Semiconductor design Outsourcing: Global trends and Indian perspective

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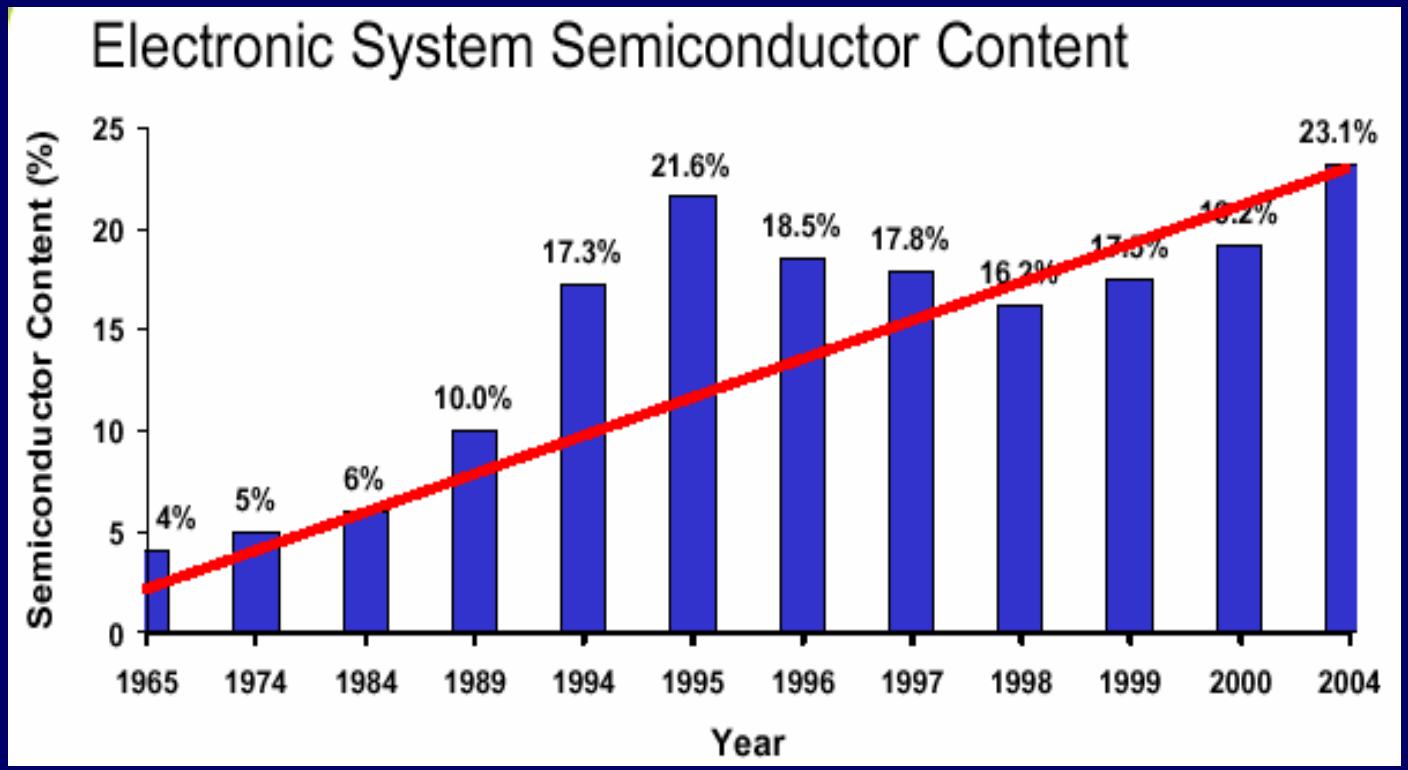
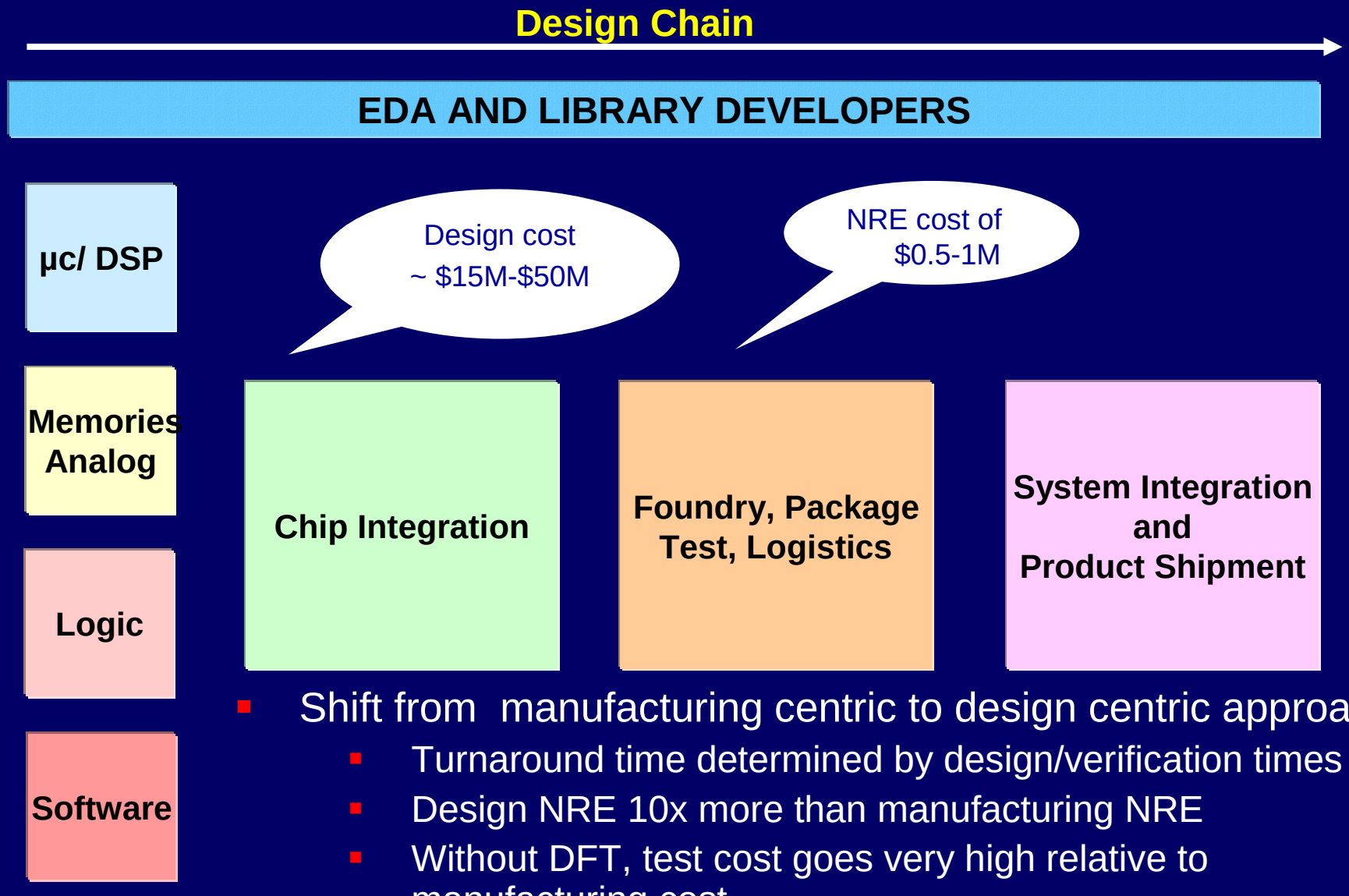
Role of Semiconductors in Products



