

**strategy+business**

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**Innovators Without Borders Webinar**  
**Globalization of Engineering study**

July 17, 2007

# Today's speakers are leaders in the Booz Allen Innovation Team



**Kevin Dehoff**  
**Vice President and Innovation Team Leader**  
**New York**



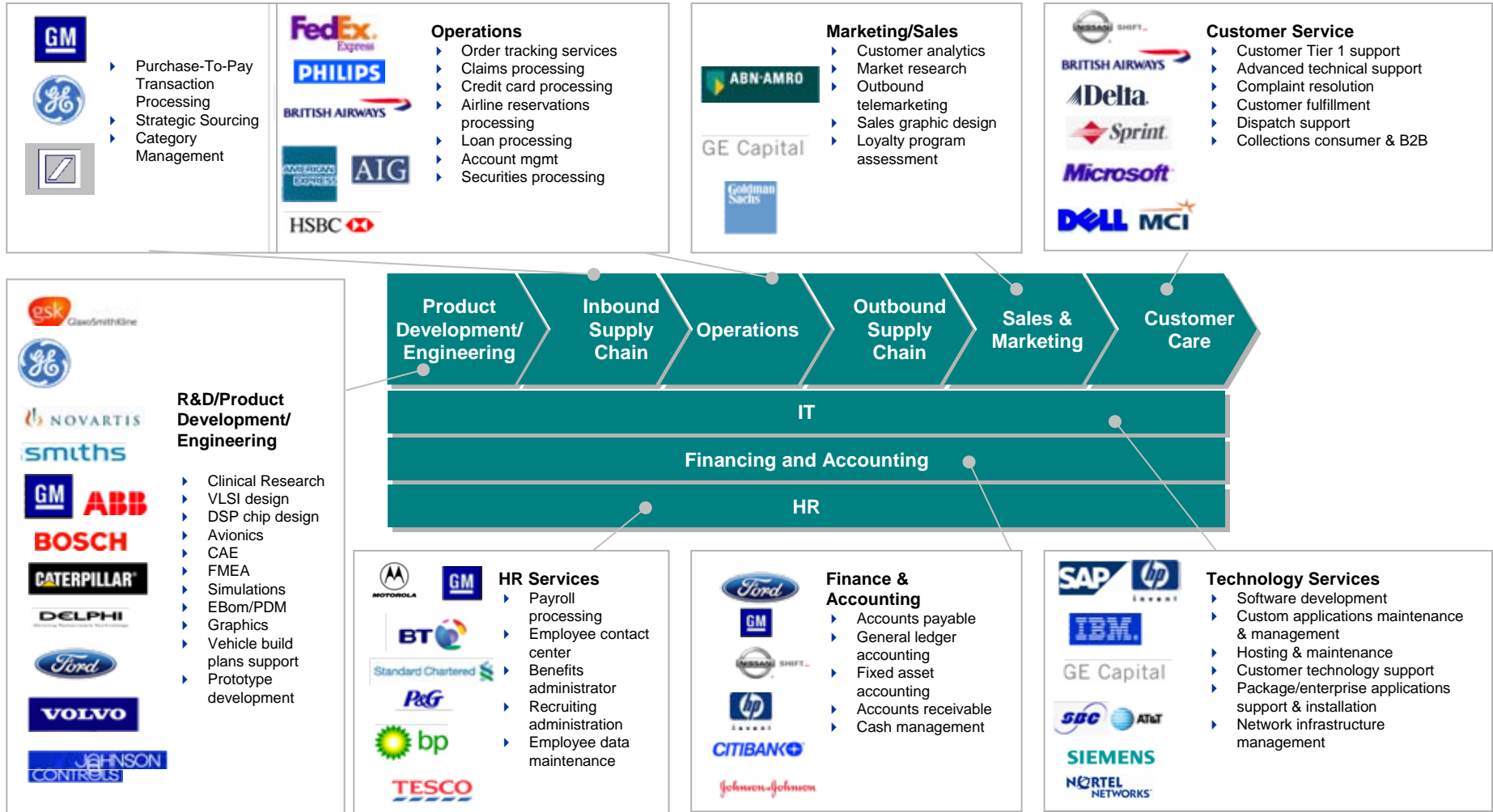
**Vikas Sehgal**  
**Principal and Executive Director, India Business**  
**New York**

