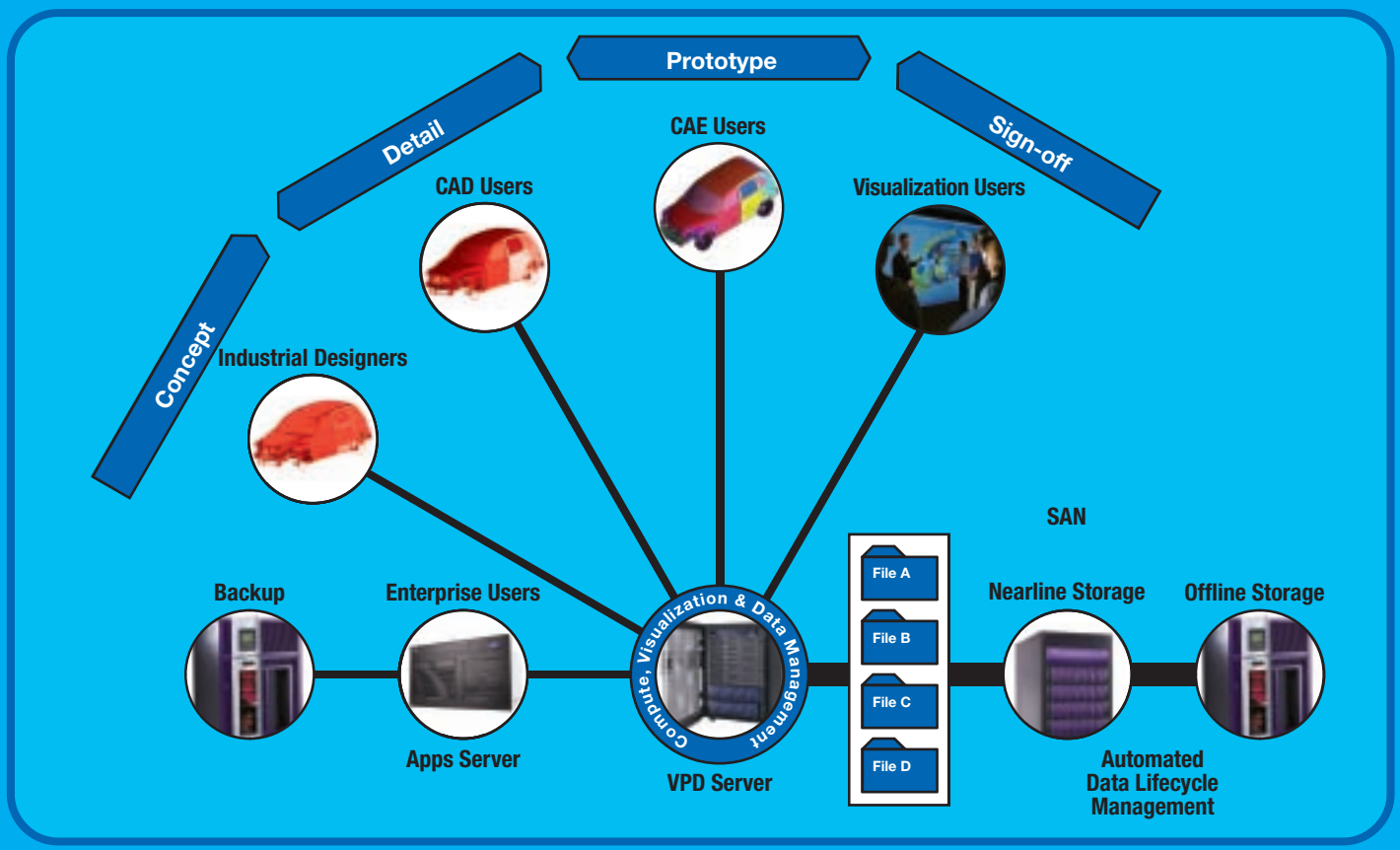
Traditional VPD Workflow Infrastructure

Traditional VPD Infrastructures create 'islands of data' and fragment compute, visualization, and storage resources. Inefficiencies in data access and data sharing create bottlenecks.



