One of the key influences in the development of the semiconductor industry was the emergence of groups such as International Sematech (Austin, TX) and Semiconductor Equipment and Materials International (SEMI; Mountain View, CA). As that industry matured, it derived significant benefits from having designated focus groups to develop technology roadmaps, measure market forces, create standards to facilitate automation, and lobby for legislative support. Now, the photonics industry is following suit with the formation of the Photonics Manufacturers' Association (PMA; see oemagazine, May 2002, page 16).

The PMA has been formed as a new council within an established trade organization, the IPC (Northbrook, IL; originally the Institute for Printed Circuits), which is an official standards-development organization. Its recent merger with the Surface Mount Equipment Manufacturers' Association (SMEMA) has also brought manufacturing equipment to the forefront of its mission, making it a good fit for the needs of the PMA and enabling the PMA to quickly take on a number of important initiatives to help organize the burgeoning photonics supply chain.

developing standards
When industry insiders speak of market recovery, there is a general consensus on two points: the need for cost reduction and the need for scalable production. Both of those requirements point toward automation as a solution, but automation is only viable if, as in the semiconductor industry, the component and module manufacturers don't have to become automation specialists themselves but can purchase equipment from third-party suppliers. Those automation suppliers must have standards to work to, however, just as component and module manufacturers must have standards to test to.

Standards are essential for healthy industry growth and cost reduction, so many standards-writing efforts related to the photonics industry are already underway. For example, the IPC has initiated an "umbrella standard" document, IPC-0040, which provides a background and structure for creating manufacturing, test, and measurement standards. In addition, several groups organized by the National Electronics Manufacturing Initiative (NEMI; Herndon, VA) are working to develop specific standards in several important areas, including automated fiber handling, package-to-board
soldering, fiber splicing, connector quality and performance, optical adhesives, and optical backplanes. Many of these efforts will likely connect to the IPC-0040 document structure for eventual dissemination since NEMI does not develop standards itself but rather provides an optoelectronics roadmap that typically spurs other groups to develop them.

At the 2002 Photonics West conference (San Jose, CA), SPIE ran a Manufacturing and Automation Forum that featured sessions on both technology and standards development. In addition, the Optoelectronics Industry Development Association (OIDA; Washington, D.C.) is running workshops on manufacturing automation and cost-reduction technologies to help identify standards, direct government policy, and develop technology roadmaps.

**building a standard**

Standards efforts are initiated from a variety of sources and then formalized through standards development organizations (SDOs) like IPC, the Joint Electron Device Engineering Council (JEDEC, part of the Electronic Industries Alliance), the American National Standards Institute (ANSI), the International Engineering Consortium (IEC), and others. Typically, needs for standards are initially identified, articulated, and prioritized through roadmapping activities throughout the industry (see figure). In photonics, NEMI, OIDA, and IPC are several of the most active organizations driving formal roadmapping activities. Out of these efforts, small working groups are formed on a volunteer basis to develop a working draft of the standard.

At some point early on, the group would apply for sanctioning from one of the SDOs; this typically involves submitting a description of the proposed standard, a scope of work, and a list of group personnel dedicated to the development. Approval of the application gives the group a standards structure to work within and a formal channel for eventual approval and publication. Once the draft is complete, the SDO submits it to industry for review and comment, incorporates the comments, and releases the standard; this part of the process typically takes four to six months.

Alternatively, a group of manufacturers may get together independently to agree on a “standard” for form factor, electrical interfaces, or other important functional or geometrical specifications. These multi-source agreements represent voluntary guidelines that enable the collective customers of the group to buy from multiple sources. It is important to note that most, if not all, standards are voluntary, but adoption of the standard typically has strong consequences regarding market acceptance of products.

It is imperative that the PMA show early, tangible results for its efforts. With a coordinated approach, we expect to achieve several key milestones this year that should help enhance the photonics manufacturing industry overall. We are working on staffing of the steering committee and subcommittees within the PMA Council and recruiting of PMA membership. We expect to complete the NEMI 2002 Optoelectronics Roadmap Update. We will hold OIDA workshops on cost-reduction technologies and manufacturing automation. The IPC will publish its IPC-0040 umbrella standard for optoelectronic manufacturing. We hope to develop and deploy at least one standard that comes out of NEMI working groups focused on specific manufacturing areas and publish it within the IPC-0040 document structure. And we will create an IPC/PMA website to link together industry efforts and connect members.

**organization**

The PMA leadership will consist of a steering committee of approximately 10 representatives from the equipment, materials, and services sectors, as well as at least one executive from the IPC. The steering committee will appoint subcommittee chairs to recruit and staff subcommittees as appropriate to address council issues.

Four subcommittees are planned to start with: Roadmapping; Standards, Guidelines and Specifications; Industry Metrics/Statistics; and Trade Shows (see sidebar). Subcommittee membership is open to all IPC members, subject to the approval of interest to the membership and recommend appropriate measurement categories and reports for approval by the membership. Some categories may include sales or orders by region, application, and product type; employment statistics; and salary surveys.

The trade show subcommittee will help the PMA and IPC coordinate trade-show efforts, as well as develop and maintain a list of industry events. — R. H.
of the subcommittee chair.

Because the PMA is neither the first nor the only organized effort within the photonics industry to attempt to standardize, forecast, or measure our business, these charters are focused first on supporting, coordinating, and building upon any existing efforts to maximize efficiency and reduce overlap. The PMA will act initially to support and help disseminate the results of existing activities; then it will aid any standards development, trade, or industry-measurement actions that groups such as the OIDA, NEMI, SPIE, the Optical Society of America (OSA; Washington, D.C.), and standards bodies come up with.

The rapid formation of the PMA is a testimony to the strength of common interests surrounding these initiatives. Efforts to establish the PMA were launched at the National Fiber Optic Engineers Conference last July, when SPIE, OSA, and OIDA sponsored a meeting attended by many supply-chain and equipment companies. A core group of volunteers began discussing the lack of standards, insufficient technology roadmaps, and a missing infrastructure of relevant and accurate industry metrics. Alan Rae, vice president of technology development for Cookson Electronics (Foxborough, MA) and a member of IPC, took the helm as chair pro tem of the group, temporarily called the Photonics Manufacturing Equipment Association. Founders of the group borrowed large portions of the SMEMA structure and charter to establish a foundation for what would become the PMA.

At SMEMA’s Assembly Process Exhibition and Conference (APEX; San Diego, CA; 19–24 January), association members adopted a resolution to drop the word “equipment” from the group’s name and broaden the focus of the association to the entire supply chain. Author Randy Heyler of Newport Corp. (Irvine, CA), a founder of that company’s Photonics Packaging Automation division, assumed the chair’s role from Rae and began working with author David Bergman of IPC to develop a proposal to incorporate the PMA as a new council under the IPC. In this structure, the PMA will operate similarly to the SMEMA Council and represent the unique needs of the emerging equipment and supply chain to the fiber-optics and photonics industry. The IPC board accepted the proposal in March.

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For further information, to join, or to volunteer for a committee, contact Randy Heyler at rheyler@newport.com or David Bergman at davidbergman@ipc.org, or visit www.ipc.org. To see IPC-0040, the umbrella standard document, go to www.ipc.org/html/IPC0040Proposal.pdf.