# Contents

- ▶ **Engineering Services Market Opportunity**

- ▶ Competition for Offshoring ES Market
- ▶ Corporate View of Offshoring Engineering

# Companies are outsourcing and offshoring activities across the value chain – including Engineering and R&D



# The study assessed global demand for offshoring engineering services to India along five sectors and four service offerings

**The Scope**

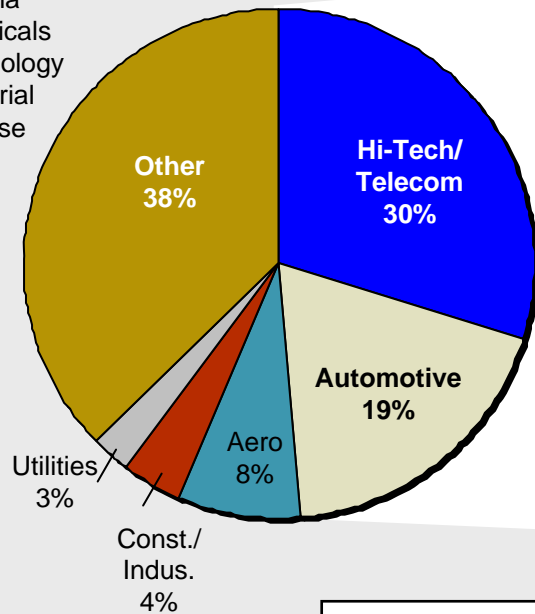
		Sectors & Sub-sectors				
Service Offerings		Automotive	Aerospace	Hi- Tech/ Telecom	Utilities	Construction & Industrial Machinery
Product and component design						
Plant design						
Process engineering						
Plant maintenance & operations						

**Study was completed with India's National Association of Software and Service Companies (NASSCOM)**

# Global spend on engineering, research and development is projected to exceed \$1 trillion by 2020

Engineering Spend By Sector  
(2004)

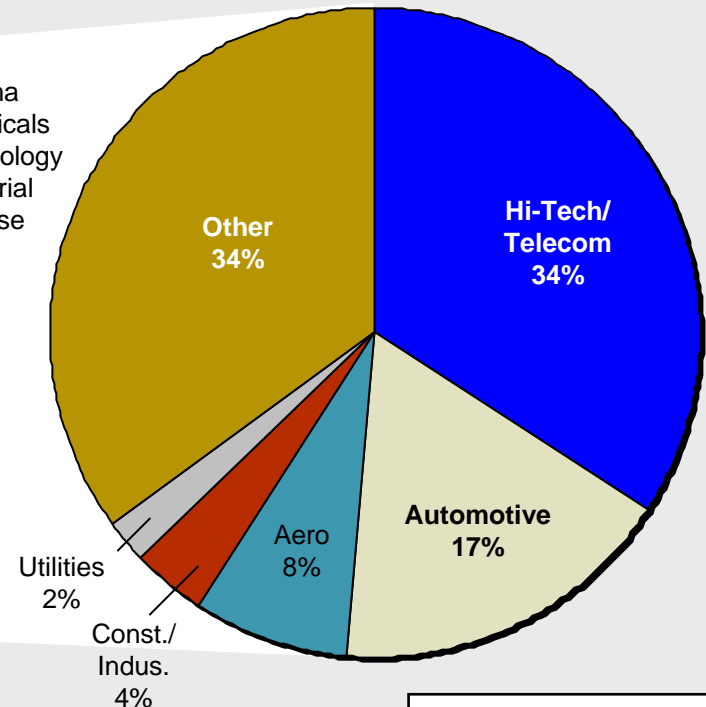
- ▶ Pharma
- ▶ Chemicals
- ▶ Technology
- ▶ Industrial
- ▶ Defense



Total = \$746 Billion

Engineering Spend By Sector  
(2020)

