SGI Corporate Vision and Strategy

An IDC White Paper

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Introduction

SGI remains deeply committed to delivering the most advanced visual and scalable computing solutions for technical and creative users. The company has a long track record of working in these industries and of bringing high-performance computing solutions to these markets. SGI's corporate strategy is twofold. First, SGI develops and maintains close relationships with core customers. Second, the company balances internal technology innovations with industry standard technologies to bring to market cost-effective products that expand customers' capabilities.

SGI Supports Leading-Edge Technical Customers

Scientist, engineers, graphic artists, film producers, content creators, and so forth are arguably the most demanding of leading-edge computer users. These communities place the greatest pressures on their system's suppliers to continue to advance proven technology, bring next generation technology to market, and explore untried technical alternatives, all while maintaining current systems and minimizing costs to users. It is an understatement to call these requirements "challenging." Many computer systems vendors that tested this market found its requirements too daunting and retreated to more conservative commercial markets.

From its inception, SGI has accepted the challenge of the technical and creative user communities, working to provide them with the most advanced computational tools. Since its divestiture from the Cray vector and MIPS embedded businesses, SGI has worked to become a "single-mission company." This mission is summarized in its corporate vision statement: "Deliver the world's leading visual and scalable computing solutions for technical and creative users." This white paper presents SGI's vision, reviews the company's overall strategy for implementing the vision, and presents IDC's analysis of SGI's market opportunities and challenges.

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Returning to Its Basic Vision

True vision statements pack a maximum of meaning into a minimum of words and, thus, should be looked at closely. The SGI vision statement focuses on the company's commitment to its customers:

SGI is devoting its resources to meeting the needs of scientists, engineers, creative people, and their associated support/infrastructure organizations.

1. **Commit to a community.** SGI is devoting its resources to meeting the needs of scientists, engineers, creative people, and their associated support/infrastructure organizations.
2. **Create customized products.** SGI is committed to designing, manufacturing, and configuring computer systems that meet the specific needs of its customers.
3. **Address the entire problem.** SGI is committed to delivering complete computational, software, and services solutions to customers.
4. **Provide next-generation solutions.** SGI is committed to continuously addressing the emerging computational and visualization requirements of its customers.
5. **Provide intellectual leadership.** SGI is committed to continuously advancing the standards for technical, graphics, and visual computing within the industry.

The company has developed core competencies in graphics, visualization, and powerful servers.

Creating Core Competencies

SGI has historically been know for its leading-edge, top-of-the-line graphics combined with innovative high-performance servers. The company has developed core competencies in graphics, visualization, and powerful servers and turned its understanding into industry-leading products.

The term "core competency" refers to the combination of institutional knowledge, skills, organization, technology, and equipment that allows a company to excel in a marketplace (i.e., what the company knows or does better than anyone else). Technology-based companies are founded to bring to market the core competencies of their founders. Companies grow in part by expanding their competencies. If companies can develop a critical mass of competencies, they are then positioned to join the ranks of established long-term players in the market.

Supporting Technical and Creative Users from the Beginning

SGI was originally created to bring a new level of workstation graphics performance to the technical and creative communities. These systems became a fundamental driver from such technical advances as scientific visualization and computerized special effects generation. Such

market-driving technologies create requirements for new and supporting technologies. It is not enough to be able to display three-dimensional, semi-transparent, color images of very large data sets; it is also necessary to generate the data sets, store the data, and move the data between systems.

High Performance: What SGI Does Best

The problem with working with scientists, engineers, and creative users is that no matter how smart you are, you will regularly find yourself dealing with people who are smarter than you are. — Ancient Cybernetic Proverb

To succeed in technical and creative markets, SGI has had to continuously meet the needs of a very demanding set of users.

To succeed in technical and creative markets, SGI has had to continuously meet the needs of a very demanding set of users. The nature of scientific and engineering inquiry is that the solution to one problem creates a set of new and ever more demanding problems. SGI had to develop products that could expand its capabilities at roughly the same rate that the company's customers grew their problems. To keep pace with its user base, the company has developed a set of core competencies that center around providing total (i.e., systemwide) high-performance solutions. These competencies fall into four major categories:

- **High-performance visualization.** SGI has helped drive the move from plotters to graphics workstations to fully integrated visualization systems. One of SGI's greatest assets is its 3D graphics heritage, particularly in understanding how graphics are used to solve complex visualization problems. The company is driving the technology forward into such areas as collaborative visualization, immersion visualization, and visualization servers.
- **High-performance computation.** Throughout the last decade, SGI has been at the forefront of both developing innovative high-performance architectures based on RISC processors and bringing supercomputer capabilities to larger midrange and low-end markets.

