# 2018 AIM Photonics Call for Proposals

Welcome to our 4th annual AIM Photonics Call for Proposals for 2019 projects. The Call for Proposals is open to qualified parties that seek to secure federal funding in 2019 on a matched basis to implement projects targeting the technology goals of AIM Photonics. These high level goals include: (1) providing an infrastructure for cooperative development of advanced integrated photonics manufacturing solutions in the United States; (2) catalyzing the maturation and stratification of the integrated photonics ecosystem; and (3) providing world-leading photonic integration technology access/on-ramps to U.S. industry, including the small and medium size enterprise and entrepreneurial sectors, as well as the U.S. government and academic communities.

Prior year and current 2018 projects in our Manufacturing Centers of Excellence (MCEs) have enjoyed considerable success in advancing our Multi-Project Wafer (MPW) services, including design automation, to support sophisticated photonic integrated circuits (PICs) with increasingly high-performance components. Current projects also include extending MPW functionality to Multi-Project Wafer & Assembly with stacked multi-chip 2.5D interposer architectures, with a longer-term goal of fully-integrated co-design of CMOS and silicon photonics and 3D integration. The planned 2018 launch of operations at the Rochester Test, Assembly, and Packaging (TAP) will provide state-of-the-art automated packaging development and pilot production for emergent integrated photonics markets and companies. Additional higher risk projects target differentiating manufacturing capabilities including epitaxial lasers on silicon and high-density I/O solutions.

For the market-facing Key Technology Manufacturing Areas (KTMAs), the goal continues to be market-driven advanced manufacturing capabilities that will further the development of a sustainable domestic integrated photonics supply chain. Prior year and current 2018 projects have advanced technology for high-radix photonic switching, improved component performance for analog and RF applications, basic building blocks for sensors, and arrays for free-space communications links. As we mature and to further our mandate of being sustainable after the initial five year start-up period, AIM Photonics views KTMA projects as unique opportunity for industry members to drive toward manufacturing readiness of products for general, or for private company use, while challenging the technology readiness of our MCEs. With two years left in the start-up stage, 2019 KTMA projects will need to be more strongly driven by AIM Photonics member companies or prospective member companies.

Projects with strong corporate participation delivering credible functional demonstrators that showcase AIM Photonics capabilities and mature MCE platforms are desirable. However, recognizing that substantial corporate investment in KTMAs will often entail development of company proprietary solutions and customization, proposals for KTMA projects are expected to (1) have dominant Class B or Class C project[1] contributions that reflect a strong development commitment from the partner company or companies, and/or (2) offer tangible prospects for sustaining utilization of AIM Photonics MCE

[1] As defined in the Membership Agreement:
"Class B Corporate Interest Project" is a joint development project not funded by Government funding.
"Class B Government Interest Project" is a joint development project funded in whole or in part by the Government.
"Class C Service Project" is a project funded exclusively with private funding by a Project Participant(s) and under which a Project Participant(s) may obtain services from AIM Photonics.

infrastructure. If KTMA project proposals with adequate strength in these dimensions are not submitted in a particular KTMA segment, it is likely that no project will be funded in that segment.

As in prior years, we welcome new members that bring critical competence or clearly identified value to the institute and proposers may include enterprises that are not currently members. However, in order to receive federal funding to co-develop solutions outside of simple service agreements, such enterprises will be required to join AIM Photonics at a Tiered membership level prior to the date on which awardees are required to submit detailed plans, including an explicitly stated strategy for achieving project matching contributions.

AIM Photonics is a manufacturing institute, nominally focusing investments on projects achieving targets in the Manufacturing Readiness Levels (MRL) 4-7. This call will not consider basic research proposals. During project evaluation and selection, proposals from academic members will require industry partnerships in the appropriate ecosystem segment that illustrate a likely pathway to manufacture. In addition, AIM Photonics does not intend to award federal funding to projects that demonstrate functionality that simply exercises existing institute capabilities. While such projects may be important to both members and the future sustainability of the institute, they are classified as “user projects” and should seek funding through external public or private resources.