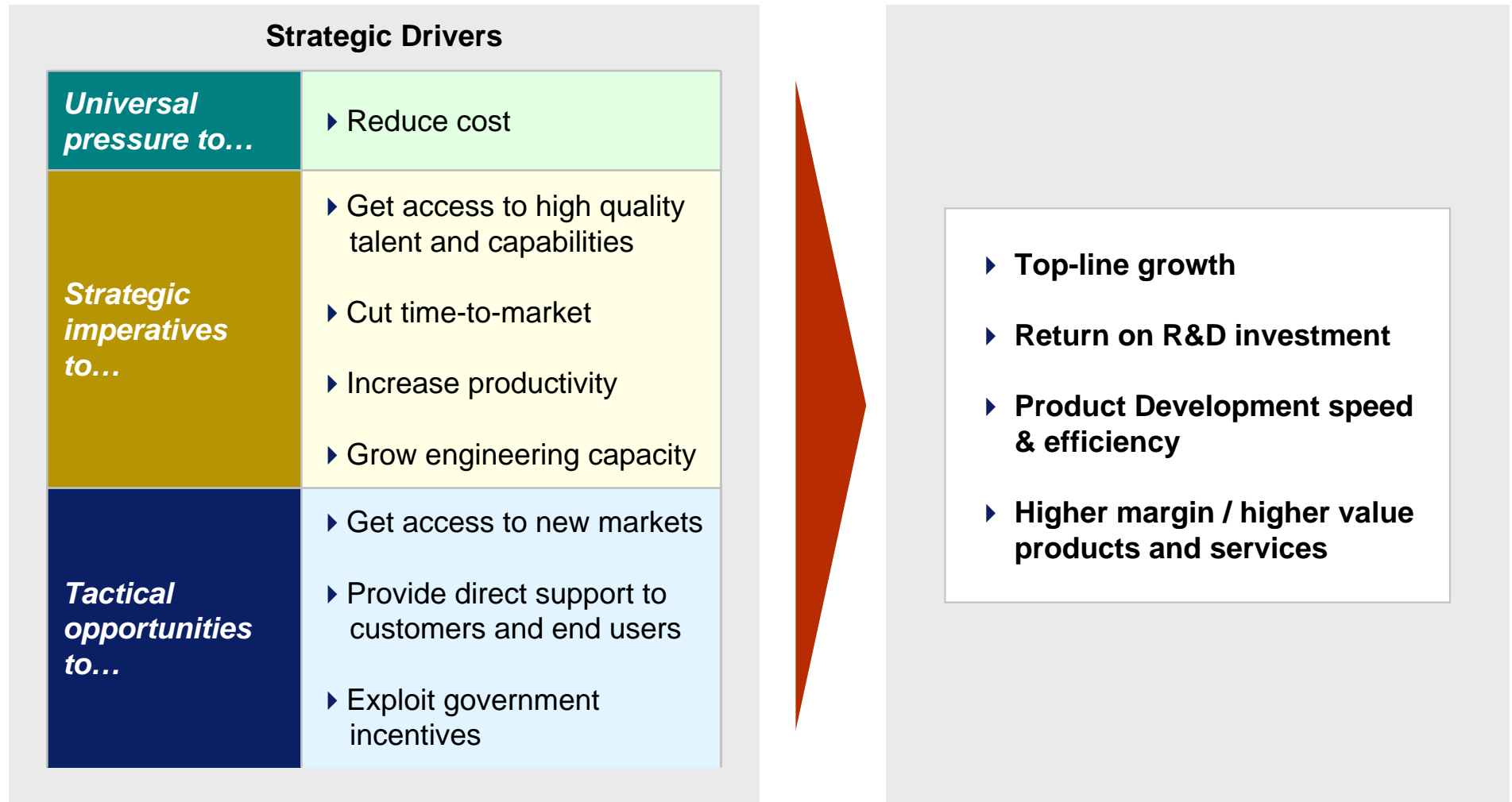
- ▶ Pharma
- ▶ Chemicals
- ▶ Technology
- ▶ Industrial
- ▶ Defense