A supercomputer is a system that turns a compute-bound problem into an I/O-bound problem.

- **High-performance data management.** All user and vendor organizations that enter the supercomputing arena eventually learn its darkest secret: A supercomputer is a system that turns a compute-bound problem into an I/O-bound problem. If you are running systems that perform billions of calculations per second, then you must manage billions of bytes of data per second - getting it in and out of the computer, storing it, backing it up, and so forth. SGI has consistently worked to develop data management solutions that keep pace with the visualization and computational capabilities of its workstations and servers.
- **High-performance networking.** The other side of managing data is moving it between systems. It does not make sense to be able to move data effectively within a computer if the data stream grinds to a halt at the logical edge of the system. SGI had to develop expertise in networking to keep its computational and visualization sys-

tems working together effectively. This expertise ranges from the ability to optimize standard network performance at the operating system (OS) and network driver levels to the development of high-performance network standards and ASICs such as the Gigabyte Systems Network (GSN) and its supporting SuMAC ASIC.[1]

SGI's 18-plus years of experience in high-performance computing have allowed the company to develop intellectual property across a broad spectrum of computer systems technologies (i.e., processor design to customer support services). A reference point for the extent of this intellectual property is the more than 538 U.S. and 301 international patents claimed by the company, with a filing rate for new patents in the 150 per-year range. In addition, it is important to note that SGI core competencies are directly matched to its vision of "being the world's leading provider of visual and scalable computing solutions for technical and creative users." At its core, this vision reflects the company's commitment to its customers and its resolve to continue to bring to market innovative, high-performance technology to solve next-generation problems.

SGI Corporate Strategy: From Vision to Reality

Corporate strategies are essentially top-level plans for translating vision, competencies, materials, equipment, and so forth into products and services. These strategies address such questions as: what markets will the company target, what technology investments will it make, what type of hardware and software products will it develop, how will it grow its business over time, and so on. This section briefly reviews some of the major components of SGI's corporate strategy.

SGI's strategy for accomplishing its vision is based on a products-focused approach to the market. The company continues to:

The company continues to provide complete solutions for technical and creative customers through a complete line of workstation, server, and services products.

1. Provide complete solutions for technical and creative customers through a complete line of workstation, server, and services products.
2. Develop high-performance servers based on SGI's architectural concepts, the MIPS processor, and Irix operating system.
3. Develop advanced graphics systems based on MIPS and Irix.
4. Extend its graphics and computational capability into both 32-bit and 64-bit Intel-based systems running under Linux or Windows NT.
5. Bring new technology to market on a long-term, ongoing basis.

Targeting Markets

SGI is investing most heavily in supporting customers in the following industries:

[1] GSN has been accepted as an ANSI T11 working group standard, and SGI has licensed the ASIC technology to all other providers of GSN products.

- **Manufacturing.** SGI will support the design, development, and production of manufactured products ranging from nuts and bolts to airplanes. This market includes the automotive, aerospace, and electronics industries. Applications include modeling, design and styling, virtual prototyping, crash analysis, computational fluid dynamics, and electronic computer-aided design.
- **Science and education.** The company will support national research facilities, universities, and commercial organizations involved in all levels of scientific inquiry. This category ranges from theoretical science in areas such as quantum chemistry to applied sciences in areas such as drug discovery, environmental monitoring, and the location and management of oil and gas reserves.
- **Government and defense.** SGI will support national defense and security efforts. This market includes a broad range of players such as the weapons labs, military organizations, national security agencies, and defense contractors. Applications include weapons design, basic research, war gaming, simulations, security analysis, crypto analysis, and signal processing.
- **Telecommunications and media.** SGI primarily targets the convergence of telecommunications, Internet, entertainment, and media applications. This includes telco companies interested in developing media-rich products; Internet service, applications, and hosting providers developing new products and competing on a cost-of-services basis; and broadcast and media companies interested in moving content from analog to digital media and repurposing content for the Internet. Applications include digital content creation, asset management, and media streaming.

Technology Investments

The requirement in today's computer market is for vendors to develop technology where it adds value and leads to differentiated products.

