ism THOUGHT LEADERS IN CUSTOMER STRATEGY

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Nvidia Contribution to the Metaverse Case Study: Providing a Solid Foundation to the Metaverse

Nvidia Corporation is an American multinational corporation and technology company headquartered in Santa Clara, CA. It was founded in April 1993 by three American computer scientists: Jen-Hsun Huang, Chris Malachowsky, and Curtis Priem. Nvidia is headquartered in Santa Clara, CA, had revenues of $27 billion and employed more than 26,000 employees at the end of 2023.

It is a software and fabless company that designs graphics processing units (GPUs), application programming interfaces (APIs) for data science and high-performance computing as well as 'system on a chip' units (SoCs) for the mobile computing and automotive market. Nvidia is also a dominant supplier of artificial intelligence (AI) hardware and software.

For more than 30 years, Nvidia has been a leader in technology innovation in the semiconductor chip industry. Here is a brief timeline of Nvidia innovations:

1993: Introduces 3D graphics to the gaming and multimedia markets.
1999: Invents the GPU, the graphics processing unit, which sets the stage to reshape the computing industry.
2006: Unveils the CUDA® architecture, which opens parallel processing of GPUs to science and research.
2012: Sparks the era of modern AI by powering the breakthrough AlexNet neural network.
2018: Reinvents computer graphics with NVIDIA RTX™, the first GPU capable of real-time ray tracing.
2022: Announces the Nvidia Omniverse platform, which plays a foundational role in building the metaverse.
2023: Creates the H-100 GPU chip, which Nvidia calls the first chip designed for generative AI. It is the most powerful and commercially accessible GPU for large-scale AI and High Performing Computing (HPC) tasks including large language models, recommenders, computer vision, medical imaging, and speech recognition.

In addition to being known for its technological innovations, in the past few years Nvidia has gotten significant attention because of its stock performance on the NASDAQ exchange. Investors that bought Nvidia stock in 2016 at $10 a share have seen Nvidia's price skyrocket 239% in 2023 and increase already 41% in 2024 to its current price of $727. Wow!

Key Nvidia competitors include AMD, Intel, and others.

Nvidia's Significant Contribution to the Metaverse: The Omniverse™ Platform

Nvidia Omniverse offering is a platform for building and operating metaverse applications in 3D. The Omniverse platform is a gateway to a 3D metaverse, which links digital and physical worlds. It comprises all the technological advances of Nvidia and connects specialists across all industries and all disciplines to enable real-time and synchronized workflows within the platform.

The standard language of today's 2D internet is HTML. For the metaverse, the standard language is Universal Scene Description or USD. Like the internet, the metaverse requires a computing platform. That platform is Omniverse, a USD platform that is both a toolkit for building metaverse applications, and a computer engine to run virtual worlds.

Omniverse is a new computing platform, and thus it requires a new computer system. There are three elements to the Omniverse computer. The first one is the RTX computer for creators, designers, and engineers. The second is the OVX servers to host connections to the Nucleus database and run virtual world simulations, including digital twin technology. And finally, the Nvidia GDN, which are like portals into the Omniverse.

Building Real-World Applications on the Omniverse Platform

Let me now briefly share with you 8 real-world applications that are built on Nvidia's Omniverse platform:

- **Amazon** operates and orchestrates a global network of warehouses that include over 200 fulfillment centers handling tens of millions of packages per day. This complex operation requires over half a million mobile drive robots to support warehouse logistics. By building AI-enabled digital twins of their warehouses using Nvidia Omniverse Enterprise, Amazon optimizes warehouse design and flow, trains more intelligent robot assistance and gains overall productivity.
- **PepsiCo** is another company with a complex network of hundreds of distribution centers. Since one billion PepsiCo products are consumed daily, improving throughput, reducing downtime, and reducing the energy consumption of their distribution centers are critical. Leveraging the Nvidia platform, PepsiCo is developing an AI-powered digital twin of their distribution centers in Nvidia Omniverse Enterprise and optimizing operations with Nvidia Metropolis and TAO.