Enhanced VPD Workflow Infrastructure

Data centric VPD Infrastructures offer fast, shared access to data in a heterogeneous environment. These workflow optimizations remove bottlenecks, increase productivity, and deliver results faster.



Increasing complexity in managing digital assets
Time-to-market, cost control, and product reliability are critical in a world where manufacturers compete globally. Leading manufacturers increasingly turn to digital technology at all stages of product development — from concept to sign-off — to improve product performance and quality, reduce costs, and shorten time-to-market.

The implementation of a Virtual Product Development (VPD) process allows engineers to consider more design alternatives and evaluate them more thoroughly in less time, without the need for expensive physical prototypes.

However, deployment of VPD technologies over time has fragmented the storage infrastructure at most companies. Discrete 'islands of data' have sprung up across organizations, increasing infrastructure complexity, hampering data sharing, and introducing inefficiencies in the workflow. At the same time, increased use of VPD technologies has resulted in fast-growing digital assets that are critical to manufacturing success.

To remain competitive and get the most value from VPD, manufacturers need a reliable, scalable, cost-effective, and high-performing infrastructure capable of delivering results in shorter periods of time. MSC.Software, SGI, and Intel have teamed to offer a complete and integrated solution that accelerates product development. Enhanced workflow solutions from these industry leaders bring together all the essential components — hardware, software, and data management — into an easy-to-deploy solution for manufacturers.

"Enhanced VPD workflow solutions can increase productivity 25x by removing bottlenecks caused by FTP, accelerating time to solution using MSC.Nastran, and providing immediate visualization of results."

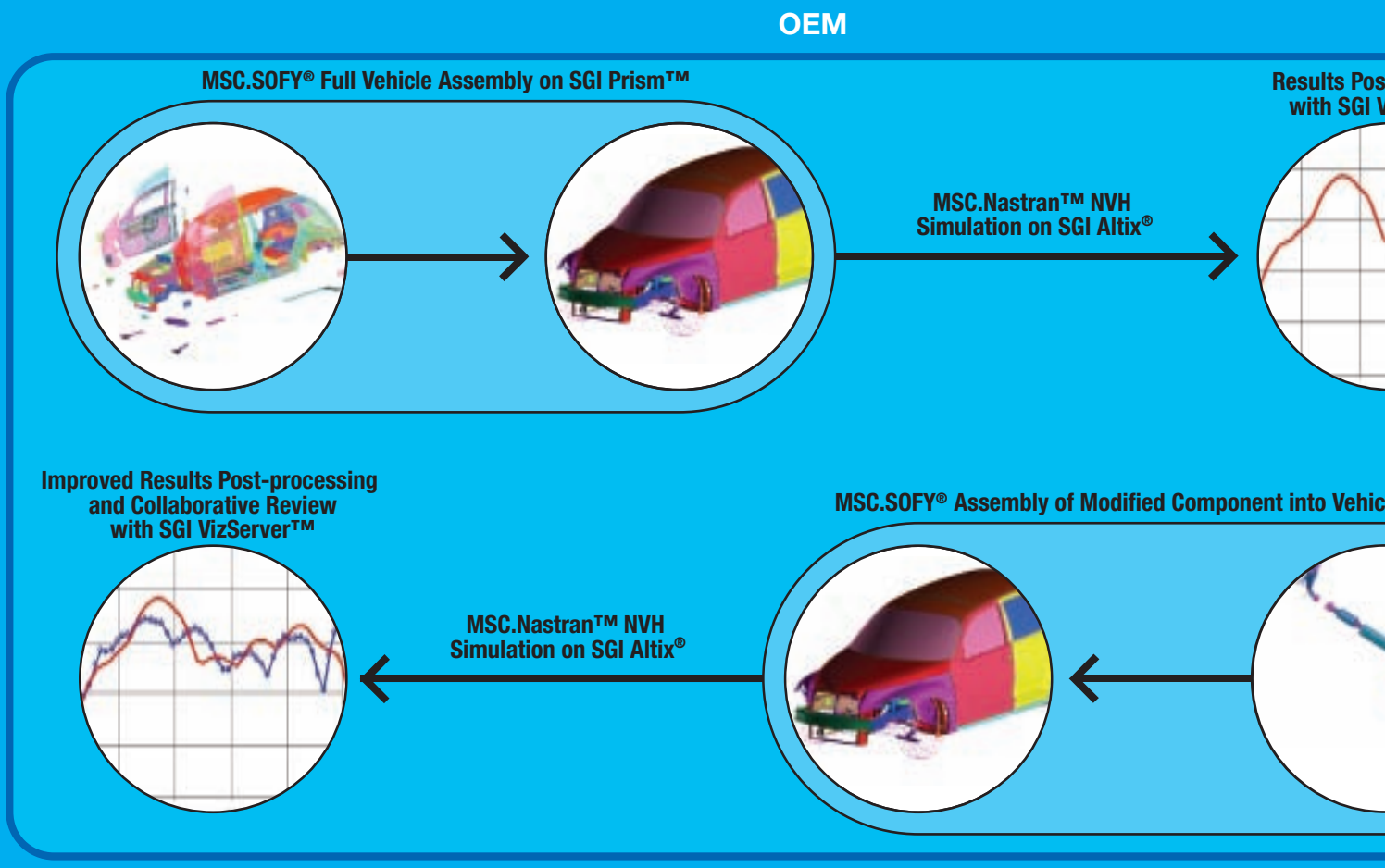
Enabling Efficient Workflow
A key element of the enhanced infrastructure solution is the SGI® InfiniteStorage shared file system CXFS™. The CXFS provides high-speed, shared data access to eliminate the bottlenecks that hamper virtual prototyping and visualization operations. By giving all systems on a storage area network (SAN) shared, high-speed access to data, CXFS avoids the bottlenecks associated with manual copying and dramatically streamlines workflow and improves productivity. More jobs can be completed in the same amount of time — even simulations of considerably greater complexity than were previously possible.