Total = \$1,100 Billion

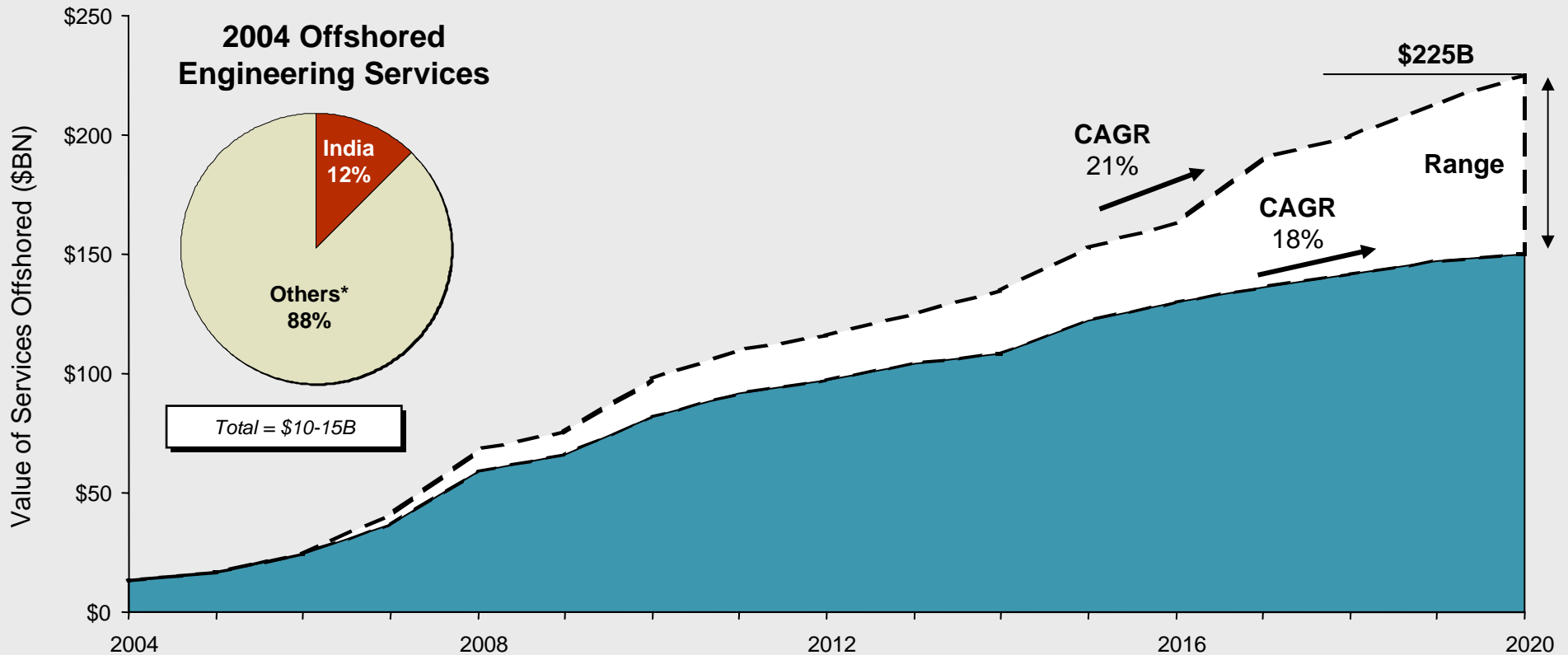
Source: Booz Allen Hamilton engineering spend database, World Investment Report; U.N. Developing Countries Report

# While growing, spend on engineering & technical services is under pressure to produce increasing returns



# Today, about \$15B of engineering services work is done offshore – by 2020 it will be \$150B

Offshored Engineering & Technical Services  
(2004– 2020)