Proposed projects should be affiliated with: (a) one of the three Manufacturing Innovation Centers of Excellence (MCEs) with the intent to advance, mature, or transition integrated photonics manufacturing or design platforms that address known market needs; (b) one of the four Key Technology Manufacturing Areas (KTMAs) with the intent to engage AIM member companies, prospective member companies, or government agencies in advancing manufacturing capabilities in support of genuine deployment targets for integrated photonics solutions into the respective KTMA market segments; or (c) AIM Academy to implement tactical projects targeting AIM Photonics Education, Workforce Development, and Roadmap goals.

Projects are nominally one year in duration. Proposals must be concise and include clearly delineated milestones, deliverables, and success criteria. While the continuation of a project may be both possible and appropriate for certain efforts, such proposals must briefly highlight prior year funding accomplishments and include clear milestones that will permit the assessment of progress during a one-year funding timeframe. These requirements will be captured in a template that includes required key information blocks and is subject to specified page limits. Since the template forms the basis of the Project Award Agreement that will govern the work to be performed by the Project Participants, your adherence to the requirements reflected in the template will facilitate the processing of any Project Award.

Proposals will be scored by the Technical Review Board (TRB) according to the MCE and KTMA scoring criteria that are set forth below. Scores in each category are used to facilitate discussion and prioritization of proposal impact, including technical strengths and weaknesses, and suitability of goals and the project team. Using the results of the TRB scoring, in conjunction with consultations with key industry participants and additional assessments of a project’s potential contribution toward institute sustainability, the AIM Executive Staff will present a portfolio of recommended projects to the AIM

Photonics Leadership Council (LC) for preliminary approval in the Fall of 2018 for projects that seek funding starting in January of 2019.

Note that once a proposed project has been recommended for funding by the TRB and has received preliminary approval from the LC, the AIM Project Management Office (PMO) will provide the Project Lead with templates and detailed checklists, outlining Participant requirements and required level of detail for each component of the refined project plans. Any project for which the refined project plans have not been completed satisfactorily, or for which all Project Participants have not executed a Membership Agreement by November 15, 2018, will not be submitted to the LC for final approval.

**Proposals are due June 15, 2018 by 5:00 PM EDT; the submission email address will be provided with the proposal templates.** See AIM Academy section for additional AIM Academy proposal requirements on submitting letters of intent by May 15, 2018.

# MANUFACTURING CENTERS OF EXCELLENCE (MCEs)

**Technical Review Board Scoring Criteria**

**MCE Scoring Metrics (5=excellent, 1=poor):**

1. Matching contribution is defined, valid, appropriate and at 1:1 or greater
2. Strong industry engagement, participation and investment for pathway to impact
3. Manufacturing focused, not readily funded by conventional agencies
4. Specific engagement with solution vendors in respective stratified ecosystem segment
5. Project is responsive to the Call for Proposals
6. Advance or capability likely to contribute to the sustainability of AIM Photonics
7. Capability is critical in near term to one or more KTMA needs
8. Project advancing capabilities in valuable way that can credibly be integrated into MCE offering
9. Capability enables critical needs of government stakeholders
10. Capability enables industry needs in area(s) with volume market potential
11. Support for small-to-medium enterprises (SMEs) and emerging markets
12. Performers have required competency & infrastructure for efficient execution
13. Deliverables/Checkpoints are clearly defined
14. Budget is appropriate to proposed activity and deliverables
15. Timing of Goals (1 = checkpoints don't really enable assessment in perf period, 5 = checkpoints at 6 months that enable assessment)
16. Milestones include good prospects for near-term institute-level success stories
17. Qualitative Assessment of Overall Project Merit (1 - 5)

