Principia LightWorks, Inc.
(privately held)

CEO INTERVIEW
March 26, 2002

On March 22, Laguna Research Partners held an in-depth interview with Glenn H. Sherman, president and CEO of Principia LightWorks, Inc. (www.principia-optics.com), a developer of cutting-edge digital cinema projection technologies. Our interview focused on Glenn's view of the digital cinema market opportunity, Principia's milestone achievements to date, and the Company's expected timeline to commercialization.

Glenn was interviewed by Kevin B. Skislock, founding partner and senior entertainment technologies analyst for Laguna Research Partners.

LRP ▸ Good morning, Glenn. Let's start with a simple description of Principia's digital cinema technology…

Glenn ▸ Yes. Very simply, Principia is developing a proprietary, patented Laser-CRT projector [Laser-Cathode Ray Tube projector] for digital cinema.

THE DIGITAL CINEMA OPPORTUNITY

LRP ▸ I'd like to focus our talk on three primary areas. First, what is the opportunity that Principia is seizing? Second, what is the business model that Principia has developed to seize that opportunity? And, third, what sort of performance is Principia expecting to achieve once it has emerged from the development stage and entered production and marketing?

Let's start with the opportunity…

Glenn ▸ Sure. There are 100,000 to 125,000 high-end movie theaters around the world and Hollywood will spend $5 to $7 billion over the next five to 10 years retrofitting those theaters with digital cinema projectors.

LRP ▸ And what are the factors driving this retrofit?

Glenn ▸ In general, competition for the time and money that consumers devote to entertainment is intensifying dramatically. New entertainment technologies are proliferating at an astounding rate and Hollywood is locked in a battle for survival. It's counting on the brighter, sharper, and clearer images delivered by digital cinema to upgrade the movie-going experience, fill more seats and boost profits.

More specifically, digital cinema provides compelling, identifiable benefits to every segment of the motion picture business. From the standpoint of studios and distributors such as Disney, Universal and Paramount, there are multi-billion dollar per year savings on film, production, and distribution costs to be realized. On the creative side, Lucasfilm's George Lucas, a major supporter of digital cinema, has saved millions of dollars by shooting

Star Wars: Episode II on digital. He would love to release only to digital theaters—release is scheduled for May 16—because he's convinced his work looks better there. In May 1999, *Episode I* premiered on 2,970 screens. *Episode II* is expected to have an even broader release, but there will be fewer than 100 digitally equipped screens up and running by that time. If we're lucky, *Episode III* will be released on thousands of our Laser-CRT projectors!

For exhibitors, digital cinema will enable significant revenue and profit streams from alternative content such as sports events, live plays and concerts. Imagine watching the Super Bowl on the big screen at your favorite local theater. Things like this are already happening. In Toronto, for example, one night mid-week, when seats are usually empty, several theaters double or triple ticket prices and fill their seats with rabid World Wrestling Federation fans. And in London, recently, cinema patrons paid a large premium to watch a digital showing of a live Broadway play. They loved it, and 90% of them said they'd be back. Depending on who finances the placement of digital cinema projectors, alternative content could be a huge boon to entertainment industry participants beyond exhibitors.

LRP ▸ What does it cost, Glenn, to do a digital cinema retrofit?