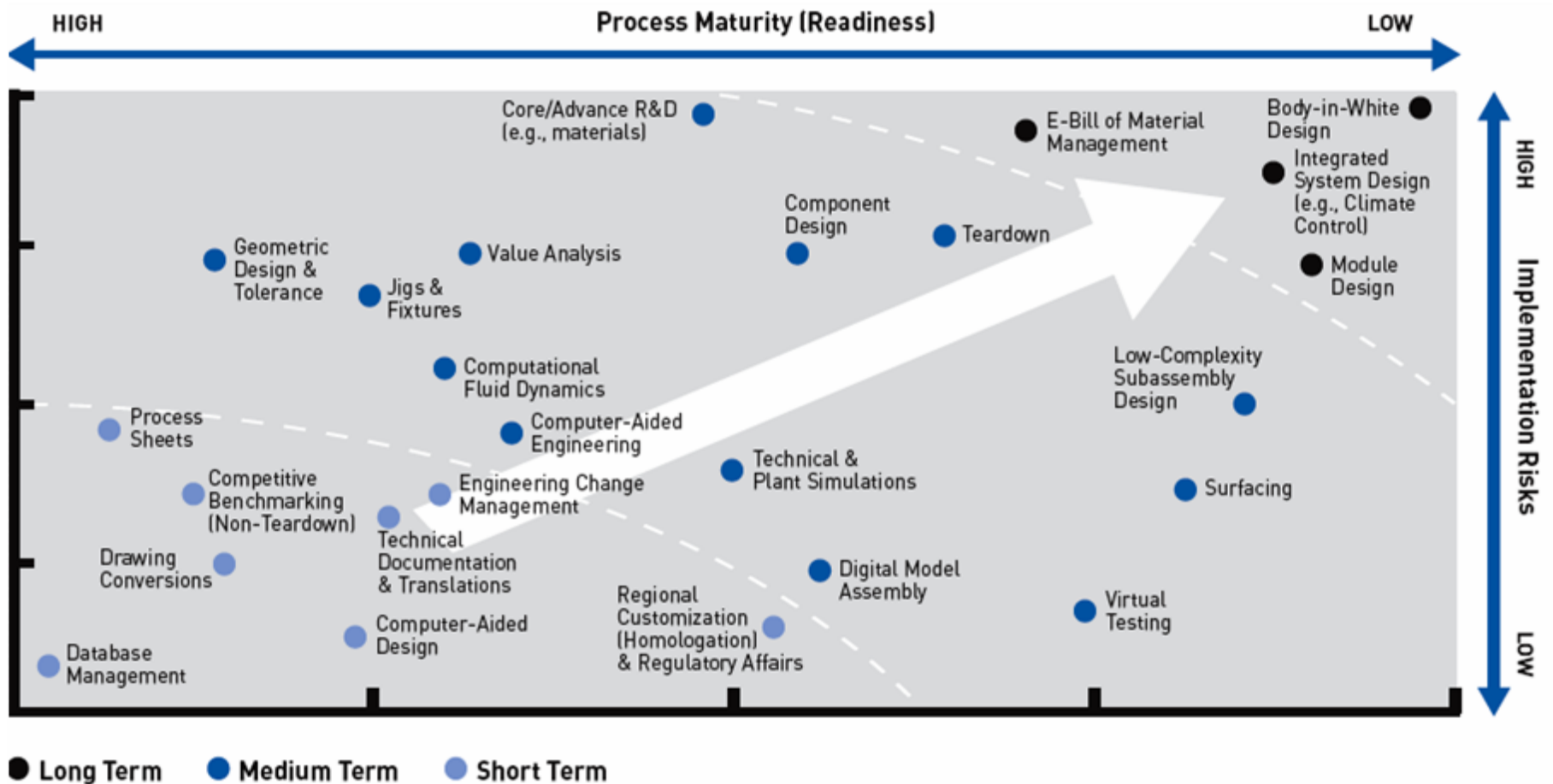


\* "Others" includes all countries offering lower wages than high cost countries – includes Canada, Mexico, Eastern Europe, Brazil, ASEAN, and China

Source: Booz Allen Hamilton engineering spend database and intellectual capital; World Investment Report; U.N. Developing Countries Report; industry and expert interviews

