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Quality Solutions • Global Partnerships

**Industry – Academia Collaboration for Mfg. R & D
An EMS Perspective**

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Vice President of Technology

APEX Session: January 17, 2001



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Agenda

- **Situation Analysis: Outsourcing Trends and Market Drivers**
- **Evolution of OEMs Outsourcing Requirements**
- **Evolving Customer Needs**
- **Manufacturing Development Strategy**
- **Conclusion**

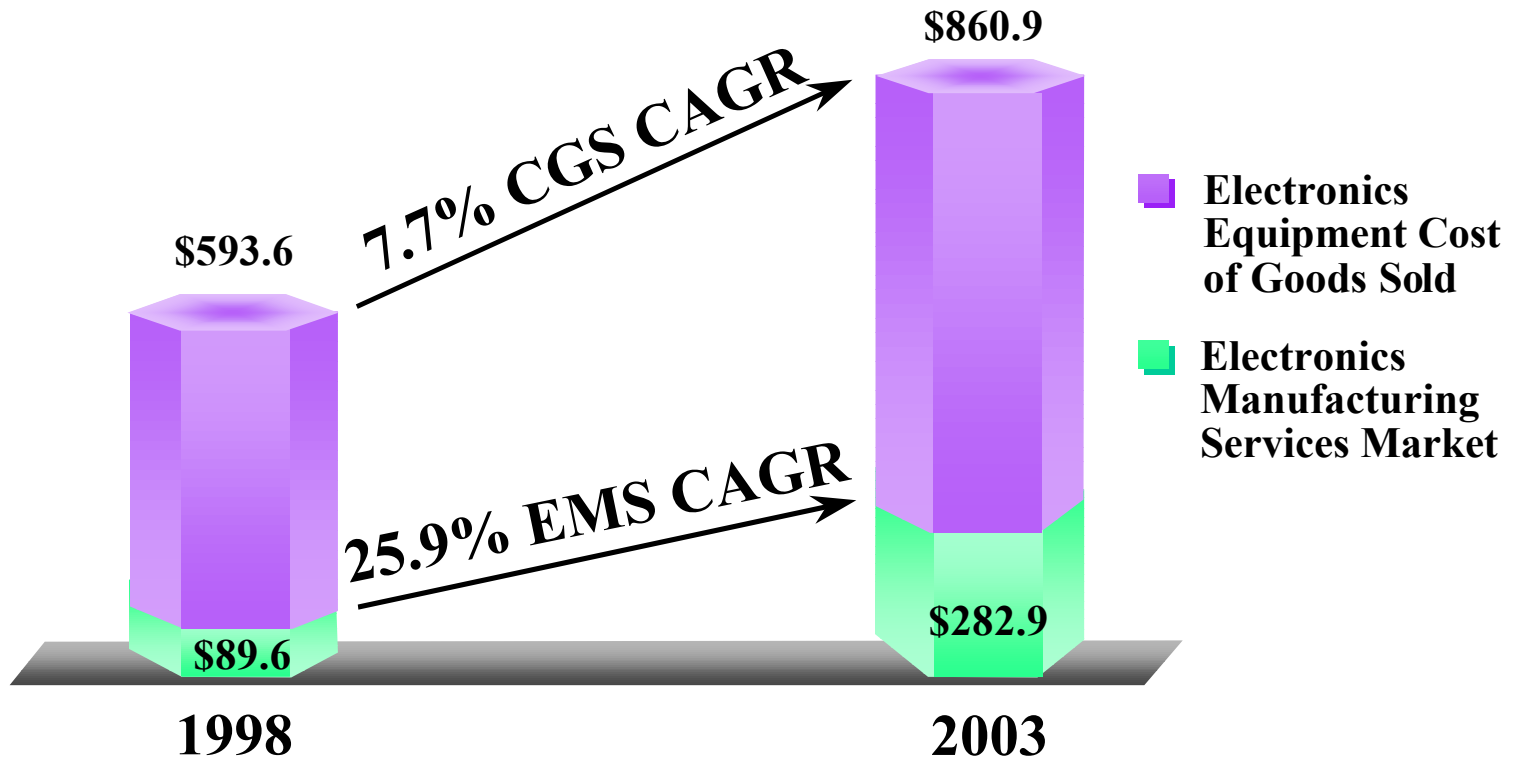


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The Outsourcing Trend Continues (US\$ in Billions)



Sources: Dataquest, December 1999
Technology Forecasters, Inc., September 1997*

*TFI has released an updated forecast which is under review.



