

OIDA News

Optoelectronics Industry Development Association

— Our 12th Year of Service —

Workshop Envisions OE's Future:

Designers Are Urged to Reduce and Integrate

An optoelectronics future rich in promise emerged from OIDA's "Future Vision" workshop in Rochester, N.Y. on Oct. 30-31. Looking ahead two de-cades, 85 participants assessed products and technologies deemed likely to disrupt the status quo in applications as disparate as health care and warfare.

To accomplish these advances, however, they were repeatedly reminded of the importance of cost reduction, size reduction, and integration of components and functions.

Monolithic modules

Reporting on trends in components and modules, Fred Leonberger of JDS Uniphase described the evolution from discrete elements to hybrid and, eventually, to monolithic systems on a single platform of a single material, manufactured on wafer scale. An affordable, hybrid-integrated tunable-laser module, for example, will feature a wavemaker, digital control electronics, output power around 13 dBm, high side-mode suppression ratio, and tuning ranges across the entire C-band between 1529.55 and 1563.86 nanometers in channels that are only 50 gigaHertz apart.

Integration is introducing a need for new metrics, Leonberger continued. Whereas the quality of lightwave transmission is traditionally described in gigabits transmitted per second per kilometer, the new metrics for a sub-system module must also reflect the need to minimize size, cost and power dissipation.

Improvement in testing was emphasized by Theresa Sze of Sun Microsystems. She cited system cost as a principal

(See Vision, page 4)



OIDA Chairman David R. Smith of Kodak, left, with former Chairman Don Keck, recently retired from Corning, at OIDA's Future Vision Workshop in October.

Young Companies Describe Their Survival Strategies

Most of OIDA's Annual Forum on Nov. 20 and 21 was devoted, as usual, to such longer-range considerations as a decades-ahead vision for optoelectronics and to road maps for getting there. But the dramatic focus was on the shorter-term challenge of survival in a time of industry recession and legislative uncertainty.

In a session organized by David Krohn, of investment firm Light Wave Venture, 10 emerging companies reported on their survival strategies over the past two difficult years. Some firms did better than survive; at least one managed to double its size, Krohn reported.

Common elements of success

The case histories contained a few common elements: determination to bring down cost; devotion to customer

(See Forum, page 6)

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Spur to Broadband Could Aid Telecom Rebound



Is recovery finally in sight? If you were to pose that question in South Korea, a likely response might be, "Recovery from what?" While the U.S. communications market experienced the biggest decline in history, South Korea's optical communications industry, albeit significantly smaller, has grown steadily, reducing

imports and increasing exports.

Besides a generally growing communications business, Korean telecom carriers have introduced broadband access to the largest number of subscribers (per capita) among developed countries, at a very affordable rate, \$38 a month. The reason this is important is that broadband, especially access to the residential and small business customer, is likely to be the next key technology leading a return to growth of the communications industry worldwide; it's a trend we need to embrace here.

For much of OE, the worst seems past

Is a recovery in sight for U.S. communications companies? The answer, we think, is a qualified yes. In other areas of optoelectronics the worst already seems to be over, as pointed out elsewhere in this issue of *OIDA News*.

Several trends point to a communications turnaround as well: Surplus equipment is being exhausted, and prices in key market sectors have stopped falling. New orders for telecom equipment appear to have stabilized at levels about 60% of those at the peak of the bubble. In November, telecom stocks gained 11% compared with 3% for the S&P 500.

The bad news today is that significant broadband deployment has not happened in the U.S. despite our access to the most advanced communications technology in the world. The good news, on the other hand, is that there are precedents, in Korea and elsewhere, that the U.S. can emulate.

At an SPIE conference in Shanghai in October, Dr. Yoshiaki Nakano, a professor from the University of

Tokyo, said that he recently upgraded his broadband access at home from 10 Mbs to 100 Mbs—for \$58 a month. His action suggests that there are applications or performance enhancements available to take advantage of that bandwidth; these new ways of using the net will most likely flourish in any country that provides the infrastructure. So, at least in part, the infighting among the carriers and the delayed introduction of "true" broadband in the U.S. not only punishes suppliers to the optical communications industry, but may also undermine our position in software and peripherals affecting many applications.

The benefits of "true" broadband (10-100 Mbps) have been described, for example, in a white paper supporting legislation (S2582, the National Broadband Strategy Act of 2002) that Sen. Joseph Lieberman introduced during the last session of Congress. This bill is one of many that attempted to improve the situation in the U.S.