**Electronic and Photonic Design Automation (EPDA):**

The AIM Photonics Electronic Photonic Design Automation (EPDA) MCE seeks proposals that advance integrated photonics design methodologies and examples with the ultimate goal of lowering the cost, schedule and risk associated with creating new integrated photonic devices and systems. In addition, proposals which address the incorporation of the photonic interposers and CMOS, from a design methodology are encouraged. To mitigate competitive issues, proposals that are not company or product-specific and enable the EPDA industry as a whole are strongly encouraged. Meritorious, improved EPDA design methodologies outside of today's workflow methodology may be considered, in addition to proposals that comprise investigation and analysis for definition of future projects. Proposals originating in academia will benefit strongly from partnerships with corporate Institute members.

**Topics of known interest include:**

1. **Reference Designs** – A project is desired to continue the reference design development started in 2017 and continued into 2018 which utilize the AIM MPWA including the active silicon photonics platform and CMOS integration. The reference designs should demonstrate the capabilities within AIM and provide a value-add in defining topics of CMOS integration from an EPDA design methodology perspective. The developed reference designs should be physically realized within AIM MPWA and the learning applied to electro-optical co-simulation techniques and tools. The overall goals of the reference design are to provide open and sharable examples of integrated electro-optical design while highlighting system integration including system level electro-optical co-simulation.

2. **Design for Manufacturing (DFM)** - A project is desired in 2018 to continue the DFM Project that has been going in 2016-2018 to mature the DFM related quality and reliability of the AIM Photonics MPW and PDK offerings. Some of the primary goals should be to gather significant test data and process it to drive quality and reliability of the AIM Photonics PDK and MPW offerings. It would be expected that collaboration with the AIM PDK and MPW development teams will be needed for this project.

3. **Photonics Design For Test (DFT) or Parasitic Effects-** Additional project areas of interest are developing methodologies and optimization techniques for handling photonics DFT and parasitic effects. Both of these are rather immature for photonic chip design and improvements are needed relating to these types of topics (this is a non-exhaustive list provided as a guide): leveraging DFT techniques from the electronics industry where possible; definition of scalable test structures; automated test structure insertion; automated stimulus/response for test structures; power/loss efficiency of test structures; definition of photonic parasitic parameters and the factors that impact them; methods for optimizing or minimizing parasitics; definition of temperature effects as a parasitic; etc.

**Multi-Project Wafer and Assembly (MPWA):**

The AIM Photonics MultiProject Wafer and Assembly (MPWA) MCE seeks a set of proposals that utilize AIM's existing process design kit (PDK) for prototyping and manufacturing photonic components and photonic integrated circuits; that support 2018 EPDA goals; and that include feedback to the MCE on MPWA performance, capabilities, and priorities for development. Proposals that further strengthen the MPWA manufacturing offerings are strongly encouraged.

**Topics of known interest include:**

1. **Prototypes and Products Manufacturing –** Projects utilizing AIM's PDK to fabricate and test (ICT) high value add photonic components and development PIC/CMOS integration in SUNY Polytechnic's cleanroom and provide feedback to further improve our offerings.

2. **Passive and Active Interposers –** Projects are desired that access development started in 2017 of passive and active interposers with the AIM MPWA team. The overall goals are to improve existing design guidelines, improve capability and enable a PDK for 2019 MPWA runs. Projects that align with TAP MCE goals are encouraged.

3. **Laser Chip Attach –** Projects are desired that access 2017 development started in 2017 of laser chip attach on CMOS for heterogeneous integration and laser chip attach on interposers. The overall goals are to improve existing design guidelines and enable a PDK for 2019 MPW runs. Proposals that address development priorities and improvement of laser chip attach process technology in MPWA and TAP MCEs are encouraged.

4. **III-V on Si Epitaxy –** Proposals to advance heteroepitaxy QD laser technology cooperatively with, and targeting compatibility with, the SUNY Polytechnic fab.