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Market Drivers for OEM Outsourcing

■ Time-to-Market

- Increased Competition
- Quick Global Ramp-Up
- Product Obsolescence

■ Economic

- Focus on Core Competencies
- Asset Utilization
- Cash Conservation
- Cost and Risk Reduction

■ Technology

- Complexity
- Process Capabilities
- Manufacturing Engineering Scarcities

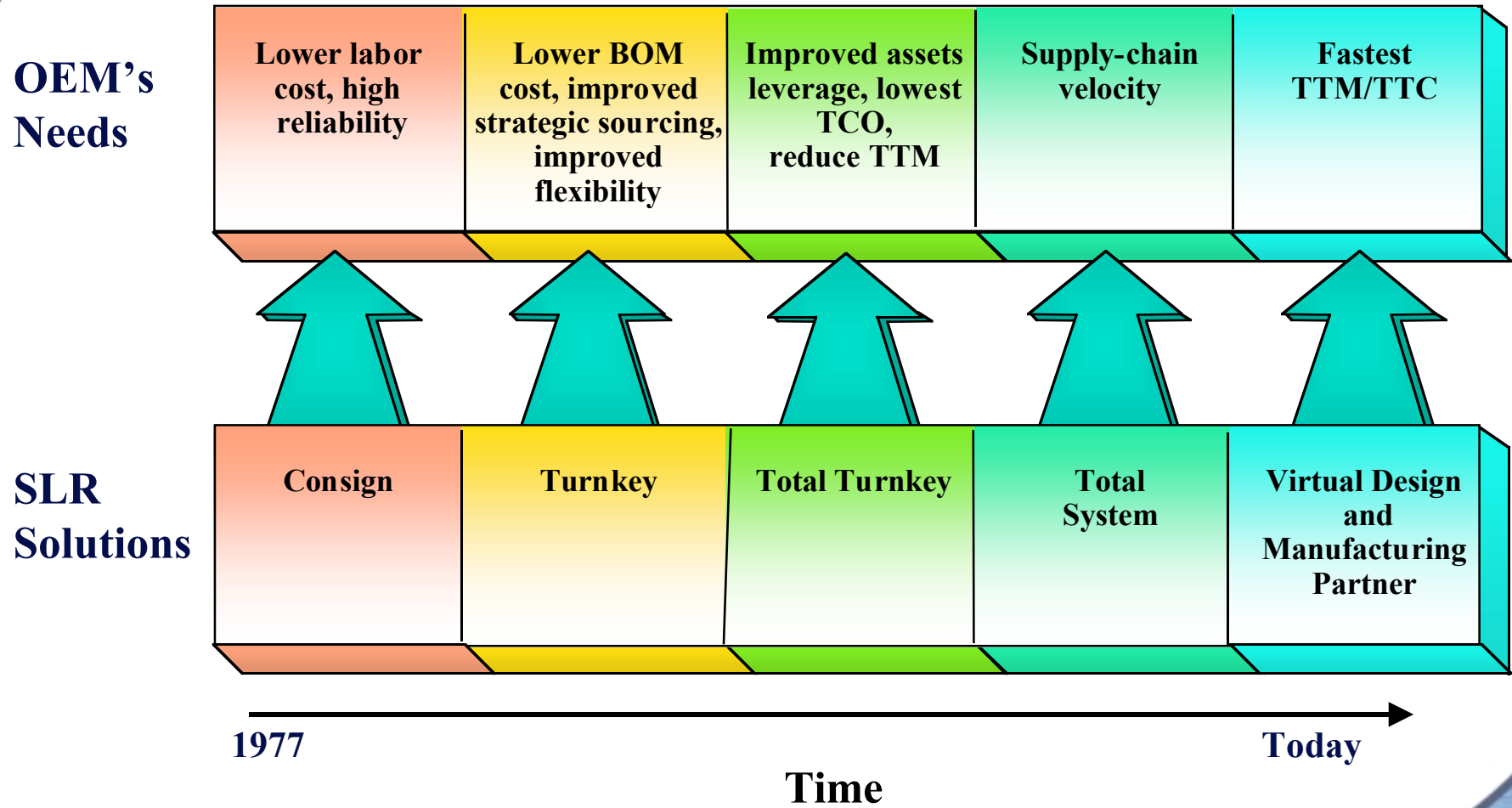


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Evolution of OEM's Outsourcing Requirements