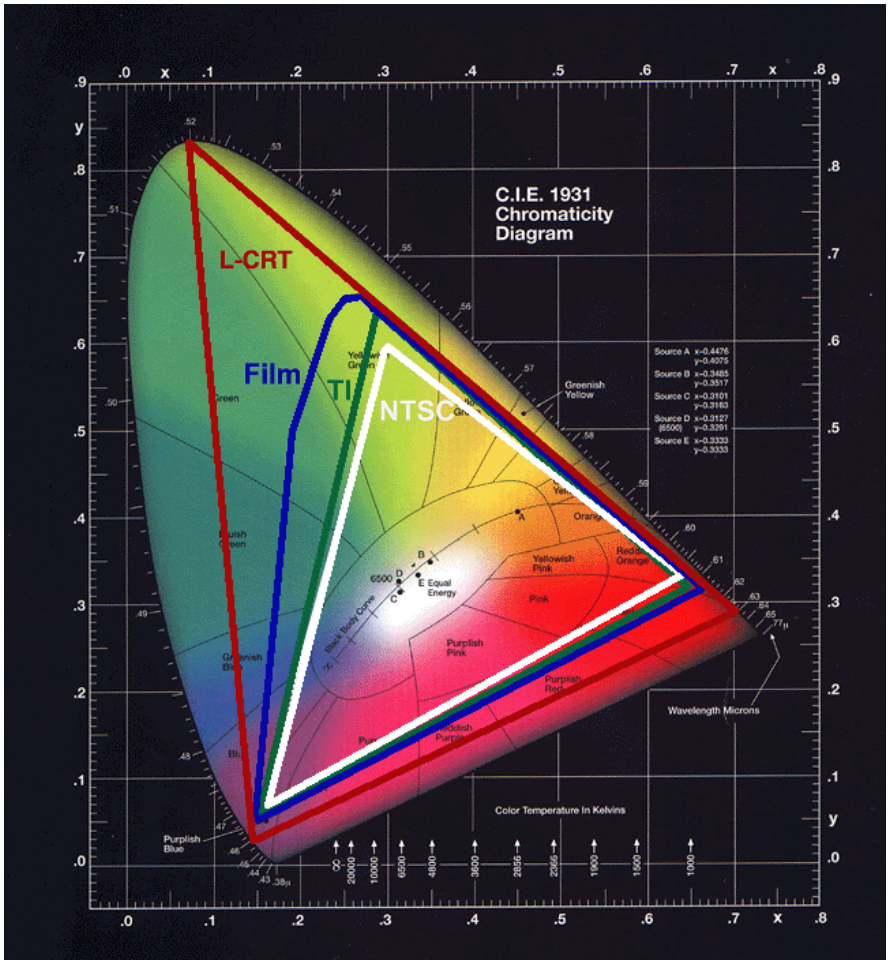
Glenn ▸ Pure and simple, $150,000 for the today's low resolution, 1.4 million pixel projectors just doesn't make economic sense. Until there's a $50,000 projector with the look and feel of movie film, digital cinema will languish.

Principia's proprietary Laser-CRT projector has 3 million pixels and brilliant saturated colors only available with lasers. It will sell for $50,000. When our product is ready, digital cinema will take off! Our Laser-CRT combines the beauty of laser images with the low costs, high resolution, and reliability of CRT technology. Superior images at half the cost… That's a recipe for rapid market penetration and explosive growth.

LRP ▸ And image quality?

Glenn ▸ This picture [please see Figure I] shows the broad color palette of our Laser-CRTs. The area inside the white triangle shows the colors that can be achieved with TV phosphors and regular projectors. The green triangle, just slightly larger, shows our

Figure I
Principia LightWorks, Inc.
Competitive Comparison: Principia L-CRT versus Film, Television and Digital Cinema Projector Competition



Source: Principia LightWorks, Inc.

competition. The blue is movie film. As you can see, our Laser-CRT, outlined in red, is far superior to all of these.

LRP ▸ You mentioned the high price of digital cinema projectors earlier, Glenn, as being a hurdle to new placement activity. At the same time, though, we've already been seeing some digital projector placements…

Glenn ▸ That's right. Even with the present high prices, digital cinema is beginning to take off, as early adopters jump in and companies like Qualcomm, Technicolor, and Boeing, who all have a stake in some aspect of digital cinema, try to accelerate the market with heavily subsidized installations.

LRP ▸ Let's talk about the players in the digital cinema projector space, particularly TI and Kodak…

Glenn ▸ It's just my opinion, but Hollywood creative types don't seem to be real happy with Texas Instruments' projectors, probably because the 1.4 million-pixel resolution is too low and the $150,000 price is too high. And the path to 3 million pixels and ultimately 8 million-pixel resolution that Hollywood wants looks to me like it might be very costly for TI, so it might be difficult for them to lower prices. We're already at 3 million pixels, and our upgrade path is simple and inexpensive. And to get the colors they need, TI looks to me like it might have to use very large, expensive xenon lamps that have poor lifetimes, increasing recurring costs. Theater owners probably won't be happy with this. The 10 to 20 times better lifetime of Laser-CRTs should give us another great competitive advantage.

Kodak uses JVC's DILA [digital image light amplification] liquid crystal technology, which depends on the same large xenon lamps. I expect that they'll have even more difficulties because liquid crystals waste more of the light generated. Liquid crystals have aging problems in high light environments, so lifetime and maintenance could be issues. I expect that all of this could lead to a high price per unit for this technology as well.

There are others, such as NEC, Panasonic and Sony, and I expect that each has the same or similar problems. We consider TI's licensees and Kodak as our main competition.

THE BUSINESS MODEL: Principia LightWorks, Inc.

LRP ▸ What is the source of Principia's underlying technology?