OIDA and its membership will continue to urge action by the administration and Congress to provide incentives for the introduction of true broadband. In the

short term, the best course is to encourage helpful administrative ruling changes by the FCC. At its Nov. 22 meeting, OIDA's board of directors voted to join the Fiber to the Home (FTTH) Council's effort to persuade the FCC to remove the unbundling requirements on the incumbent local exchange carriers (ILECs) for Fiber-to-the-Home deployments.

While this effort is narrowly focused on FTTH, it's straightforward, limited appeal may have some chance of rapid implementation and could get orders for optical communications equipment and components moving again.

The government, both Congress and the administration, should latch onto these legislative and regulatory opportunities to stimulate new growth. If they do, we believe the recovery could be spectacular. ■

— Arpad Bergh

"Freeing the ILECs from unbundling requirements for fiber to the home could speed the deployment of true broadband services."

Outlook:

Analysts Expect a Slow, Uneven Recovery

The optoelectronics industry seems poised to begin a slow but steady worldwide rebound later this year. This will follow a 20% plunge in component sales in 2001 and an even steeper descent in 2002. Orders for OE-enabled products other than communications equipment, which declined only slightly in 2001, appear to have stabilized in 2002. Sales of communications equipment, in contrast to computer peripherals and displays for example, all but collapsed.

No analyst included in OIDA's study expected a quick return to the status of three years ago, either in the size or shape of the market. The association's third-quarter market update, based on outside analyses, was presented Nov. 22 to OIDA's Board of Directors by Fred Welsh, the association's executive director.

Telecom jobs down 40% in U.S.

While he didn't predict the rebound's speed, Welsh gave a somber outlook for U.S. jobs and market share. With layoffs in telecommunications—the largest OE sector—already approaching 40% of the U.S. production workers in that application, and with shipments down 42% in two years, he warned that the American industry may miss much of the coming “modest recovery” in optical communications as volume production and jobs move to the Far East. Telecom imports have exceeded exports since 1999, he continued.

Welsh presented some of the data earlier, on Nov. 14 at a conference at Boston University's Photonics Center, and on Nov. 7 at the University of North Carolina in Charlotte. At the Boston meeting Patrick Nettles, chairman of Ciena, estimated the losses from telecom's market peak in 2000 at 560,000 jobs and \$2.4 trillion in market capitalization, more than 92% of the market capitalization of nearly three years ago. He predicted a further downturn in capital spending this year.

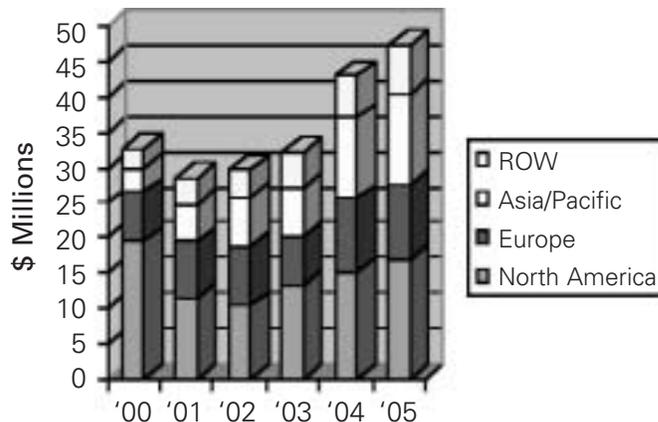
'Modest recovery' in optical telecom

Optical communication appears to be returning to favor abroad, Welsh said. But sales in North America aren't expected to bottom out until later this year. Fiber cable won't immediately share in the upturn, however. Despite significant price declines, new installations fell

37% last year and are expected to increase only 7% this year and next, to about 70 million fiber-kilometers per year.

In service revenues, one bright spot is cable telephony, where global revenues grew nearly 50% last year to

Further Gains in Optical Telecom



Analysts expect a slight upturn that began last year to accelerate sharply in 2004. Source: RHK

\$3 billion. Analyses summarized by Welsh predict another 30% increase this year, to \$3.9 billion.

Growth despite everything

If the near-term future of telecom for U.S. suppliers remains dim, other applications of OE are more promising. Revenue growth never stopped in storage or imaging, and fell only briefly for displays; in all three applications, growth is expected to accelerate this year and next.

In lean times as well as good, digital imaging has continued to grow vigorously. Sales of digital cameras, which surpassed film cameras in revenue in 2001 forged ahead in unit sales last year.

In addition to digital imaging, prospects are good for networked storage. These applications combine with others in what Kodak calls “infoimaging.” The company estimates this to have been a \$225-billion activity in 2001,

(See Outlook, page 5)

A sobering outlook for U.S. jobs and market share

Vision

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deterrent to bringing OE inside computers to take advantage of the technology's clearly superior speed. A key element of the whole system cost is testing, which can constitute more than 70% of total manufacturing cost for certain products, she reported.