Delivering the Fastest Results
To successfully analyze designs using VPD, problems with hundreds of thousands to millions of degrees of freedom are becoming common. Such scenarios create massive data sets and require intensive floating-point operations, which go beyond the capabilities of 32-bit computing. The SGI Altix® server platform is the high-performance computing solution for VPD users. Combining SGI NUMAflex™ architecture, Intel® Itanium® 2 processors, and the Linux® 64-bit operating system (OS) along with MSC.Nastran software optimized for the Altix platform, this configuration enables reduced time-to-solution for large analysis problems.

Facilitating Collaboration
The Silicon Graphics Prism™ system provides a high-performance visualization platform to access and share MSC.Nastran results as soon as they are ready. The Silicon Graphics Prism system becomes the heart of a Visual Area Network (VAN) which — through OpenGL Vizserver™ software — enables engineers to interact, in real-time, with complex graphics data across different locations and different platforms.

Improving Data Management
All the data that has been created needs to be managed. SGI's Data Lifecycle Management™ solution virtualizes storage assets, creating a scalable storage pool that is transparent to users and applications. SGI's Data Migration Facility™ software takes the guesswork out of data management by automatically and transparently moving data from primary disk to secondary disk, tape, or other storage devices according to your criteria, ensuring that data is always stored on the most appropriate and cost-effective media.

Scales with User Needs
SGI's enhanced VPD infrastructure solution allows you to satisfy growing needs without forklift upgrades. An organization can re-assign system resources as needed and have a virtually unlimited growth path. The system can scale independently in multiple dimensions over time: compute, I/O, memory, visualization resources, storage capacity, bandwidth, and connectivity.