- **Siemens** is focusing on being the leading player in the industrial metaverse. In June 2022, Siemens struck a deal with Nvidia to combine Siemens' Xcelerator digital business platform with Nvidia's Omniverse platform both to enable the industrial metaverse and to help companies design and operate metaverse applications.
- **Deutsche Bank** signed a multi-year partnership contract with Nvidia to rethink financial operations using AI technology. Leveraging Nvidia Omniverse's photo-realistic digital avatar capability, the bank has developed a 3D virtual avatar that aims to help employees navigate internal bank systems and answer staff-related questions. Soon this technology will be used to reimagine the bank's customer experience. The companies are also building a number of applications and large language models to detect fraud operations and improve services in the field of risk management.
- **Sony Pictures Animation** has made great strides in improving their pre-production workflow, allowing their artists to have greater control and creativity when transitioning their 2D storyboards into a 3D space. Sony Pictures Animation leveraged Nvidia's Omniverse platform to develop an internal application called FlixiVerse, which allows non-3D-fluent artists and directors to easily navigate a 3D environment, making better-informed creative decisions as well as significantly optimizing and accelerating the pre-production workflow.
- **Lotus Cars**, the makers of iconic British sports cars, uses Omniverse to help build digital twins of its factories to assist with optimizing its manufacturing processes, such as virtually assemble welding stations.
- **Jaguar Land Rover** (JLR) uses Nvidia's Omniverse platform to train artificial intelligence models and control algorithms for real-world driving scenarios. This allows JLR to iterate on machine learning algorithms for self-driving cars much faster than having them drive on real-world courses, putting working smart cars onto test courses in a fraction of the time.
- **BMW** is building the world's first virtual factory on Nvidia's Omniverse platform; this virtual factory is a perfect digital twin of BMW's future 400-hectare plant in Debrecen, Hungary, which is slated to produce around 150,000 vehicles every year when it opens in 2025.

Nvidia's Newest Contribution to the Metaverse: AI Innovations & Applications

Nvidia has been a leader in the field of AI for over two decades. Nvidia's current AI technology, which is at the heart of its involvement in the metaverse, is used to:

- Create virtual worlds very quickly.
- Develop virtual reality games.
- Create incredibly realistic virtual worlds, including photo-realistic avatars, allowing players to explore and experience the virtual world in ways that have never been seen before.

- Create augmented reality applications that provide users with an enhanced experience of the virtual world.
- Train GenAI for computer visioning, natural body poses, and more.
- Create data-driven applications used to analyze the metaverse and provide insights into the virtual world.
- Create virtual experiences that can be monetized, such as virtual reality games and augmented reality applications.

Nvidia Builds its Metaverse Presence Via Partnerships

Nvidia is keen to partner build out its metaverse toolset with leading technology players such as Siemens and Microsoft. Nvidia recent deal with Microsoft allows them to adopt many of Microsoft's tools within their Omniverse platform including Azure, Teams, OneDrive, and SharePoint. That will allow users to collaborate more easily in an environment they are familiar with, and shift into and out of virtual 3D worlds using the Omniverse platform.

Closing Remarks

Nvidia has made a huge commitment to the metaverse. The company is leveraging its expertise in AI to create new and innovative ways of experiencing the virtual world. From metaverse-based gaming to augmented reality, Nvidia is making it possible for people to experience the metaverse in ways like never before. By leveraging its powerful hardware, Nvidia is also revolutionizing user experience in the metaverse, and paving the way for new and exciting metaverse applications. Nvidia is also helping to create the standards, protocols, and development tools needed to make the metaverse a reality. Nvidia's Omniverse platform provides powerful tools and services that enable businesses like BMW, Siemens, Sony, Amazon, and many others to capitalize on opportunities presented by the metaverse. Nvidia's AI technology, driven in large part by its new H100 GPU chip, has the potential to transform the metaverse. While Nvidia faces a number of challenges in the metaverse including security, competition, and monetization, I am convinced this 30-year-old company, which has built its admirable reputation on technology innovation, will continue its impressive innovative approach to not only address these challenges but to also open new metaverse opportunities to all while it moves the metaverse frontier to new heights.

My Metaverse business partner, Tim Bajarin, and I are keen to assist fashion/retail companies at each step of the way to ensure their successful entry into the Metaverse. To read about additional semi-conductor and related Metaverse case studies, I strongly encourage you to visit ISM's award-winning Metaverse Resource Center – www.ismguide.commetaverse-resource-center – where in addition to gaining access to more than 300 Metaverse case studies, more than 300 Metaverse articles, and more than 100 Metaverse videos, you can download ISM's new '8 Steps to Do Business Successfully in the Metaverse' White Paper, download ISM's New

'VR Training Guide for the Enterprise,' learn about and sign-up for ISM's complimentary 2-hour Metaverse Executive Bootcamp, and more.

Barton Goldenberg (bgoldenberg@ismguide.com) is president of ISM, Inc. Since 1985, ISM has established itself as the premier strategic advisor leveraging leading edge technologies – the Metaverse, Digital Communities, and CRM – to create and implement customer strategy with a focus on sales, marketing and customer service. His thought leadership including creator of the 'Business Success in a Virtual World' podcast, creator of the award winning Metaverse Resource Center, and author of three business books including The Definitive Guide to Social CRM. He is also in high demand as a keynote speaker (www.bartongoldenberg.com).