Source: IC Insights

- Semiconductor content in end product increasing
  - Eg. Automotive: semiconductor content per vehicle is increasing roughly 6 percent to 8 percent a year

Semiconductors - Design is the key

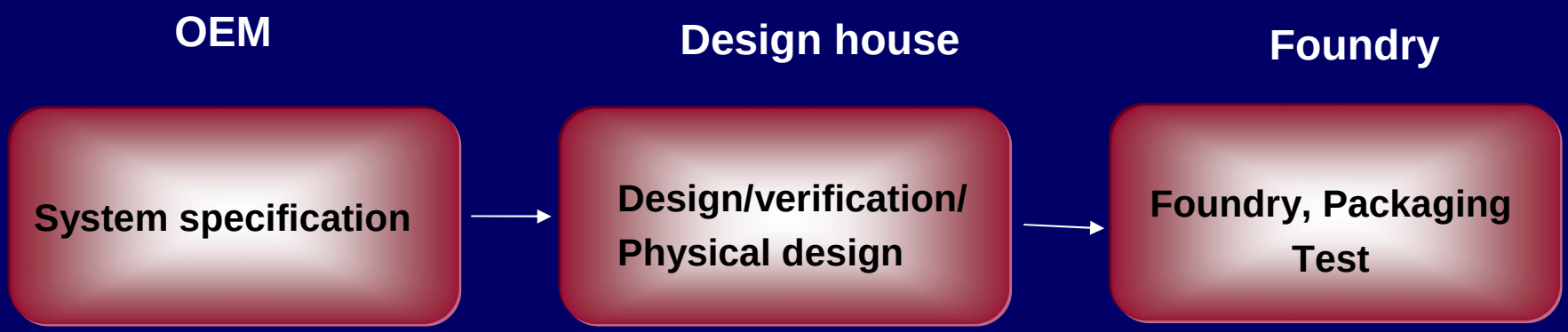


- Shift from manufacturing centric to design centric approach
  - Turnaround time determined by design/verification times
  - Design NRE 10x more than manufacturing NRE
  - Without DFT, test cost goes very high relative to manufacturing cost

Design challenges

- Productivity gap
  - Expected 300K gates/PY to actual 100K gates/PY in 2001
  - Verification complexity
  - Move towards ESL and higher IP reuse to enhance productivity
- Getting it first time right
  - About 50% of defects due to functional and timing issues
  - Other issues seen are mixed signal interface, IR drop, clocking, power, noise issues
- Predictability in timelines
  - 3 months late (1 year product life)= $500M loss
- Software needs
- Effective project management and multi-location/multi-vendor interactions
- Push for error tolerance in devices in the future will call for more design implementation activity