The combination of staying on the Moore's Law price/performance growth curves, coupled with the complexity of modern computer systems, and the large number of efficient component and subsystem suppliers has made it impossible for computer vendors to build systems in-house "from the ground up" or even to control specifications of all system components. The requirement in today's computer market is for vendors to develop technology where it adds value and leads to differentiated products while relying on commodity technology where it meets user needs and reduces costs.

SGI's overall technology strategy strikes a balance between company-based differentiating technologies and the incorporation of industry-standard components. This dynamic process requires the company to invest in developing and supporting its own technology while at the same time working to incorporate standard technology components into its future products. It is important to note that SGI invests about 13% of its revenues in R&D across five major areas:

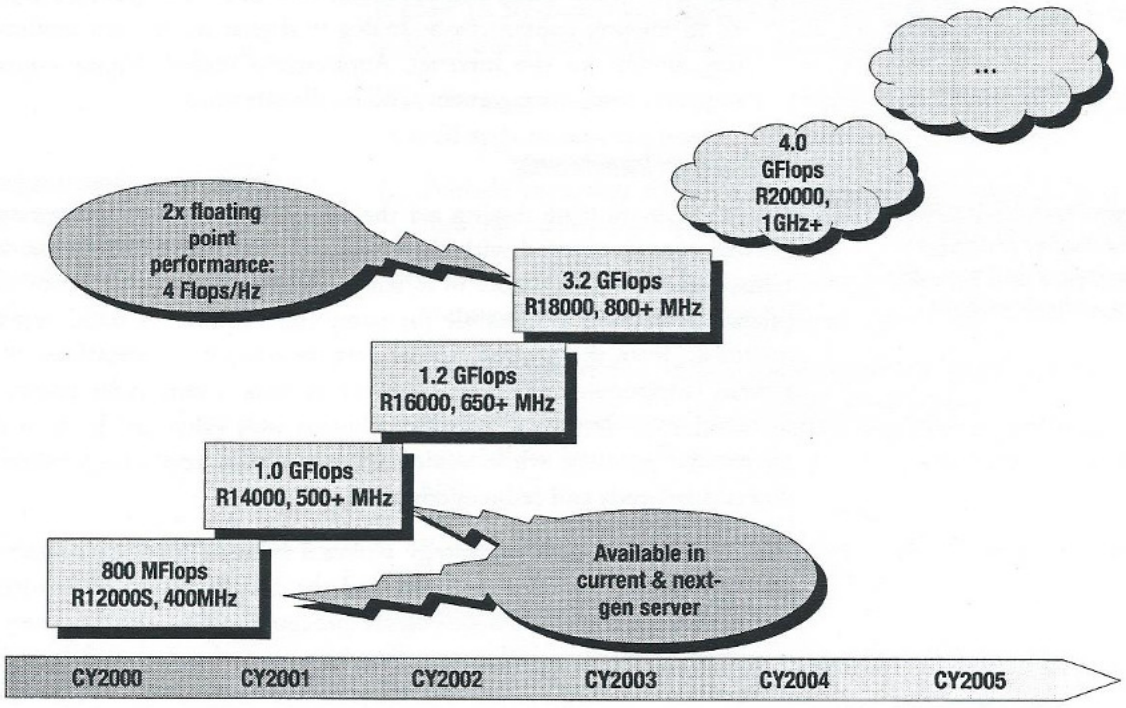
SGI will continue to advance the scalable shared memory NUMA architecture.

1. **Systems architectures.** SGI will continue to advance the scalable shared memory NUMA architecture introduced in 1996 with the Origin series. The third generation of this architecture is designed to make use of either MIPS or Intel IA-64 processors. At the same time, the company is using industry-standard technology for low-end SMP architectures based on Intel IA-32 processors and providing cluster packages for both MIPS- and IA-based systems.
2. **MIPS processors.** SGI is committed to extending the capability of MIPS processors for at least another five generations of the technology. Figure 1 presents the MIPS road map.
3. **Intel processors.** SGI is balancing its investments in the MIPS processors with its efforts to incorporate Intel processors at all levels of its product line.

SGI will continue to support and extend its very solid Irix OS as it works to expand the capabilities of Linux.

4. **Operating systems.** SGI will continue to support and extend its very solid Irix OS as it works to expand the capabilities of Linux.
5. **High-end graphics.** SGI will continue to drive high-end 3D graphic capabilities through development of custom-designed products.