Glenn ▸ The Laser-CRT was invented by Nikolai Basov, who shared the Nobel Prize for the laser, at the Lebedev Institute, Russia's premier research facility. Principia has a worldwide exclusive license, and exclusive access to their laser crystal technology. Principia is also protected by 10 patents, and we have the 20 years of know-how of our Lebedev partners. And we interact with them on a daily basis.

LRP ▸ And what was it that got you involved in this project?

Glenn ▸ It's almost as if my entire career has been in preparation for this product.

First, Principia's fundamental technology is based on II-VI semiconductor technology, which I learned early in my career at II-VI Incorporated.

Second, our digital cinema technology requires a strong understanding of advanced precision optical polishing and thin film coating technologies, which were our strengths at Laser Power Corporation, the company I founded in 1979 and took public a few years ago. It also requires a good understanding of solid state lasers and laser projectors, which were additional strengths of ours at Laser Power.

And, finally, during my stint as CEO at Christie Digital, I learned the cinema industry. I was actually the one at Christie who signed the contract to become the first licensee of TI's DLP [digital light processing] Cinema technology.

LRP ▸ How long, Glenn, before Principia has a product to market?

Glenn ▸ Here's where we're at today.

Our Russian partners have completed a great looking demo, but it uses big, heavy Laser-CRTs with liquid nitrogen cooling and very high voltage, so they're not commercially viable.

At Principia, we've developed the first-ever room temperature, low voltage Laser-CRTs, and we have a proof-of-concept projection demonstration. We believe it will take us about a year to turn this demo into a product ready for the market. A year after funding, that is.

LRP ▸ Once you're in production, Glenn, how will you make money from this technology?

Glenn ▸ In order to maximize our profit potential and minimize our risk, we plan to pursue opportunities in both sales and licensing.

First, we plan to make sales of our digital cinema projectors either directly to exhibitors or, preferably, to conventional projector manufacturers seeking a digital cinema product line. We also will sell our projectors into other high-end applications such as simulation, rental staging, auditoriums, board rooms, etc.

Second, we expect to have significant sales and profit opportunities in licensing. Once we have a proven product, we think that some of the big names in consumer electronics—companies like Mitsubishi, Sony, NEC, Panasonic, Thomson, and so forth—will be excellent candidates to license our technology for high volume applications like home theater.

Performance

LRP ▸ What's your sales potential over the first several years of production?

Glenn ▸ I mentioned earlier that there are up to 125,000 high-end movie theaters around the world and Hollywood will spend $5 to $7 billion over the next five to 10 years retrofitting those theaters with digital cinema projectors. With very modest market penetration, less than 4%, in five years we estimate that we can grow to $141 million in sales, with very good gross margins and profitability. As our production runs increase and our prices decline, I expect that we'll be able to increasingly tap into the broader worldwide projection market. And as I mentioned just a moment ago, we also hope to be collecting substantial licensing fees.

LRP ▸ How much capital has been put into the Company to date?

Glenn ▸ About $1.3 million was raised by the company's founder from angel investors such as Leonardo DiCaprio and Stone Gossard of Pearl Jam.

I joined the company a little over a year ago and was able to raise another million in a very tough environment, from angel investors such as Dr. Don Scifres, Co-Chairman of JDS Uniphase, and Dr. John Goode, retired Dean of the business school at DePaul University.

LRP ▸ What is it going to take to get you into production and sales?

Glenn ▸ We need $4 million to turn our demo into a product and build up our manufacturing infrastructure. In the year after that, we'll need another $4 million to ramp up production and continue building up infrastructure.

LRP ▸ And, finally, what about your exit strategy?

Glenn ▸ I just mentioned some of the big players—Mitsubishi, NEC, Sony, Thomson, and others—who might be interested in licensing our technology for high volume applications like home theater. Many of them would also like to have a position like Kodak, JVC, and TI in digital cinema, so I think that any one of these are examples of companies that might want to acquire us once we have a proven product.

LRP ▸ Thanks for taking time to talk with us, Glenn.

Glenn ▸ My pleasure. Thanks for your interest in Principia.

Bio ▸ Glenn H. Sherman (glenn92014@aol.com)

Glenn H. Sherman, Ph.D. is President and CEO of Principia LightWorks, Inc., an early stage company developing proprietary Laser-Cathode Ray Tube projectors for digital cinema. Principia is based in Carlsbad, California.