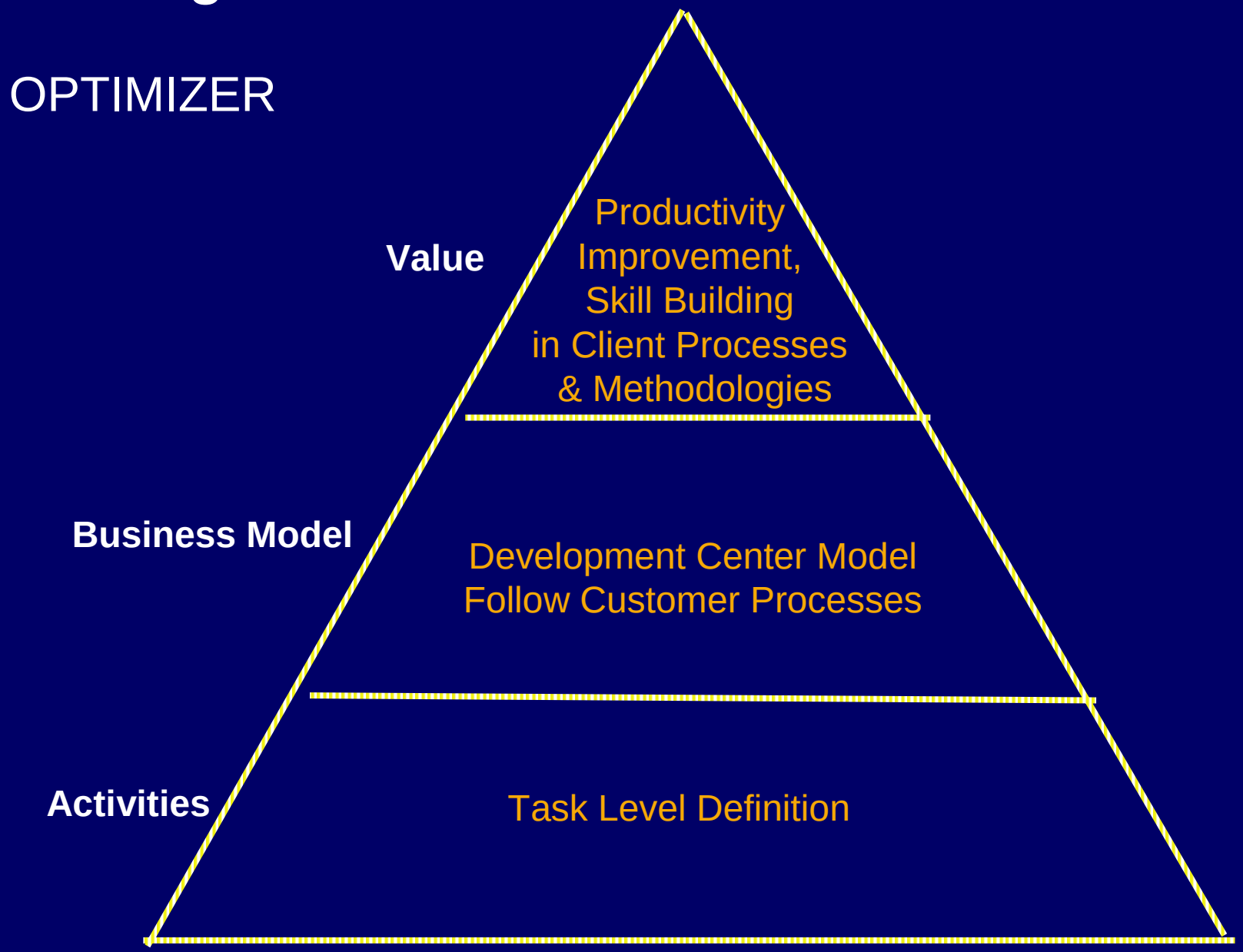
Design services model



Design services drivers

- Dis-aggregation creates more specialization outside each company
  - More companies focus on core competency and depend on partners to bring in other specialization
  - IP Companies (ARM, Virage Logic, Artisan), Foundries (TSMC, UMC, Chartered), Contract manufacturers
- Resource requirement surge
- Partners for complementary skills
  - Reference solutions
  - Derivative designs
- Better financial ratios
  - Better revenue per employee
  - Optimum resource utilization