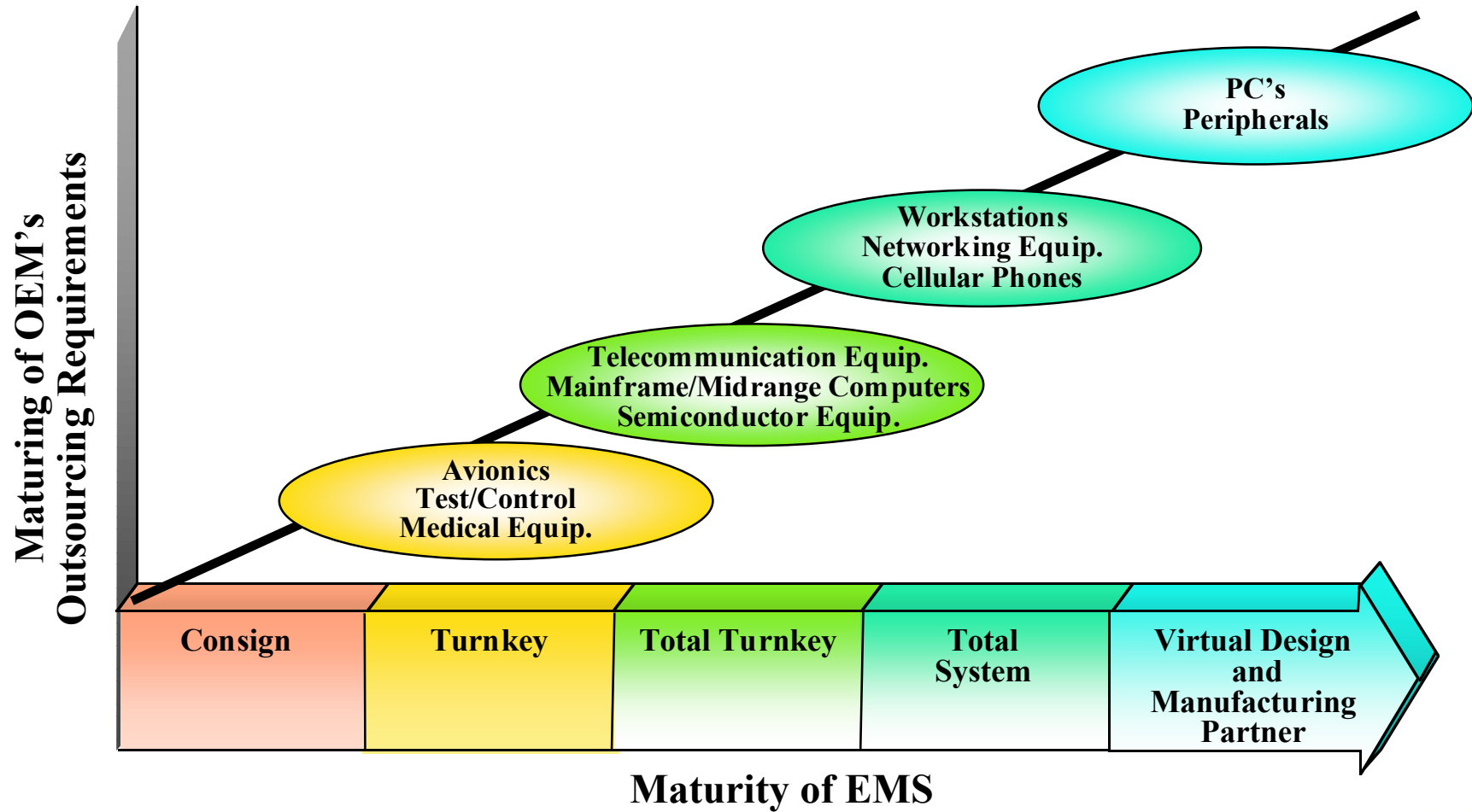


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Evolving Customer Needs



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Manufacturing Development Strategy

- **Key Differentiator: OEM and EMS**
 - **Flexibility to Work with Different Sets of Design Rules**
 - **Rapid Transfer and Ramp Up**
 - **Quick Change-Over**
 - **Standard Placement Times and Intra-Site Comps**



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Manufacturing Development Strategy

- Consortia
- Academia
- Supplier Partnerships
- Customized Solutions



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Manufacturing Development Strategy

■ Program Specific

- Customized Services: Where and When Needed
- Unique Design Specific Solutions - Concurrent Development

■ Program Generic:

- Applicable to All. Best Return!



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Manufacturing Development Strategy

■ Program Generic:

- **Moves Entire Industry Forward. Effective when Conducted in Collaborative Environment – Academia, Suppliers, EMSs, OEMs.**
 - **No Lead**
 - **Repairable Underfill**
 - **Odd Form Component Placement**
 - **Automated Processes for Optical Products**
 - **“Universal” or Flexible Test Fixtures**
 - **Yield Prediction Modeling**



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Conclusion

- **EMSs capturing the next wave of OEMs' strategic outsourcing**
- **Anticipating and positioning for the market evolution**
- **Our focus is on providing total supply-chain solutions through Development Programs – Consortia, Academia, Supplier Partnerships, Joint Development with OEMs, and In-House Programs.**





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**A Global Leader Providing
Electronic Manufacturing
Outsourcing Solutions**



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