Dr. Sherman most recently was President and CEO of Christie Digital Systems, Inc. ($130 million to $140 million in sales), the premier manufacturer of movie film projectors, high-end digital projectors, and the first licensee of Texas Instruments' DLP Cinema technology. He was hired in 1999 by Christie's Japanese parent, Ushio, Inc., to take Christie public, but the subsequent financial problems of the theater exhibitor industry prevented the IPO, and in December 2000 he left Christie to join Principia.

Previously he was the founder (in 1979) and CEO of Laser Power Corporation (LPC), building it to the $35 million to $40 million revenue range and taking it public; the company was subsequently sold to a competitor. LPC had manufacturing operations in San Diego and Temecula, California, Tijuana, Mexico and Gent, Belgium. LPC manufactured blue, green and infrared micro-lasers used in medicine, industry, projection display, and telecommunications, and optics for high-power industrial, medical and military lasers and night vision systems. During the early 1990's LPC won many government sponsored research contracts for laser projector development; it was then that Dr. Sherman developed a keen interest in digital cinema, believing it to be the natural market for laser displays.

LPC's core business was polishing and coating crystal materials very similar to Principia's laser faceplates, and Dr. Sherman is a leading expert in the technology. He was active in all phases of LPC's business, including manufacturing, marketing and sales, engineering, research and development, and finance. During the course of building the business, he acquired five companies (including one in Belgium), he built a low cost manufacturing facility in Mexico (under the Maquiladora program), and he attracted major corporate investors, including projector manufacturer Proxima and Union Miniere, part of the largest company in Belgium.

Prior to founding LPC, Dr. Sherman spent seven years with start-up II-VI, Inc., where he served as Vice President, Sales and Marketing. While at II-VI, he organized and developed their high power laser thin film coatings capability, participated in development of their optical polishing capability and was responsible for new product development. He led II-VI through a thirty-fold growth in sales volume during his tenure as VP Sales and Marketing, from just past start-up to the $3 million to $4 million range, before leaving to found LPC.

Dr. Sherman earned three degrees from the University of Illinois at Urbana-Champaign (UIUC): BS (with honors), MS, and Ph.D., all in electrical engineering. In 1990, he received the Distinguished Alumnus Award from the UIUC Department of Electrical and Computer Engineering.

In 1985, Dr. Sherman was the founding President of the Lasers and Electro-Optic Manufacturers Association, the laser industry's first trade association, and served on its Board of Trustees until 1996. He has served on the board of the International Forum for Corporate Directors and on the boards of several small southern California high tech companies.

Bio ▸ Kevin B. Skislock (skislock@LRPonline.net)

Kevin Skislock is Founding Partner and CEO of Laguna Research Partners LLC. He also serves as the Firm's senior entertainment technologies analyst.

Kevin has 28 years of experience as a Wall Street stock analyst. Nearly half of his career has been spent analyzing stocks for leading buyside money managers including Citibank, N.A., a division of CitiGroup, and Wellington Management Company. On the sellside of Wall Street, he has analyzed stocks for the institutional and retail investment clients of firms including a "research boutique" subsidiary of Paine Webber, Inc. and Dain Raucher Wessels, Inc.

Having served as a Director of Investment Research and Investment Strategy Committee member on the buyside of Wall Street and a Director of Investment Research and Commitment Committee member on the sellside, Kevin is respected for his insights regarding the effective development and execution of business models across all sectors of the economy. He takes an active role in the creation and development of new business enterprises, often serving as a Director or Advisory Board member.

Kevin has been recognized by *Institutional Investor* magazine in their "Best of the Buyside" rating of Wall Street's buyside analysts. He has appeared on *NBC Nightly News with Tom Brokaw*, CNBC's *Market Wrap*, CNBC's *Business Center* and *The Wall Street Journal Report*, and is quoted widely in the general and financial press. He holds a BS degree in Economics from Villanova University in Villanova, Pennsylvania. He earned his MBA at The University of Chicago.

Companies mentioned in this Interview ▸

Boeing Company, The (BA-NYSE)
Disney Company, The Walt (DIS-NYSE)
Eastman Kodak Company (EK-NYSE)
II-VI Incorporated (IIVI-NASDAQ)
Lucasfilm Ltd. (privately held)
Mitsubishi Corporation (8058-TSE)
NEC Corporation (NIPNY-NASDAQ)
Qualcomm Incorporated (QCOM-NASDAQ)
Sony Corporation (SNE-NYSE)
THOMSON multimedia (TMS-NYSE)
Texas Instruments Incorporated (TXN-NYSE)
Victor Company of Japan, Limited (6792-TSE)
World Wrestling Federation Entertainment, Inc. (WWF-NYSE)

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