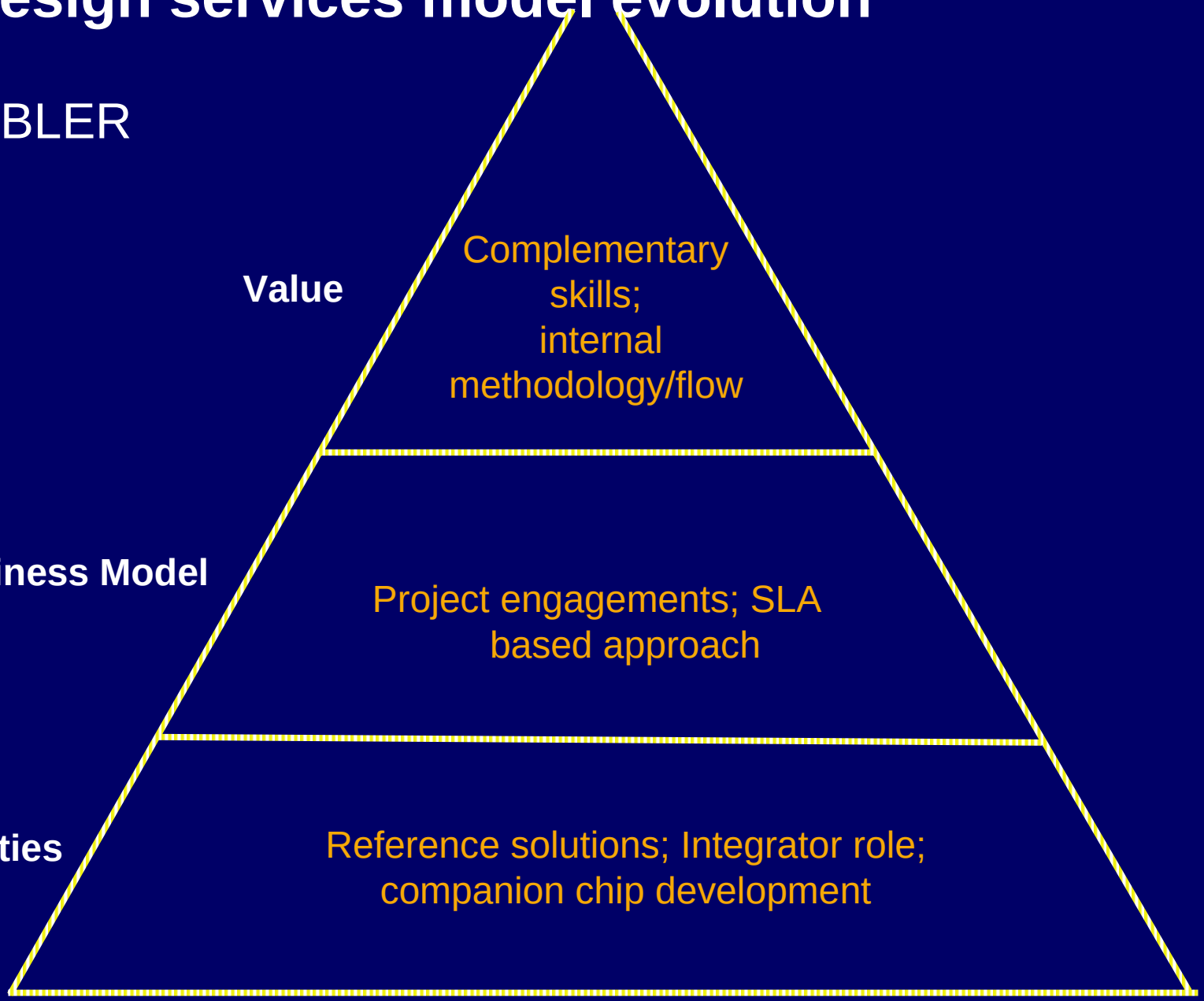
Design services model evolution



Source: Gartner

Design services model evolution

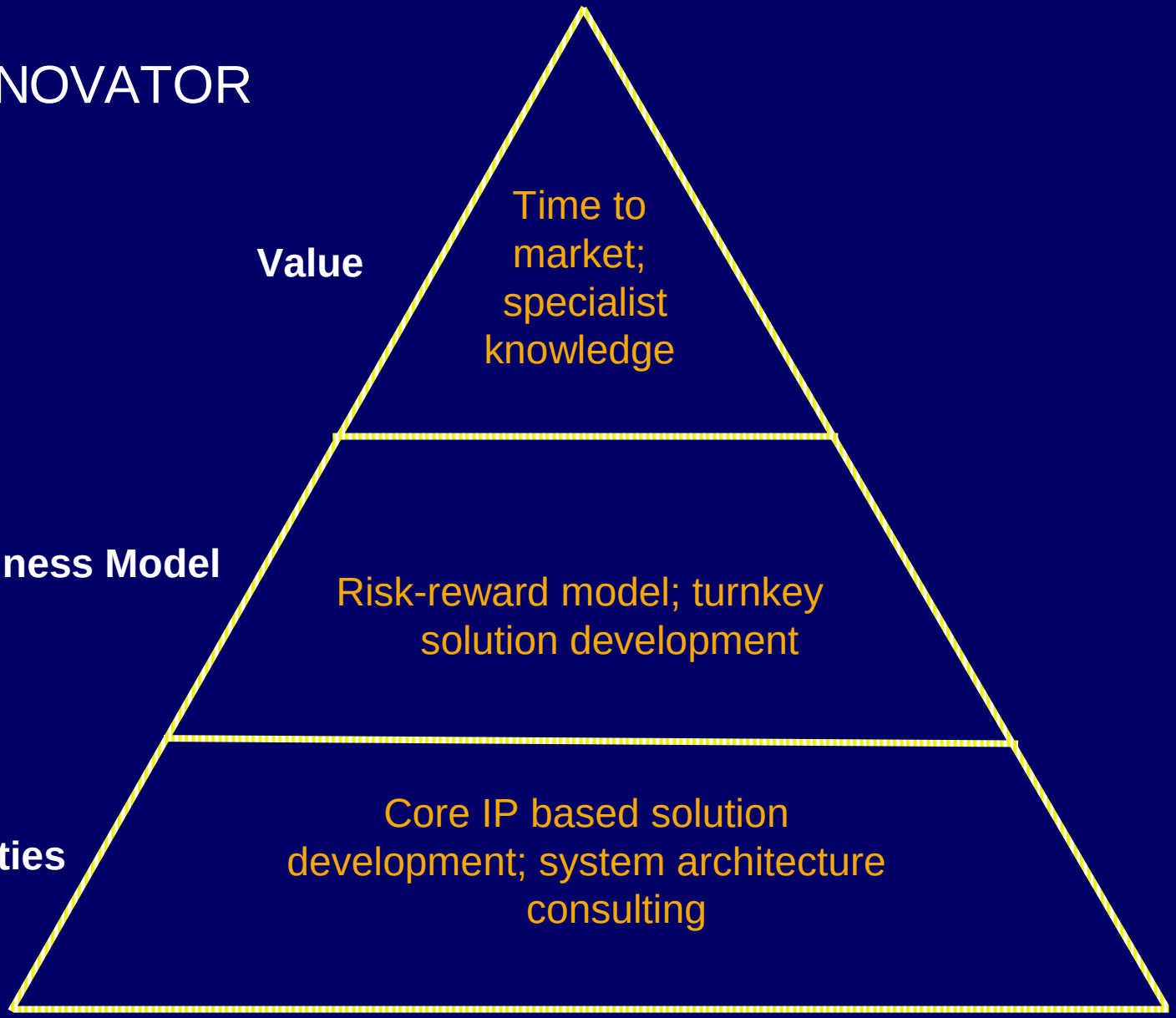
ENABLER



Source: Gartner

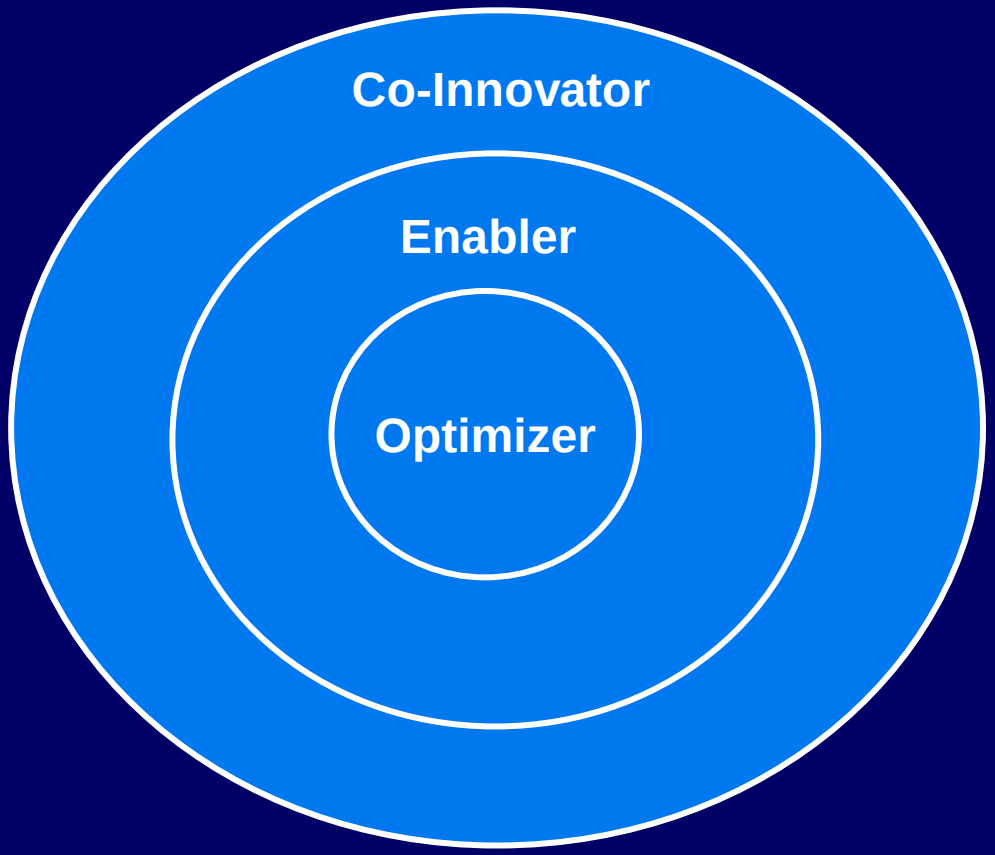
Design services model evolution

CO INNOVATOR



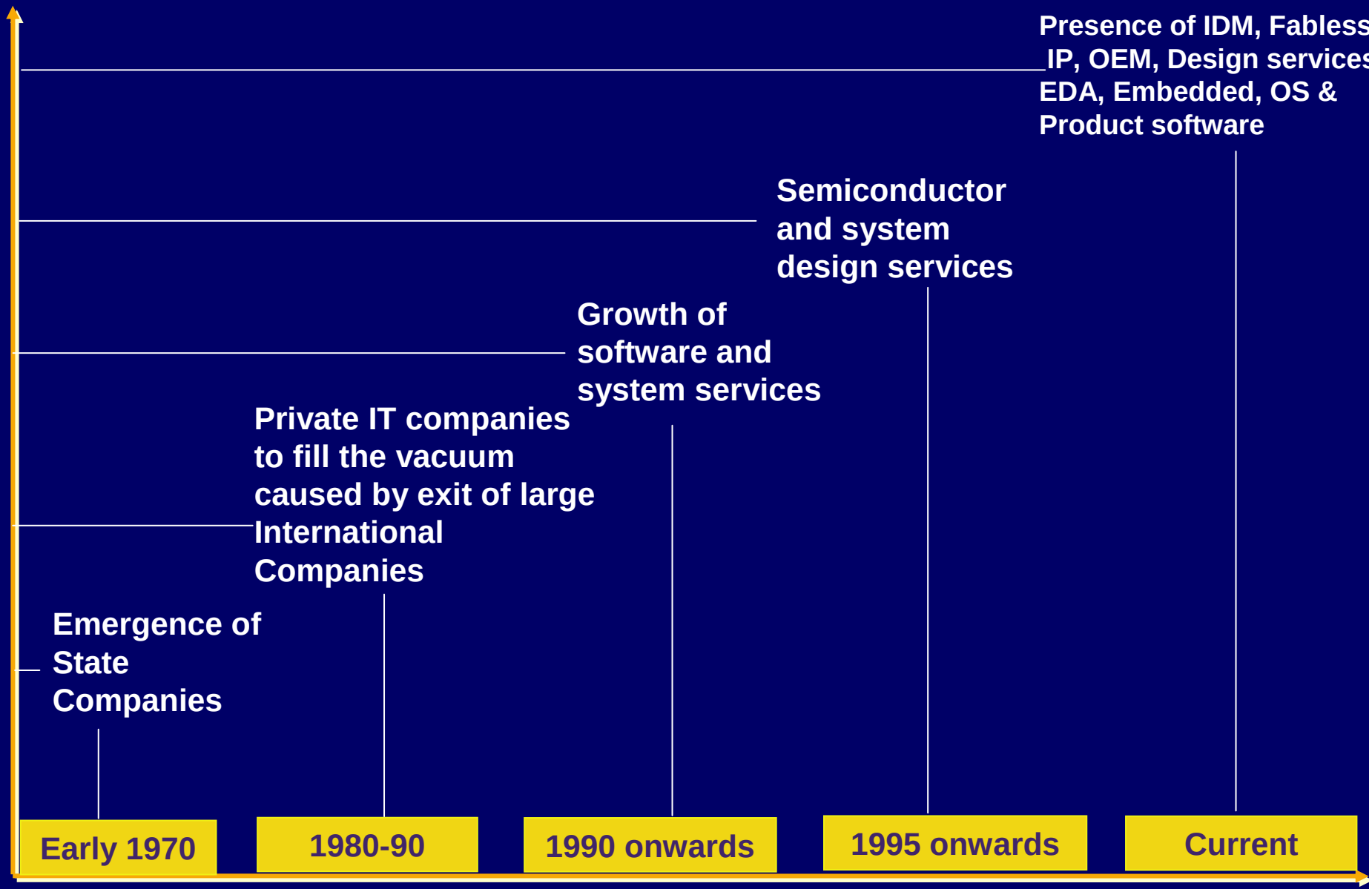
Source: Gartner