Figure 1
MIPS Processor Road Map



Source: SGI, IDC, 2000

Product Strategy

Technology strategies set the stage for product strategies. SGI's product strategy can be roughly divided into hardware platforms, operating systems, 3D graphics, broadband Internet, and services. This section briefly reviews each segment.

Hardware Platforms

SGI's hardware strategy reflects the company's commitment to supporting its current value-added technology while phasing in new product alternatives. Major components of this strategy include:

SGI will continue to develop its MIPS-based systems, with new MIPS processors planned beyond 2003.

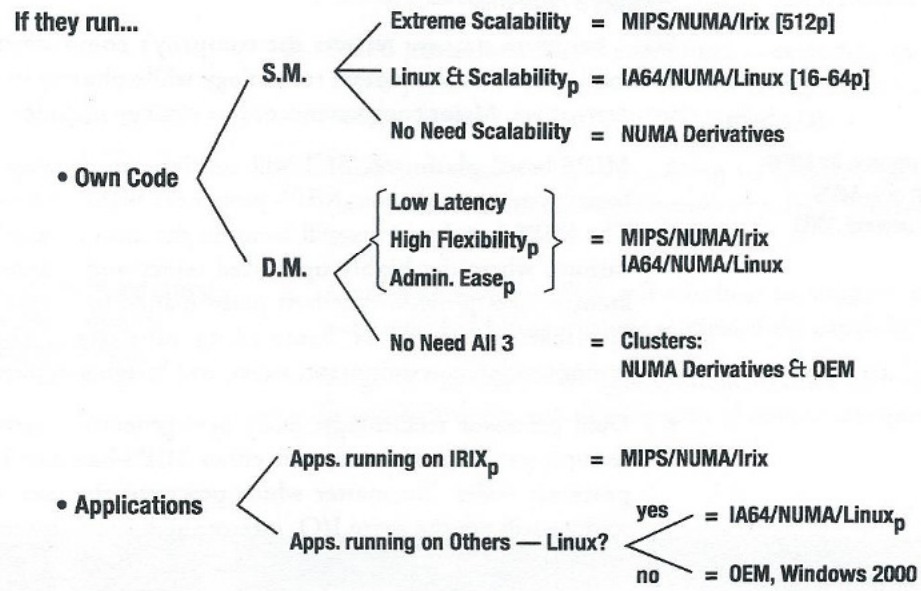
- **MIPS-based platforms.** SGI will continue to develop its MIPS-based systems, with new MIPS processors planned beyond 2003. The MIPS-based systems will focus on the most demanding applications, where the highly-optimized server and graphics systems architectures provide excellent performance for certain types of applications, such as demanding modeling, simulation, styling/design, entertainment, video, and imaging applications.
- **Dual processor technology.** SGI's next-generation systems architectures are designed to support either MIPS-based or Intel IA-64 processor nodes. No matter which processor the user selects, the systems will use the same I/O, interconnect, and networking components.

SGI is offering systems in NUMA architecture configurations with up to 512 processors and in "Super-Cluster" configurations.

- **Dual server configuration strategy.** In its Origin series, SGI is offering systems in NUMA architecture configurations with up to 512 processors and in "Super-Cluster" configurations made up of smaller 8 CPU nodes connected by high-performance, industry-standard networks. NUMA solutions provide large shared memory, high scalability, and standard programming models with single-system management features. Cluster solutions have excellent price/performance features in cases where workloads match up well with node capabilities and/or where applications are highly parallel but loosely coupled.
- **Visualization.** SGI will continue development of its high-end visualization Onyx systems. This includes ongoing development of leading-edge graphics for these systems.
- **Entry-level graphics systems.** SGI delivers a Linux workstation and a Windows NT workstation based on the Open Graphics Library (OGL) and industry-standard IA-32 processors. OGL is SGI technology that the company has released to the open source community.

Figure 2 provides an overview of SGI server solutions based on customer requirements.

Figure 2
SGI Server Solutions Matched to Basic Customer Requirements



Source: SGI, IDC, 2000

SGI is committed to providing Irix to customers on a long-term basis.