## Test, Assembly, and Packaging (TAP)

The AIM Photonics Test, Assembly, and Packaging (TAP) MCE is seeking proposals that advance the development of key photonic testing, assembly, and packaging technologies and processes in the TAP Hub. It is expected that proposals will address areas such as: advancements in photonic process capability, lowering the manufacturing cost of photonic testing, assembly, and packaging, and improving the robustness and reliability of photonic devices which flow through the TAP processes.

Projects with substantial Class B components, carrying substantial partner company commitment, are strongly encouraged.

The following are areas of interest:

1. **Product Development** –
   Projects that utilize TAP's photonic capability (e.g. photonic testing, photonic assembly and photonic packaging) to develop innovative subassemblies and/or products.
   Development projects that provide opportunities to further advance the TAP photonic technologies and process capabilities are a priority. Projects that advance process capabilities in these areas are of particular interest:
   i. High Speed Fiber Attach – Single fibers and fiber arrays
   ii. Metallization for laser chip attach including pad finishing, under bump metallization
   iii. Passive and active Interposer packaging and testing
   iv. Manufacturing solutions for board-level high-density optical I/O for SiP and interposers
   v. Advanced metrology technology

2. **Prototype and Product Manufacturing** – Projects that have completed the product development phase within TAP or external to TAP and are ready for prototyping and/or low volume pre-production builds are of interest. Projects leveraging TAP's photonic and electronic capabilities to produce a functional prototype or a product at Low Rate Initial Production (LRIP) levels are of interest.

3. **Workforce Development** - Projects that leverage the TAP facility for onsite or online workforce development are of interest. Academic institutions and industry participants are invited to submit proposals that advance the capability of the workforce to work in the photonic test, assembly, and packaging arena. Projects can address workforce development and training from the operator through individuals with advanced degrees.

**KEY TECHNOLOGY MANUFACTURING AREAS (KTMAs)**

**Technical Review Board Scoring Criteria**

**KTMA Scoring Metrics (5=excellent, 1=poor):**

1. Matching contribution is defined, valid, appropriate, and at 1:1 or greater
2. Substantial industry engagement, participation and investment for pathway to impact
3. Manufacturing focused; substantial fraction of resources exercising manufacturing gap solution, not readily funded by conventional agencies
4. Project is responsive to the Call for Proposals
5. Synergistic promotion of MCE platform developments; addresses multiple AIM Photonics constituency needs
6. Deliverables represent important advance in capability that will contribute to institute sustainability
7. Addresses critical needs of government stakeholders
8. Addresses industry needs; volume market potential
9. Performers have required competency & infrastructure for efficient execution
10. Deliverables/Checkpoints are clearly defined
11. Budget is appropriate to proposed activity and deliverables
12. Timing of Goals (1 = checkpoints don't really enable assessment in perf period, 5 = checkpoints at 6 months that enable assessment)
13. Milestones include good prospects for near-term success stories
14. Your Qualitative Assessment of Overall Project Merit (1 - 5)

**Very High Speed Datacom and Communications Links (VHS D&CL):**

The AIM Very High Speed Datacom and Communications Links (VHS D&CL) KTMA seeks proposals that will target commercialization of AIM Foundry MCE capability to one or more targeted commercial applications. The goal is to develop transmission, interconnect, and optical switching operating at high data rates and with low power. Technology goals should be aggressive enough for this technology to be commercially compelling after developing the technology and ramping up manufacturing capacity.

Proposals for this KTMA are expected to (1) have dominant Class B or Class C project contributions that reflect a strong development commitment from the partner company or companies, and (2) offer tangible prospects for sustaining utilization of AIM Photonics MCE infrastructure.

For projects that require capability extension beyond the existing MCE projected capability timelines, proposers must address how the technology will be executed in the AIM Photonics flow. Additionally, all proposers must include the cost of existing MCE support, in addition to project-specific technology development.

The following are some candidate applications within the scope of this KTMA. However, the proposed applications can go beyond this list as long as they fit within the overall technical domain of datacom and communication.