Design services model evolution



Source: Gartner

India evolution in IC design space

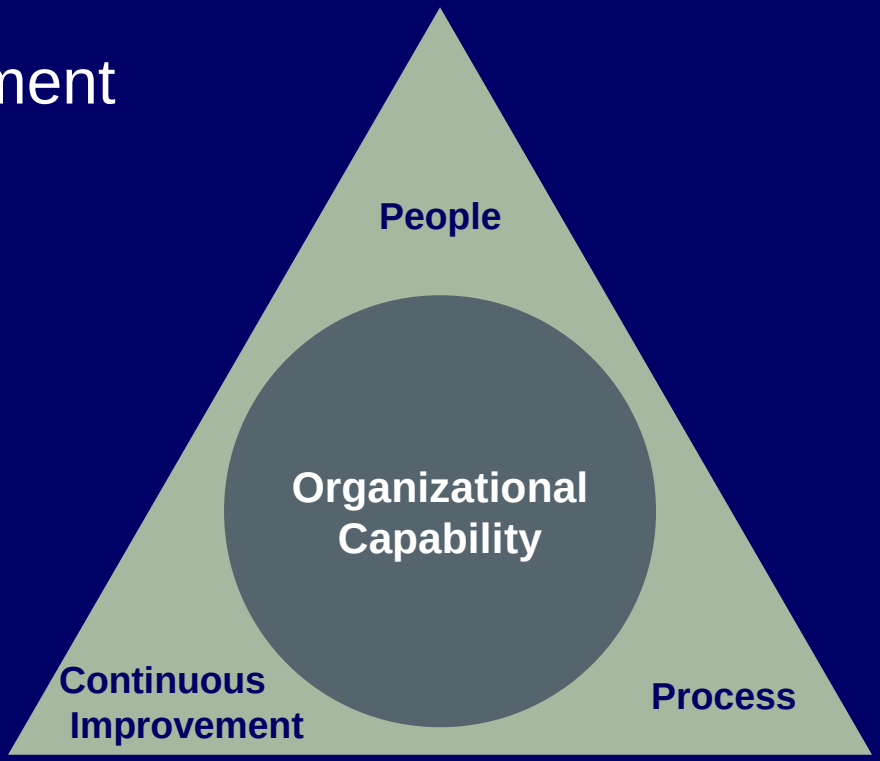


India differentiators

- Talent
- Companies with systems expertise
- Quality process framework
  - Minimize iterations
- Global development model
- Eco system – EDA, IP, software, fabless product, design service, Contract manufacturing, ASIC design houses, universities
- Industry-university linkage

Quality process framework

- Benefit of high process maturity
- Program management focus
- Focus on productivity improvement



Summary

- Design competency is a key differentiator
- Trend towards outsourcing of product implementation
- Challenges for design service companies
  - Diverse needs from different market segments
  - Technical and managerial talent pool
  - Continuous investment in processes, methodologies, training

Design outsourcing is here!

Period	*Outsourcing trends*
1960s	Mask set, packaging, test
1970s	Design automation tools
1980s	Pure play foundry
1990s	Pure play IP vendors
2000s	Independent design?

Thank you