Operating System Strategy

Many users, especially manufacturing companies, scientific research centers, and entertainment companies, have very large Unix environments. Many of these large installations require very large compute engines to solve their most complicated problems. SGI servers have traditionally been a significant part of that compute infrastructure in many companies. SGI is committed to providing Irix to customers on a long-term basis. In addition, the company is advancing its Unix technology and working to extend its Unix-based systems sales. At the same time, the company must position itself to help drive and take advantage of operating systems standards. Therefore, SGI is also expanding into the Linux environments with platforms based on industry-standard 32- and 64-bit Intel processors. This requires the company to pay close attention to the interoperability issues between Irix and Linux. In addition, SGI provides a Windows NT system based on Intel IA-32 processors. Specific features of SGI's OS strategy include:

- **Support for Irix on MIPS.** In the near term, Irix will be the primary OS. SGI will continue to supply Irix on its MIPS-based systems (e.g., Origin, Onyx, Octane, and O2). SGI will focus Irix on

very demanding environments, specifically those requiring high levels of scalability and/or real-time capabilities. In addition, the company will provide ongoing support for customers with large Irix installations. SGI is also maintaining application porting activities for Irix.

SGI will phase in Linux, with a focus on markets that are already adopting the OS, such as scientific research, entertainment, and education.

- **Linux phase-in.** SGI will phase in Linux, with a focus on markets that are already adopting the OS, such as scientific research, entertainment, and education. Linux will only be supported on Intel platforms. The company will progressively strengthen Linux with the goal of making it a mission-critical OS. In addition, SGI will initiate new application porting activities for Linux within target market sectors.
- **NT support.** SGI will support Microsoft's Window NT operating system on its IA-32-based systems.

3D Graphics

SGI's graphics strategy is to continue to drive high-end capabilities with custom-designed products while incorporating and enhancing industry-standard technologies for low-end products. Major elements of the company's graphics strategy include:

SGI will continue to develop its InfiniteReality graphics in-house.

- **InfiniteReality for the high end.** SGI will continue to develop its InfiniteReality graphics in-house. In addition, the company has introduced a new graphics subsystem for its Octane line (Vpro). SGI designed, developed, and manufactured the next-generation graphics product.
- **Partnering for the low end.** Ongoing 3D graphics development for the entry-level and midrange Linux and Windows NT workstations will be based on chips developed by nVidia. SGI's added value will be primarily in driver development rather than in the basic chip design. SGI will add value not only through the drivers but also in future board implementations and input into chip designs. The company will obtain graphics options for its Linux and Windows NT Intel-based systems from other commodity graphics providers as needed.

Reality Center

One of the interesting aspects of the Reality Center is that it is created by combining all of SGI's other major products.

SGI is fielding leading-edge visualization products in its Reality Center solution. These integrated solutions combine SGI's visualization, computational, data management, and services components to provide visualization facilities that support various business processes, from engineering design reviews and data analysis sessions to training, marketing, and education. Reality Center configurations range from desk-size systems for small groups to wall-size systems for group reviews and presentations, room-size immersive systems real-time simulators, detailed design reviews, large presentations, and so forth. The Hayden Planetarium at the American Museum of Natural History in New York

City is based on Reality Center technology. One of the interesting aspects of the Reality Center is that it is created by combining all of SGI's other major products.

Telecommunications and Media

SGI provides a solutions-based product for companies involved in media commerce. SGI's solutions are based on a combination of its scalable systems, professional services, and general support services in this market. At the heart of its strategy is the company's long history in the market, which allows SGI to partner with both customers and software vendors in addressing an expanding and increasingly complex applications domain.

Services

SGI's service strategy is to provide a worldwide corps of hardware and software support personnel to help customers design, deploy, and manage multisystem computer configurations. The company's service offerings are designed to address diverse user needs:

- **Level of support.** SGI support packages range from mission-critical, 24 x 7, onsite support to per-incident Linux and Windows NT call packs.
- **Life-cycle support.** SGI provides consulting services for configuration design, system integration support, ongoing hardware and software maintenance packages, and applications support.
- **Environments.** SGI services are available for multiple OS environments including Irix, Linux, and Windows NT.

What's Next: Growth Strategy

A vital part of strategies for technology-oriented corporations is the identification and development of opportunities that can drive overall corporate growth. In addition to expanding its presence in the markets listed above, SGI is targeting several areas for future growth, including:

SGI is targeting ASPs in the technical and creative markets as a new opportunity.