**High Speed Optical Transmission:** AIM seeks proposals to address the rapid advance of transmission data rates, along with the cost pressure from increasing market volume. Proposals can build on optical transmission technology developed so far under AIM 'class-A' KTMA programs.

**High-speed, low-power switching:** AIM seeks proposals which address the rapidly expanding data rate of optical interfaces which is stressing electrical switching capacity, and causing electrical power dissipation electrical switching to become a critical issue at the chip, board, rack, and datacenter level. Proposals should address issues including optical switch fabrics, associated integrated photonics I/O, electronic/photonic integration and packaging. Proposals can build on optical switching technology developed so far under AIM "Class A" KTMA programs.

**Advanced transceivers using electronics/photonics integration:** AIM seeks proposals that address interconnects with higher capacity, lower volume, and lower energy/bit for application at the chip, board, and rack level. Solutions should provide compelling value compared to electrical interconnect solutions projected several years into the future. Related areas include low-cost, high-density packaging, high density optical I/O and connector technologies, and mid-board optics solutions. Proposals can build on electronics/photonics integration technology developed so far under AIM "Class A" KTMA programs, including high-speed modulation drivers and interposer interconnect technology.

**Analog and RF Applications:**

The RF Analog Applications KTMA seeks proposals that advance integrated photonics manufacturing platforms to enable high-performance RF analog links and analog signal processing applications.

AIM seeks proposals that will target commercialization of AIM Foundry MCE capability to one or more targeted applications. The KTMA goal is to enable the transmission and processing of analog signals with low noise and high linearity, while maintaining the advantages of an integrated photonics platform to produce analog/RF components at low cost and in high volume.

Proposals for this KTMA are expected to (1) have dominant Class B or Class C project contributions that reflect a strong development commitment from the partner company or companies, and (2) offer tangible prospects for sustaining utilization of AIM Photonics MCE infrastructure.

For projects that require capability extension beyond the existing MCE projected capability timelines, proposers must address how the technology will be executed in the AIM Photonics flow. Additionally, all proposers must include the cost of existing Manufacturing Center of Excellence (MCE) support, in addition to project-specific technology development.

The following are some candidate applications within the scope of this KTMA. However, the proposed applications can go beyond this list as long as they fit within the overall technical domain of RF analog links and analog signal processing.

**Active RF cables**: Transmission solutions with high performance that can work in an operational environment and support high modulation bandwidth. For example, optical link technology that can support systems with noise figure (NF)<3dB, bandwidth>one octave, high dynamic range and operation to high frequencies such as mm-wave.

**Electronics co-design of RF Photonics systems:** For example, amplifier/modulator co-optimization for supporting high performance analog links or signal processing applications.

**Analog signal processing**: Once in the optical domain there can be benefits to performing signal processing optically before converting to electrical for analog/digital processing. For example, some of this analog signal processing could include frequency up/down conversion, frequency channelization, signal conditioning, or optical analog to digital conversion (ADC).

**High performance Analog/RF optical technology:** Proposals targeting other volume analog/RF applications are welcome, including commercial or defense applications which would aid in sustainability of AIM Photonics.

**Sensors:**

AIM Photonics seeks proposals to manufacture integrated optical sensors using the silicon photonics platform implemented at SUNY Poly. Applications in chemical, biomedical, and physical sensing will be considered.

Proposals for this KTMA are expected to (1) have dominant Class B or Class C project contributions that reflect a strong development commitment from the partner company or companies, and (2) offer tangible prospects for sustaining utilization of AIM Photonics MCE infrastructure.

Proposed projects should result in a manufacturable, integrated sensor prototype with market-competitive specifications using the AIM Photonics manufacturing workflow. To accomplish this, projects may also develop:

- Low-cost sensor packaging solutions in collaboration with the Rochester TAP facility and TAP MCE, including fiber-attach and microfluidic-attach, or by
- New photonic components compatible with the current AIM Photonics process for specific sensor prototypes, including transducers, filters, input/output couplers or other components.