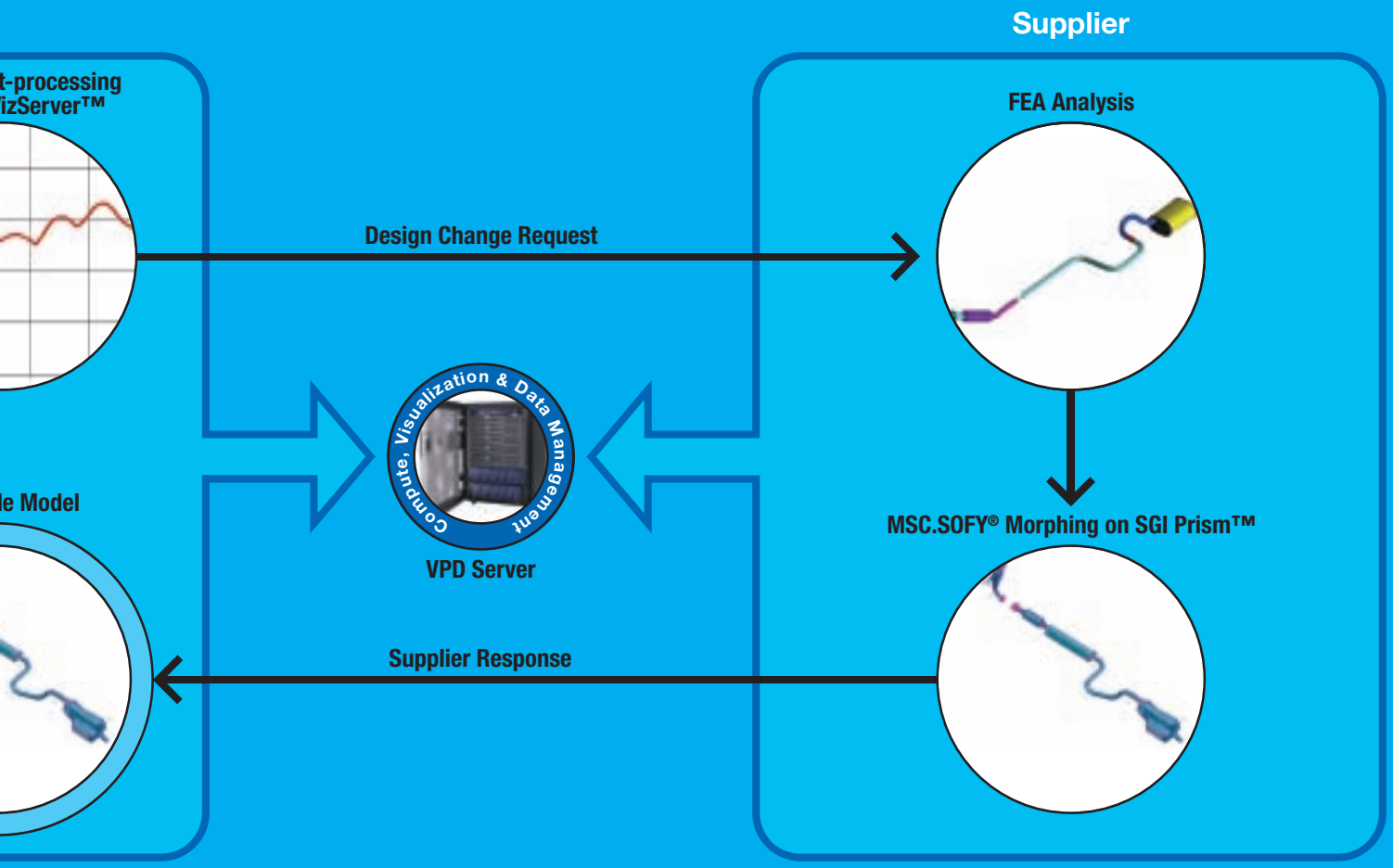
Vibration Response Assessment in the Virtual World
Automotive OEMs and suppliers need to improve their knowledge about a vehicle's performance earlier in the design process. The methodologies must enable a seamless collaboration between different product development disciplines (i.e., vehicle dynamics and NVH), as well as between OEMs and suppliers of vehicle components.

Although physical testing is still widely used, Virtual Product Development techniques are becoming more common in the evaluation of vehicle performance much earlier in the development cycle. For example, VPD solutions are being used extensively by automakers worldwide to assess the vibration and vibro-acoustic response of vehicles, from the full system down to single subsystems and components and over a wide frequency range, to ensure that optimum NVH characteristics can be achieved. Sharing complementary technologies across disciplines makes it possible to reach satisfactory balance in the overall vehicle performance.