- **Application service provider support.** Application service providers (ASPs) represent an emerging business model based on Web technology. Under this model, users send data over the Web for processing using a specific application on a service provider's system. The service provider assumes responsibility for all computer hardware and software to run the application and charges on a per-use basis. SGI is targeting ASPs in the technical and creative markets as a new opportunity.
- **Technology licensing.** SGI has licensed its technology for use by broader markets (e.g., MIPS, networking ASICs). Technology licensing and OEM agreements increase return on R&D invest-

ments by tapping markets that a company could not otherwise effectively enter.

- **Next-generation Internet.** As technologies such as DSL phone lines, cable modems, and broadband satellites become more common on the Internet, the opportunity exists for the genesis of a new generation of Web content creation and distribution support products. SGI is well positioned to take advantage of a "broadband Internet market" based on its strengths in content creation, Web serving, and video stream management.
- **Expanding the range of analytic applications.** As business environments become more complex due to such factors as increased globalization, increased risk, increased computerization, faster product cycles, and new technology trends, companies must respond in part by supporting more detailed and real-time models of their operations and competitive environments. SGI is working to leverage its expertise in supporting complex analytical applications in scientific and engineering environments into business financial analytical environments.

IDC Analysis

Focused Vision and Solid Strategy

IDC believes that SGI's corporate vision is a strong statement for a company that is refocusing its efforts on its traditional strengths.

IDC believes that SGI's corporate vision is a strong statement for a company that is refocusing its efforts on its traditional strengths. We see the strengths of the statement as first, that it commits SGI to supporting the technical and creative markets in which its products are well recognized and understood and in which it has developed a base of loyal customers. And, second the vision continues SGI's historic commitment to developing new and more capable technology for its customers.

We believe that SGI has developed a strong strategy that continues to drive internal technical innovation while leveraging the overall computing industry's ability to continuously bring more capable component technology to market. In addition, SGI's emphasis on developing complete solutions should position the company to support more of its customers' computing requirements, and thus increase staying power within sites and improve revenue potential.

Overall, SGI's focus on core business and competencies should help the company regain momentum and customer confidence.

Overall, SGI's focus on core business and competencies should help the company regain momentum and customer confidence and subsequently allow it to strengthen its position in its target markets. In addition, SGI is positioned to expand on its technology to grow into emerging markets.

Challenges

A strong corporate vision and strategy are necessary for success. However, they do not guarantee success. We believe that SGI faces a number of challenges in turning its strategy into corporate growth. The following challenges are common to most companies that are working to modify or reestablish their position in the market:

Companies must avoid the "perpetual planning cycle" in which a new strategy is unveiled every six months.

- **Consistency.** Companies must avoid the "perpetual planning cycle" in which a new strategy is unveiled every six months. Slow progress initially can lead both companies and investors to look for change before the current strategy has been able to gain momentum. We believe that SGI needs to concentrate its resources on its current strategy and work to show progress to strengthen the confidence of loyal customers and regain the confidence of more skeptical customers.

- **Execution.** Companies must turn their plans into products and keep on schedule. For SGI, executing on its strategy includes delivering products on time, maintaining high quality, developing a customer focus in the field, demonstrating the technical advantages of its architecture, and demonstrating the business advantages of selecting SGI as a partner.

Long-term growth requires SGI to graduate from a technology company to a strong solutions company.

- **Follow-through to larger markets.** Traditionally, SGI has succeeded in capturing "heat-seeker" markets and then moving into "opinion-leader" markets. However, the company has been less successful at pushing its product through to high-touch, early-majority markets. We believe that long-term growth requires SGI to graduate from a technology company to a strong solutions company that will move quickly to exploit its technology innovations over broader markets.

Meeting the Challenges

We believe that SGI has the internal technical resources, installed base, and expertise to meet the above challenges. The company will need to make a determined effort over the next six months to reestablish its position in the market. We believe that it is important for SGI to maintain its faith in its engineering, product development, and technical computing skills. The company has an impressive track record in bringing innovative technology to market and in setting new directions for the market. If SGI can develop a tighter customer focus in its selected market segments, then we believe the company will create a complete formula for success.

Conclusion

SGI remains deeply committed to delivering the world's leading visual and scalable computing solutions for technical and creative users. The company has a long track record of working in these industries and of

bringing high-performance computing solutions to these markets. SGI's corporate strategy is twofold. First, SGI develops and maintains close relationships with core customers. Second, the company balances internal technology innovations with industry standard technologies to bring to market cost-effective products that expand customers' capabilities. This strategy puts SGI in the best position that it has been in for quite some time.

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