Proposed enhancements in manufacturing capability that result in new PDK library elements or significant sustainable new process capability within the MCE infrastructure are desirable. However, proposed projects should follow guidelines set out in the AIM Photonics MPWA Design Guide as closely as possible. If deviations from this guide (or from the current MPWA platform) are necessary, proposers should clearly indicate the rationale for the deviation, where that portion of the work will be conducted, and a plan for bringing the technology into the standard AIM Photonics manufacturing workflow.

Proposals must include a competitive analysis (including performance, cost, and workflow) and detail the market need for an integrated photonic solution. Budgeting must include costs to use AIM manufacturing facilities.

Proposed projects must feature substantial resource commitments by industrial members of AIM Photonics.

**PIC Array:**

The AIM PIC Array KTMA seeks proposals that will target commercialization of AIM Foundry MCE capability for PIC Array technologies such as Phased Array Based LiDAR and/or Free Space Optical Communications serving either commercial and/or Department of Defense applications. It is important to note that the proposers should have a demonstrated technology that exceed both TRL and MRL Level 4. Additionally, proposers should have a clear commercialization strategy and path to large-scale manufacturing defined.

Proposals for this KTMA are expected to (1) have dominant Class B or Class C project contributions that reflect a strong development commitment from the partner company or companies, and (2) offer tangible prospects for sustaining utilization of AIM Photonics MCE infrastructure.

For projects that require capability extension beyond the existing MCE projected capability timelines, proposers must address how the technology will be executed in the AIM Photonics flow. Additionally, all proposers must include the cost of existing MCE support, in addition to project-specific technology development.

As mentioned above, LiDAR and Free Space Optical Communications, represent candidate applications within the scope of this KTMA. However, the proposed applications can go beyond this list as long as they fit within the overall technical domain of PIC Array technologies.

**LiDAR:** AIM seeks proposals which utilize PIC Array Technologies to address commercial and/or DoD LiDAR applications with differentiating approaches. PIC Array Technologies can enable rapid beam steering for reconfigurable solid-state LiDAR implementations not being addressed or considered currently by the commercial marketplace. For proposals focused primarily on the commercial marketplace it is important to highlight the role AIM would play to facilitate the technology transition to volume manufacturing.

**Free Space Communications:** In addition to LiDAR, free-space optical communications offers interesting opportunities for PIC Array technologies. Rapid steering of optical beams has potential to impact both commercial and DoD markets in free-space optical communications.

Regardless of the application chosen, it is expected that the developed program will address issues of process yield using Inline Control and Test (ICT) and Design for Manufacturing (DFM) techniques developed to facilitate volume manufacturing.

## AIM Photonics Academy:

AIM Photonics Academy provides the unified knowledge, technology, and workforce interface for AIM Photonics. The AIM Photonics Academy customer base includes the membership of all Tiers of AIM Photonics Institute and companies and employees in the electronics and photonics industries and application spaces where integrated photonics technology plays a critical role. The Academy projects must exhibit Customer Focus, Best Practice Execution and Compelling Content. The Education Mission is to be the industry source for technology dissemination and skill certification. The Workforce Development Mission is to provide a capable workforce and productive career paths at all levels of the integrated photonics manufacturing supply chain. The Technology Roadmap Mission is to enable cost reduction and manufacturing scale-up by identifying markets, timelines, technology roadblocks and potential solutions for Manufacturing Supply Chain alignment.

Proposed projects should be affiliated with one of the four AIM Academy Functional Directorates: Education, Workforce Development, Roadmap, and Labs for Education and Application Prototypes (LEAPs). The Commonwealth of MA has thus far invested in LEAPs at MIT (in packaging) and at Worcester Polytechnic Institute/Quinsigamond Community College (with a focus on medical sensors).