# As the supply base matures, processes of increasing complexity are being done offshore

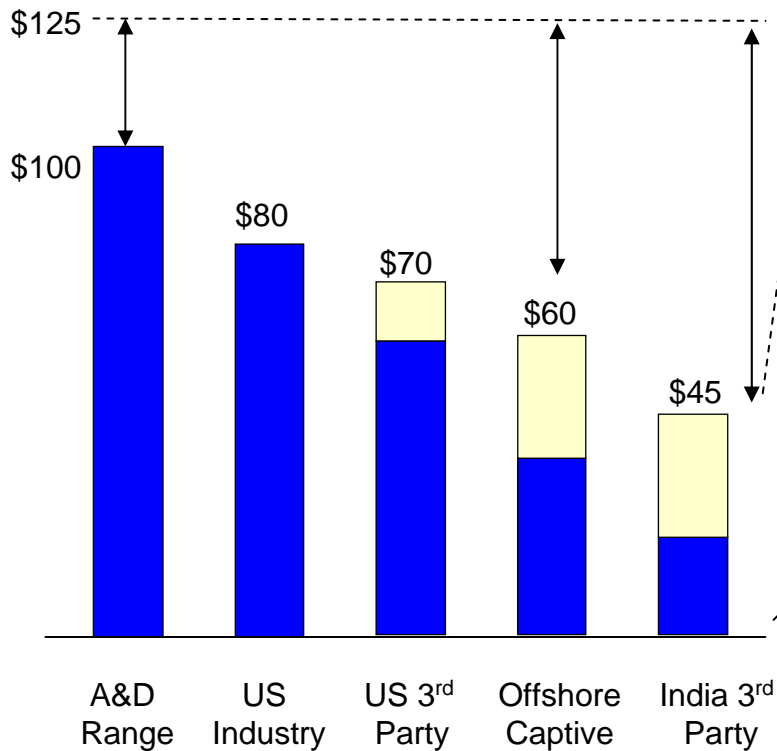
**AUTO SECTOR  
EXAMPLE**



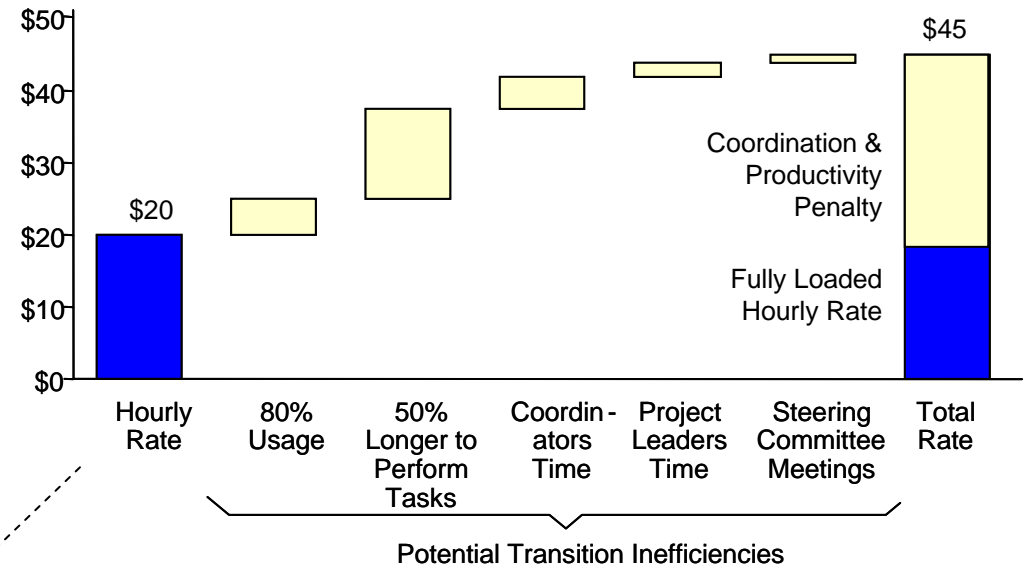
Source: Booz Allen Hamilton engineering spend database and analysis