Optical biopsy

For the huge and growing field of health care, biophotonics was hailed as a powerful enabler and a means of controlling costs in diagnosis and even treatment.

Paul Roehrenbeck of the City University of New York reported that non-invasive optical biopsy can be incorporated into endoscopes and needles using fiber optic technology. Use of light instead of an ionizing radiation such as x-rays requires no tissue removal and produces results in real time, without need for analysis in outside laboratories.

Jeff Hall of Genoptix described laser applications in cell biology, for detecting and typing such problems as bacteria, viral infection and yeast mutants in the cell's natural environment. The radiation's nondestructive quality allows retesting and manipulation, as well as sorting and harvesting for future examination.

Sadik Esener of the University of California at San Diego noted benefits of biochemical sensing, including security and environmental protection.

For military and homeland security applications, displays and advanced imaging are powerful tools. For the most dramatic contribution, night-vision capability, immediate needs include expansion of field of view and

resolution improvement to 2100 by 600 pixels from the present 400 by 400 and the 900 by 400 in development, reported Darrel Hopper of the Air Force Research Laboratory.

Wearable displays on glass or silicon substrates require greater luminance range for both daytime and nighttime

Defense and Security Opportunities

Technology Need	Optoelectronics Opportunity	Competing Technologies
Image sensing	Focal plane arrays at various energy bands	
Biometric sensing	Fingerprint/retina identification	
Wireless network	IR links; steerable optical beams	RF links
Chem/bio sensing	Optical sensing: absorption, fluorescence, spectroscopy	Acoustic, magnetic, microstructure
Image correlation	Optical processing; optical interconnects; optical memory	Copper interconnects; magnetic memory
Data mining	Optical memory/interconnects	Copper; magnetic memory
Data base search	Optical networks; optical interconnects; optical memory	Copper; magnetic memory
Automated translation	Interconnects	
Displays	Liquid crystal; LEDs/lasers; OLEDs; fiber links	

Source: Honeywell

operation, as well as smaller size, weight and power consumption. Longer-term goals include flexible displays, first of plastic, later of cloth fibers impregnated with smart pixels and sensors, where nanometer-scale intelligent pixels are connected wirelessly. ■

How OE Can Bring a Battle Site to an Operations Center

Air Force Research Lab will spend \$20 million over five years to allow a site of interest to be viewed at a command post in real time.

Source: Air Force Research Laboratory



PTAP Open for Business:

Universities Receiving Advanced OE Devices

The Photonics Technology Access Program is off and running. As of early November, 21 proposals had been received in response to OIDA's solicitations, and 5 transactions were already under way between industry and academia.

This month, talks will begin with a Canadian counterpart interested in a partnership with PTAP.

The U.S. program, operated by the association for cosponsors the National Science Foundation and DARPA (Defense Advance Research Projects Agency), makes state-of-the-art, precommercial technology available for use in academic research and teaching.

Streamlined procedures

Benefiting from experience gleaned during the recently-completed U.S.-Japan Joint Optoelectronics Project [*OIDA News* Sept 2001 p1], the association has adopted simpler procedures for PTAP. Instead of contracts, for example, agreements follow only guidelines. "It's pretty much an honor system," says Marko Slusarczuk, the program's coordinator and a former con-

tract attorney. Maximum length of a proposal is three pages plus appendices and a one-page summary. And proposals prepared by students are encouraged.

Where intellectual property is an issue, OIDA facilitates discussions between parties, but is not a participant. One goal, Slusarczuk concedes, is to sidestep drawn-out approval procedures and legal departments.

The program won't be confined to the United States. When it goes international, Slusarczuk says, OIDA's first partner will share a common language, time zones and culture with the United States. Negotiations are scheduled to begin this month with the Canadian Microelectronics Corp., a not-for-profit organization that has been providing industrial microelectronic technologies to universities since 1984 through partnerships with industry and government.

The mechanisms and procedures developed with the Canadian partner will serve as the framework for other international partnerships.

Information is available by phone at 202-785-4426 or at <http://www.oida.org/PTAP>. ■

Outlook

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including \$136 billion in media and services and \$13 billion in optical disk drives.

In storage, digital videodisk (DVD) players have outsold video cassette recorders (VCRs) for two years, and their lead is expected to widen as rewritable and high-density DVDs based on blue lasers move into the marketplace sometime in the future.

And a global shift from direct-attached to networked storage presents an attractive opportunity for fiber optics.