AIM Photonics Academy Portfolio Priorities

- Education: Develop Standard Design/Package/Test Training Tools: i) Summer and winter workshops in Test, Assembly and Packaging (TAP); ii) Application Specific Photonic Integrated Circuit (AS-PIC) modules; iii) Community college teaching modules, video lessons, testing toolkit, lab lessons for LEAPs (Labs for Education and Application Prototypes) at MIT and WPI/QCC; iv) Virtual lab: interactive simulations for PIC design, fabrication, packaging, testing; v) interposer and electronic-photonic integration (PhD/MSc) teaching package/edX course; vi) modules in design for manufacturing and PIC applications, and vii) professional online edX course sequence to prepare users to submit to AIM MPW runs.
- Workforce Development: i) Industry-wide, Integrated Photonics Internship Program; ii) pervasive SME engagement in the Integrated Photonics industry supply chain; iii) regional business/academic/government coordination for job creation; and iv) Workforce Skills and Education Needs Assessment.
- Roadmap: International Integrated Photonics System Industry-Based Roadmap: i) Document and implement a technical planning process to develop additional Application Interest Group (AIG) projects addressing strategic gaps that AIM members see as critical; ii) Launch AIGs to execute these critical projects; iii) revise the content and structure of the Roadmap as changing needs are identified, at AIM Photonics and in the great integrated photonics community.
- LEAPs: LEAP activities in i) education; ii) professional certification; iii) SME prototype tool deployment; and iv) AIM MPW and TAP engagement through creation of a design services center, v) design LEAP project partnerships among industry, academia and government.

These priorities are more fully described as follows:

**Education:** AIM Photonics Academy Education prepares students, technicians, engineers, and researchers to build productive careers in the emerging Integrated Photonics Industry, by creating and disseminating education modules (teaching packages for instructors, self-paced online learning), online edX courses and online interactive simulations (Unity gaming software platform), comprised of state-of-

the-art content and pedagogical best practices. White Paper should include: Topic of Module, edX Course or Interactive Simulation (see Portfolio Priorities below); Level of Difficulty (novice, intermediate or advanced) and Pre-Requisite Knowledge (e.g., basic knowledge of photonics, advanced physics, etc.); Target Audience (e.g., individuals working in a particular industry, graduate students in a specific field); Student Learning Outcomes (at the end of the course/module, students will be able to do or know …); Content Description (A paragraph describing topics covered); Examples of Teaching Methods (active learning lectures, demonstrations, simulations, experiments, design-build projects). AIM Photonics Academy will consider proposals related to interactive design for manufacturing content, and electronic-photonic test and photonics packaging.

**Workforce Development:** AIM Photonics Academy Workforce Development provides a capable workforce and productive career paths at all levels of the integrated photonics manufacturing supply chain. Practice opportunities in industry and academia for engagement and credentialing are priorities. Proposals that involve local communities and SMEs in Integrated Photonics industrial development are of particular interest to partnerships at the State level. AIM Industry Members should propose projects related to SME engagement in the industry supply chain.

**Technology Roadmap:** The AIM Technology Roadmap enables cost reduction and manufacturing scale-up by identifying markets, timelines, technology roadblocks and potential solutions for Big M Manufacturing supply chain alignment. As a gateway for AIM Member recruiting, projects that i) determine market and system requirements or ii) establish limited term (e.g., 18 months) industry-led consortia to develop prototypes with near term manufacturing targets. Projects that use AIM Photonics' MPW platform at SUNY Poly (for Si photonics) are encouraged.

