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Integrated Photonic Systems Roadmap

# Integrated Photonic Systems Roadmap (IPSR)

Bob Pfahl
Director of Roadmapping

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Driving Photonics Manufacturing

# Sponsors & Participants

## Sponsor

AIM photonics

## Lead Participants

the MicrophotonicsCenter @MIT

iNEMI International Electronics Manufacturing Initiative

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# Overview of IPSR

## Roadmapping Process and Scope

Participants in Roadmap as of October 1, 2016
16 Countries, 590 Individuals, 231 Organizations

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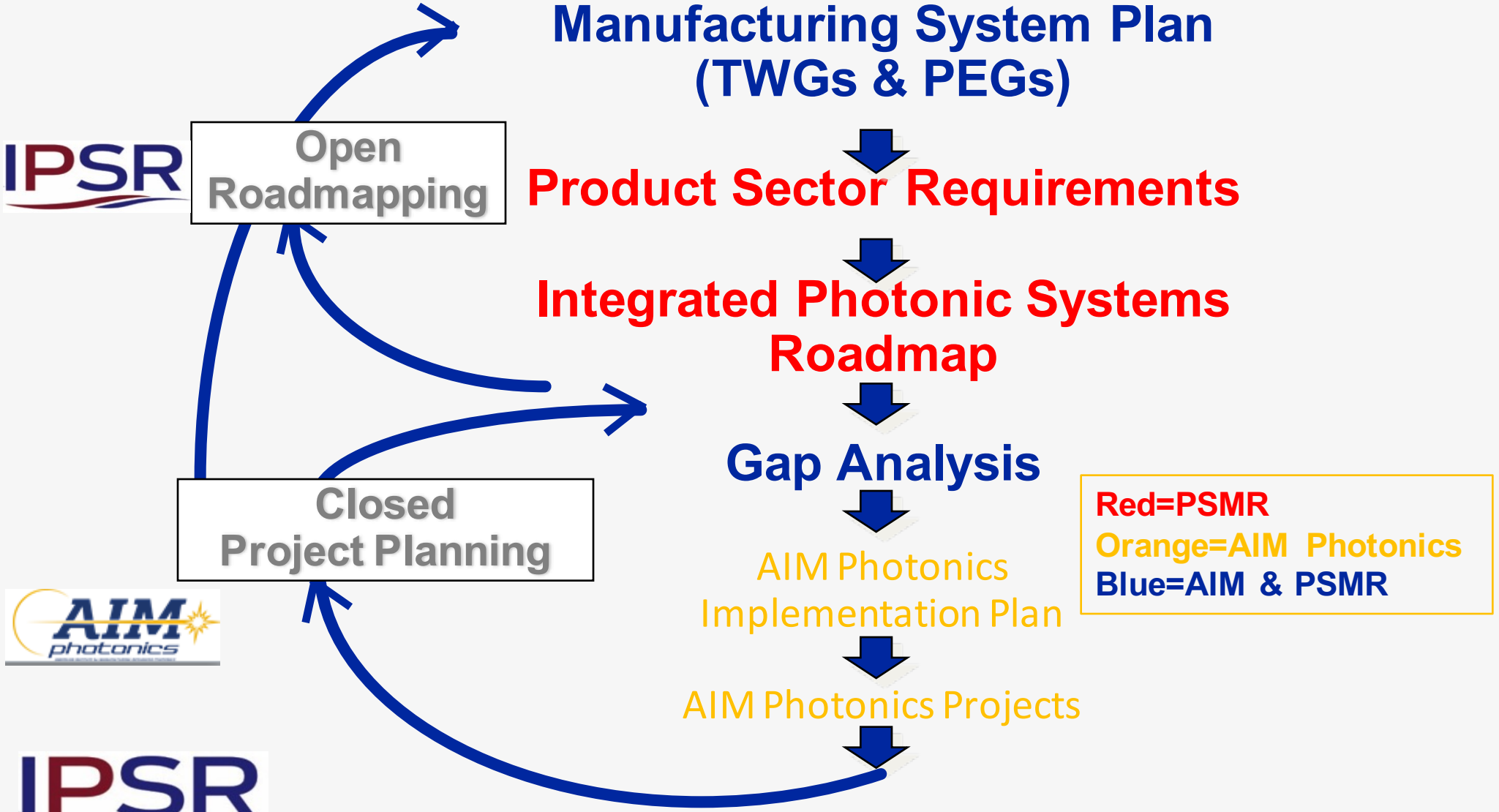
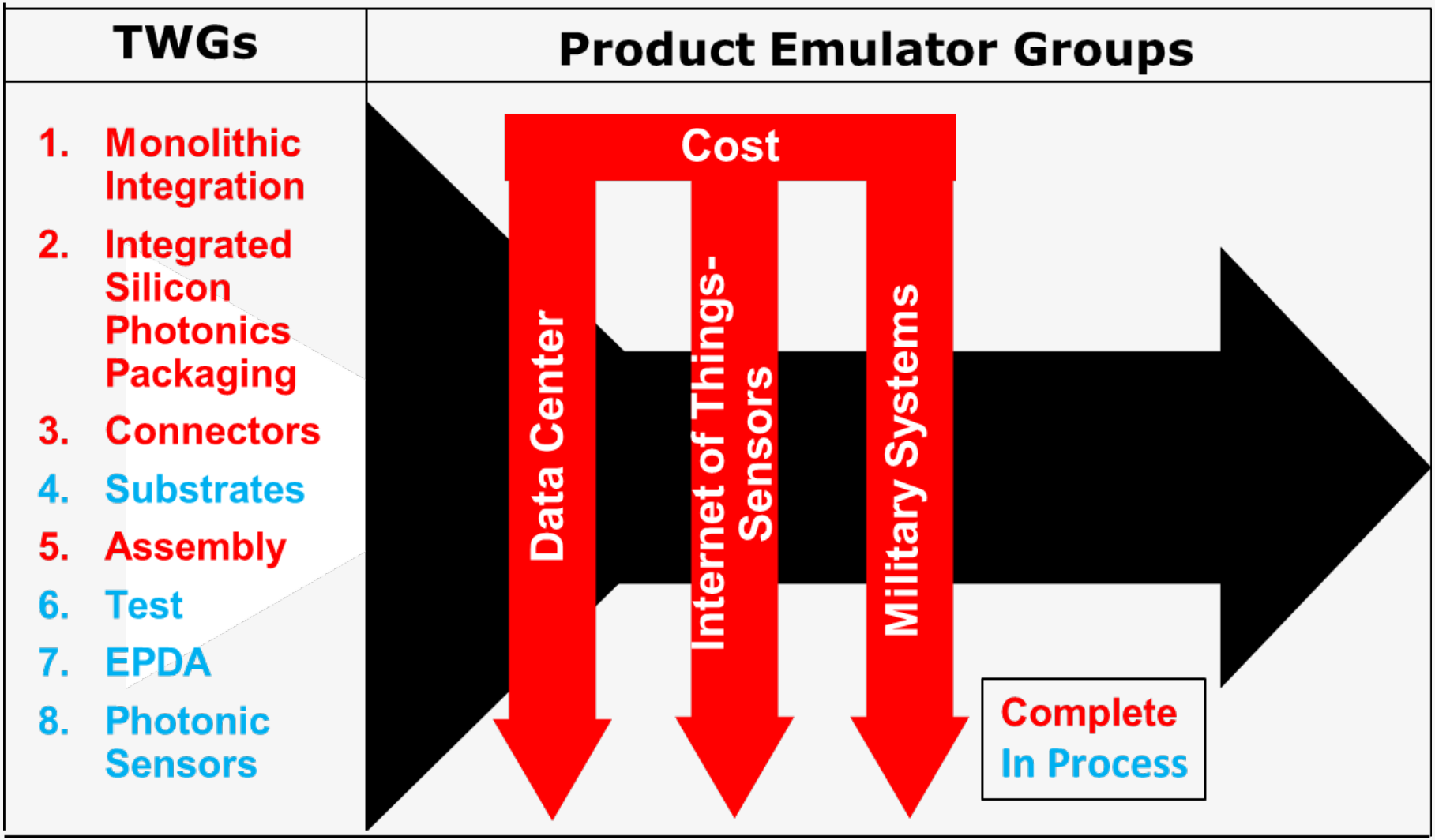
# IPSR-AIM Photonics Roadmapping/Project Planning Process