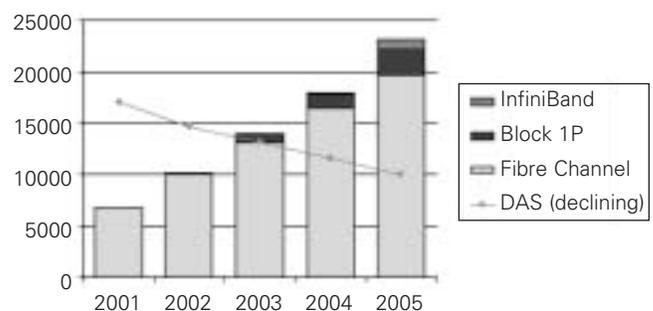
One component whose sales turned upward again last year is the high-brightness LED. After leveling off in 2001, sales turned upward slightly last year and the gain is expected to accelerate in 2003, spurred by a variety of applications [*OIDA News* Oct p3].

Rx for a healthy industry

Welsh offered a three-step prescription to restore health and domestic strength to the U.S. industry:

- Stimulate broadband applications by improving incentives for investment and easing regulatory problems;

The Shift to Networked Storage



Trend away from direct-attached storage presents opportunities for fiber optics.

Source: IDC

- Improve the manufacturing infrastructure to reduce costs through such measures as standardization and emphasis on "design for manufacture;" and
- Foster emerging OE technologies and applications. ■

continued from page 1

service and product quality; rapid, ruthless right-sizing, usually downward, while less-successful competitors remained too long in a bubble of irrational exuberance; and market diversification for common products, typically developed for tele-communications and most commonly applied as well to defense and health care.

Some of the goals, notably customer service, are universally recognized in the abstract but often flouted in practice, Krohn observed.

The young companies' appearances at the forum paid off, Krohn said after the meeting. Each reported receiving at least one good lead, and all expressed interest in returning next year.

OIDA's year reviewed

On longer-range issues, a review of OIDA's roadmapping activities covered the Future Vision study reported elsewhere in this issue; smart sensors and intelligent systems [OIDA News Oct p1]; cost reduction and photonics

Emerging firms find sales prospects among attendees at Forum

manufacturing [OIDA News July p1]; and solid-state lighting [OIDA News July p6].

And a review of OIDA initiatives presented status reports on the Next Generation Lighting Initiative and the Photonics Technology Access Program. PTAP's progress is reported in a separate article in this issue.

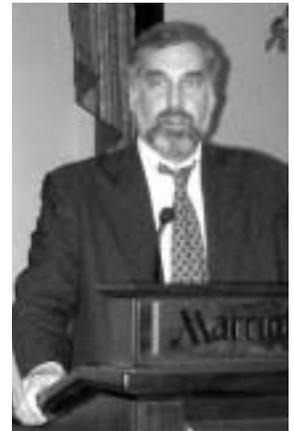
Spotlight on broadband

The lighting initiative [OIDA News Jan 2002 p3], however, failed to receive legislative approval in the just-ended session. The 107th Congress adjourned without voting on the Department of Energy budget, which encompassed the lighting initiative. The new, 108th Congress will now consider the measure.

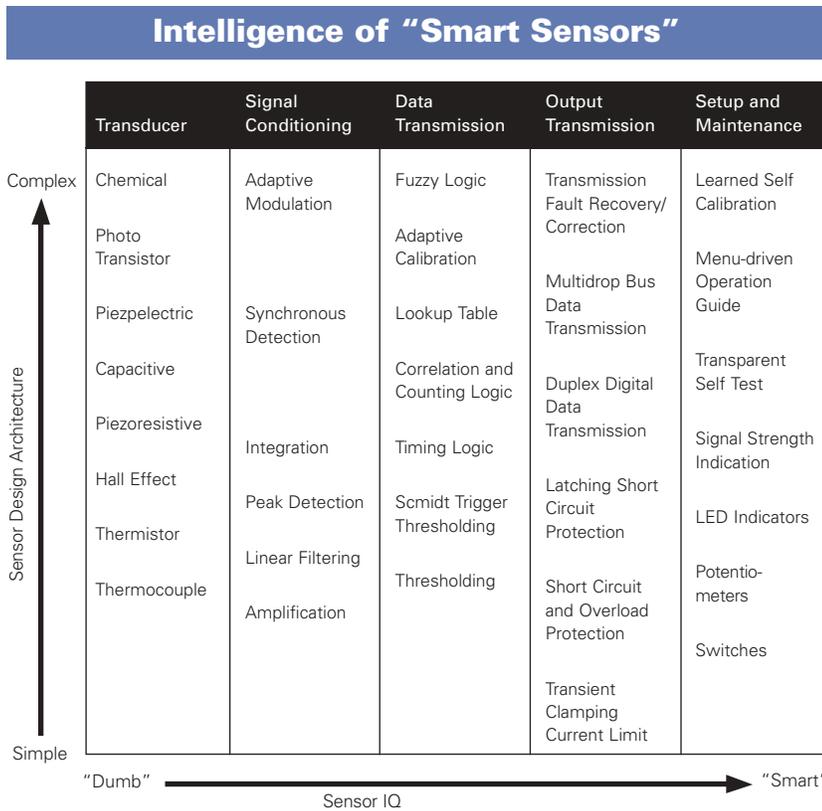
A session on science policy concentrated heavily on prospects for a national program to encourage faster adoption of broadband communications. Also featured were reports on OE programs at the Defense Advanced Re-search Projects Agency (DARPA), and on the National Science Foundation's (NSF) cooperative programs with industry and academia.