**AIM Design Center:** The AIM Design Center provides the gateway for MPW submissions on SUNY Poly 300mm Si photonics fabrication flow/line. AIM Photonics Academy will host a portal at the Design Center for education, training and collaborative Roadmap projects. The Design Center offers a special opportunity for industrial engagement in building a community of integrated photonics designers and in tapping into AIM creativity with Design Challenges. The Si photonics MPW Design Reticle is a 50mm2 area that will be partitioned for education and training projects. Industrial partners are encouraged to sponsor Design Reticles for i) education/training to develop the AIM design cohort and ii) functionality focused Design Challenges. The rules of engagement will be determined during the post white paper proposal development period. These projects will align with growing engagement in the SUNY Poly 300mm Si photonics fabrication flow/line with NSF, with AIM's TAP (Test, Assembly and Packaging facility) and with other partner organizations. A significant interest is anticipated for these projects, so please submit at the White Paper stage to secure participation.

**AIM Labs for Education and Application Prototypes (LEAPs)**: AIM Photonics will host several practice facilities for engagement of students and companies in integrated photonics manufacturing technology. The missions of these facilities range from MS-level project-based teaching of processing and prototyping at the AIM-MIT LEAP to industry engagement in manufacturing equipment qualification and employee certification at the AIM Photonics SUNY-Poly foundry and at joint AIM-Manufacturing Extension Partnership (MEP) design, test, and prototyping facilities. Proposal topics are expected to include: i) equipment donations, ii) joint tool development to meet manufacturing requirements, iii) technician certification for specific skill sets, and iv) development of the employee/student cohort and associated challenge projects in integrated photonics manufacturing.

Proposal Submission for AIM Photonics Academy is a two-stage process:

- Letter of Intent with White Paper: triggers support of AIM Photonics Academy staff – before end of day, May 15, 2018
    - one page text, budget estimate, and CVs of key personnel
    - please email submissions to Julie Diop at jdiop@mit.edu.
- Full Proposal submission: June 15, 2018

**AIM Photonics Academy Advisory Council Scoring Criteria**

Scoring Criteria Guide

1. Significance: The proposal matches tactical goals and missions of AIM Photonics and AIM Photonics Academy (Education, Workforce Development and Roadmap) to define contribution and its significance.

AIM Mission: Seek to advance integrated photonic circuit manufacturing technology development while simultaneously providing access to state-of-the-art fabrication, packaging, and testing capabilities for small-to-medium enterprises, academia and the government; create an adaptive integrated photonic circuit workforce capable of meeting industry needs and thus further increasing domestic competitiveness; and meet participating commercial, defense and civilian agency needs in this burgeoning technology area.

AIM Photonics Academy Mission: Provide the unified knowledge, technology, and workforce interface for AIM Photonics

2. Relevancy: The proposed project is responsive to the priorities of the AIM members. The proposal content should address the portfolio priorities and critical needs of Workforce Development, Education or Technology Roadmap.

AIM Member priorities: i) Education Modules and Online Courses; ii) Labs for Education and Application Prototypes; iii) Design Center; iv) Workforce Needs Assessment studies; vi) Workforce Internship, Apprenticeship and/or professional skills; v) Roadmap manufacturing supply chain and joint projects which align MCEs/KTMAs with technology and market vectors

3. Impact: the proposed project should address development of innovative methodologies and practices for advanced integrated photonics manufacturing. The proposal also needs to clearly define outcomes and to specify how to make an impact on AIM community, which may include specific engagement with solution in respective stratified ecosystem segment.

4. Implementation: the proposed project should include required competency and infrastructure for efficient execution. The deliverable milestones/checkpoints are clearly defined and realistic. The budget is appropriate to proposed activity, team personnel, resources, and deliverables.

Timeframe: Project can be done in the time allotted, such as one year or more

Target audience: Project is aligned with at least one of our target audiences: community college, undergrad, grad, industry, gr. 7-12

5. Sustainability: The proposed project includes a stable and sustainable model to support and contribute to AIM sustainability. This means the project charts a path both for financial sustainability and long-term value to AIM. Project deliverables are open access to AIM partners and the integrated photonics community.

**Scores in each category are used to facilitate discussion and prioritization of proposal impact, including delivery and technical strengths and weaknesses, and suitability of goals and the project team.**