# Roadmap Structure



# Eight IPSR Technology Working Groups (TWGs)

1. **Monolithic Integration TWG:** Lionel Kimerling, MIT
   - Chips: silicon photonics, InP
   - Tradeoffs for cost, bandwidth density, power efficiency, and functional latency
2. **Electronic-Photonic System Packaging:** Bill Bottoms, Third Millennium Test Solutions:
   - Cost, materials, heat, footprint, port count, bandwidth, integration, functionality
3. **Connector & Substrate TWG:** John MacWilliams, U.S. Competitors
   - Connectors includes: all separable interfaces within the system scope
4. **Assembly and Test TWG:** Dick Otte, Promex Industries
   - Design for Manufacturing
   - Assembly and Test
   - Supply Chain Trade Offs

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# Eight IPSR Technology Working Groups (TWGs)

5. **Photonic Sensors TWG:** Ben Miller, U. of Rochester; Anu Agarwal, MIT
   - Photonic Sensors for a wide range of markets
6. **EPDA (Electronic-Photonic Design Automation) TWG:** Bret Attaway, AIM Photonics
   - Integrated System Simulation and Design Tools
7. **Substrate TWG:** Voya Markovich, Microelectronic Advanced Hardware Consulting
   - Includes all substrates external to the package
8. **Test TWG:** Dick Otte, Promex Industries (acting)
   - Photonic and Electrical Test at all levels

# Two IPSR Product Emulators

1. Data Centers: High Bandwidth, Low Latency, Efficient Power
   - E to O and O to E
   - Applications focus on IT and Data Communications
2. IoT: Low Bandwidth, “High” Latency, Low Power
   - Primarily E to O
   - Applications include IoT, Sensors

# Three Benefits from Participating in Roadmapping

- In the Roadmapping Process you meet with your supply chain from top to bottom.
  - Includes equipment, material, and component suppliers
- The Integrated Photonic Systems Roadmapping Process:
  1. Identifies and quantifies integrated photonic market opportunities to the supply chain. Thus reducing the risk of developing new products for this
  2. Identify gaps outside the scope of AIM Photonics that partnerships or consortium can address (COBO, iNEMI, HIR, HDPUG, etc.)

     Possible Subjects

     Standards Development
     Design Standards
     Reliability Studies
     Testing Methods
     Warpage
  3. Attracts firms to AIM Photonics

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# Activities and Work Products

## TWG Meetings by WebEx
## Webinars on Key Outcomes
## Two Workshops Each Year
## Roadmap

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# Facilitate Two Roadmapping Workshops

- Spring workshop included introductory workshops by the Sensors and EPDA TWGs, and Military Applications PEG.
  - Technical Presentations on Future Technology Needs and Leading Research will address "**NEXT STEPS FOR SUPPLY CHAIN SUSTAINABILITY**."
- Fall IPSR workshop "**Building an Industry: Part II"** (Oct 31-Nov 2) will include presentations by the Photonic Sensors and EPDA TWGs
  - The Roadmap TWG leaders will present a list of Critical Challenges for AIM Project Planning.
  - Technical Presentations will address Future Technology Needs for LIDAR and other emerging markets

# Upcoming Monthly Seminar Series

## Board Level Optical Interconnect 10/20

Dr. Terry Smith: 3M

John MacWilliams: Bishop Associate

Abstract: Dr. Smith and Mr. MacWilliams will present a proposal to develop a single mode, expanded-beam module in the next 18 months for future applications such as mid-board transceiver modules, IO ports, disaggregated server. The project is designed to determine manufacturability and cost reduction.

## Key Challenges Identified by the IPSR Roadmap 11/17

Professor Lionel Kimerling: MIT

Abstract: Professor Kimerling will present the key technology needs identified by the 2016 IPSR Roadmap and particularly focus on gaps that AIM photonics should consider for 2017 projects.

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# For additional information:

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