David Goldston of the House Committee on Science described several of its activities over the past year that will help to advance technology, including OE. That committee wrote a significant portion of the Energy bill (H.R.4) which contained the authorization for the next generation lighting initiative among other measures promoting energy efficiency, renewable energy technologies, and other goals to improve the national self-sufficiency and security. He also described the new Homeland Security Advanced Research Projects Agency, intended to make science and technology a priority in the war on terrorism.

Both days of the forum featured short talks and poster sessions displaying results of university research supported by DARPA and NSF. ■



David Goldston, chief of staff for the House Science Committee, addresses the Forum.



The relative complexity and "IQ" of various sensor configurations.

Source: Juds, S.M., Towards a Definition of Smart Sensors, Sensors, July 1991

Lighting Consortium:

19 Members Awaiting Action by the Incoming Congress

While Congress, preoccupied with terrorism and Iraq, was running out of time to pass an energy bill in the session that concluded at year-end, industry and the research community were fulfilling their side of a proposed bargain on “next-generation lighting.” They created a consortium of companies and laboratories to work with the Dept. of Energy (DoE) on developing solid-state lighting [*OIDA News* Jan 2002 p3].

The program was included in a broader energy measure that expired without a definitive vote. The bill is expected to come up early in the new session of Congress.

DOE would pay 80%

The consortium has 9 contributing members: AXT, Corning, Dow Corning, Emcore, General Electric, Gelcore, Lumileds, Philips and Universal Display. Its 10 associate members are Arizona State University, Boston University, Kent State University, Los Alamos National Laboratory, the National Electrical Manufacturers Association (NEMA), the National Renewable Energy Laboratory (NREL), Pacific Northwest Laboratory, Permlight, Sandia National Laboratory and the University of New Mexico.

Under a structure proposed in the bill last year, 80% of the research would be sponsored by DOE, the rest by participating companies. Decisions about sponsored research would be made by a Consortium Governing Council, with representatives of industry and government. The program would be administered by a newly-incorporated entity, the Advanced Lighting Management Corp., an affiliate of OIDA.

\$10B in light sources alone

The new lighting, based on light-emitting diodes or organic light-emitting devices (OLEDs), would clear away the last stronghold of the vacuum tube. The potential market is estimated at \$14 billion for light sources alone, in addition to new types of fixtures, which will probably constitute a much larger market.

Savings would be enormous: in power consumption, environmental damage, and maintenance due to longer light-source lifetimes. The most dramatic applications could be in architecture, where colors and configurations could be changed easily. ■

New Members:

Calient, Panasonic Lab and Optical Horizons Join OIDA

Calient Networks in San Jose, founded in March 1999, develops all-photonic switching systems and software. Engineering and manufacturing are conducted in Santa Barbara, Calif., with MEMS (micro-electro-mechanical systems) design and production in Ithaca, N.Y. Its president and chief executive, Charles Corbalis, is a pioneer in frame-relay and fast-packet services.

Panasonic Boston Laboratory in Cambridge, Mass., develops manufacturing processes based on use of ultrashort-pulse lasers. The lab is managed by Panasonic Technologies, the research arm of Matsushita.

The third new member, Optical Horizons, is based in Boston, with a laboratory in West Los Angeles. ■

OIDA's Coming Events

January 16	OIDA Steering Committee Meeting	Washington, DC
April 22-23	Workshop: Broadband to the Home and Small Business	Palo Alto, CA
April 29	OIDA Executive Committee Meeting	Washington, DC
July 16-17	Workshop: LED Roadmap Update	Santa Barbara, CA

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