The combination of MSC.SOFY®, MSC.Nastran, and a dedicated post-processing environment offers an excellent platform for the simulation of typical NVH events, such as frequency response analysis on a full vehicle assembly, to detect and remove unwanted resonances in the system by acting on the design of the different vehicle components. The combination of the NVH solutions provided by MSC.Software and the infrastructure provided by SGI enables manufacturers to accelerate design cycles by reducing simulation time through platform-specific optimized software and by facilitating OEM/supplier collaboration through the use of VizServer™ software.

Predictive Acoustics
NVH also relates to understanding the interior acoustics of a vehicle, providing a "signature sound" that the passenger then relates to quality. Engineers are therefore looking for solutions to easily generate simulation models for acoustic response.

MSC.SOFY allows the easy assembly of complete trimmed body models, including automatic coupling between structure



and enclosed fluid. MSC.SOFY supports, in conjunction with the MSC.Actran solver, the accurate identification of the absorption properties of trim components. Several MSC.Software customers are using this solution to effectively collaborate with their supply chain, by including the effects of trim components within the complete vehicle model.

The one historical limit to the wide deployment of system-level acoustics simulation, that is the often too-long simulation times, can be resolved by accessing the MSC.Nastran version optimized for the SGI Altix® server platform. This means that engineers can now optimize body NVH simulation times, bringing them down to a manageable length, so that they easily fit within the engineering process.

No simulation is useful, though, if meaningful and clear NVH related results can't be easily extracted out of gigabytes of data. The VPD solution provides a flexible environment, which can be used to extract the maximum value out of the simulation — seeing the influence of design changes on selected performance metrics.

Value of Enhanced NVH Workflows

- Accelerated NVH studies: models are solved faster, visualization is instant, collaboration is easier, and time-to-market is reduced.
- Interoperability and protection of past hardware investments: existing hardware can be fully integrated into the enhanced VPD infrastructure; the solution supports a heterogeneous environment.
- Easy to deploy and low entry cost: customers realize immediate savings with a fully integrated and fully supported solution that is easy and cost-effective to implement.

SGI, Intel, and MSC.Software are the right partners to bring these benefits to your VPD environment. With years of experience in some of the most intensive and critical operations, SGI, Intel, and MSC.Software have the technology and expertise to help you gain maximum ROI from your VPD investments.

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About MSC.Software:
MSC.Software Corporation is the leading global provider of Virtual Product Development tools, including simulation software and professional services, that help companies make money, save time, and reduce the costs associated with designing and testing manufactured products.

About SGI:
SILICON GRAPHICS | The Source of Innovation and Discovery™
SGI, also known as Silicon Graphics, Inc. (NYSE: SGI), is a leader in high-performance computing, visualization, and storage. SGI's vision is to provide technology that enables the most significant scientific, engineering, and creative breakthroughs of the 21st century.

SGI offers a consolidated, data-centric, easy-to-deploy infrastructure for enhanced VPD workflow. Tightly integrated Linux-based solutions for VPD provide advanced computing, visualization, and data management capabilities, allowing manufacturers worldwide to improve their profitability by streamlining their product development efforts through digital simulation, design, and collaboration in real-time.

About Intel:
Intel is the largest chip maker and leading manufacturer of computer, networking, and communications products. Intel technology is the ingredient that helps manufacturing companies speed time-to-market by developing and sharing rich 3D data collaboratively and securely across worldwide supplier networks using powerful standards-based platforms. Intel's 64-bit Intel® Xeon™ and Itanium™ processor-based servers and workstations manage data in real-time with outstanding reliability and flexibility. Intel's mobile client architectures, such as Intel® Centrino™ Mobile Technology for notebooks and tablet PCs and Intel® Personal Client Architecture™ for handheld devices, let companies improve employee productivity and increase customer satisfaction by mobilizing engineering, sales, and service personnel.