# Today, cost is the primary driver of offshore engineering – with labor arbitrage of 50% or more

Fully-Loaded Hourly Engineering Rate Comparison

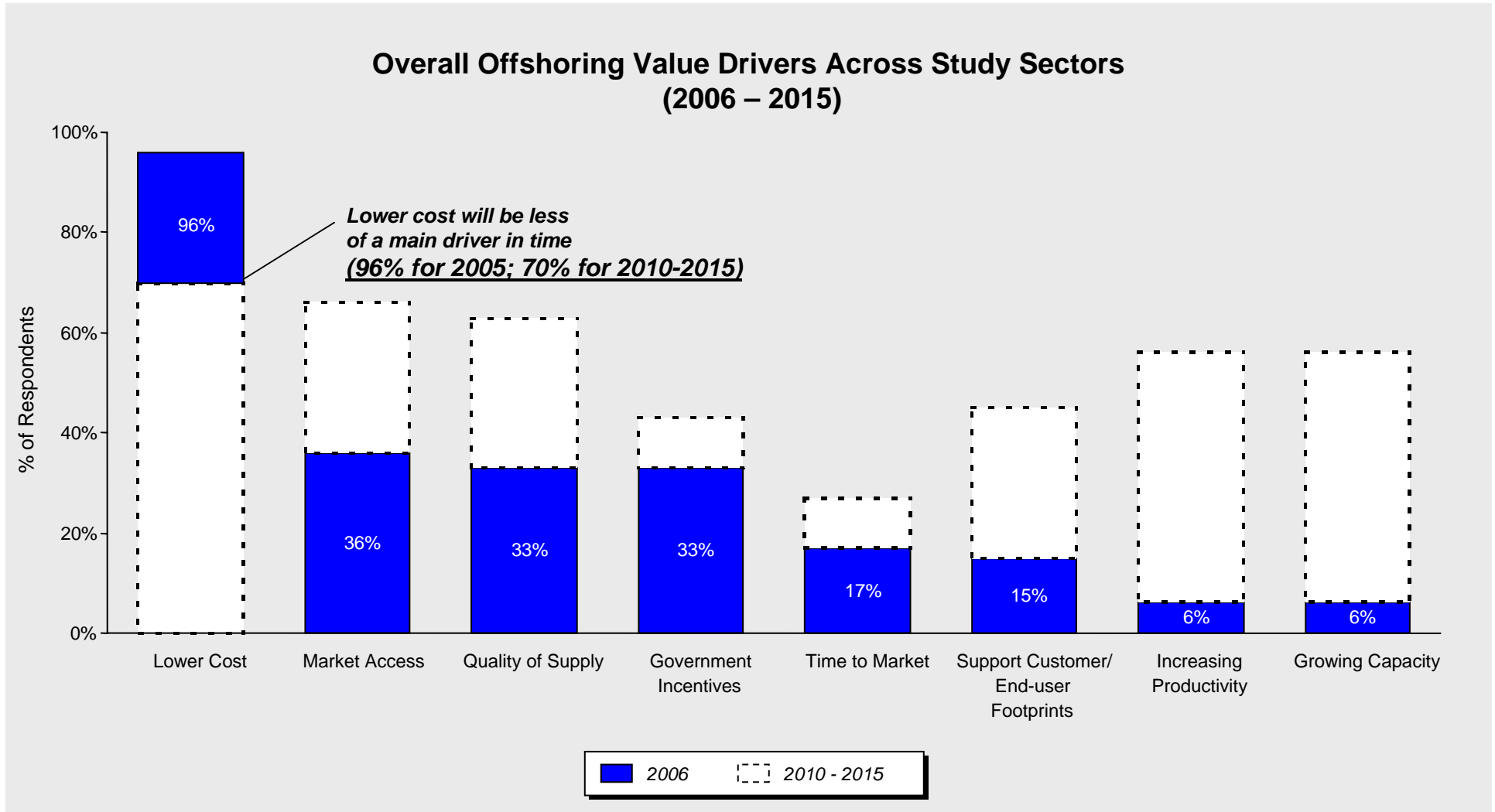


Total Effective Offshore Rate Build-Up — India —



Source: Booz Allen Hamilton interviews and analysis

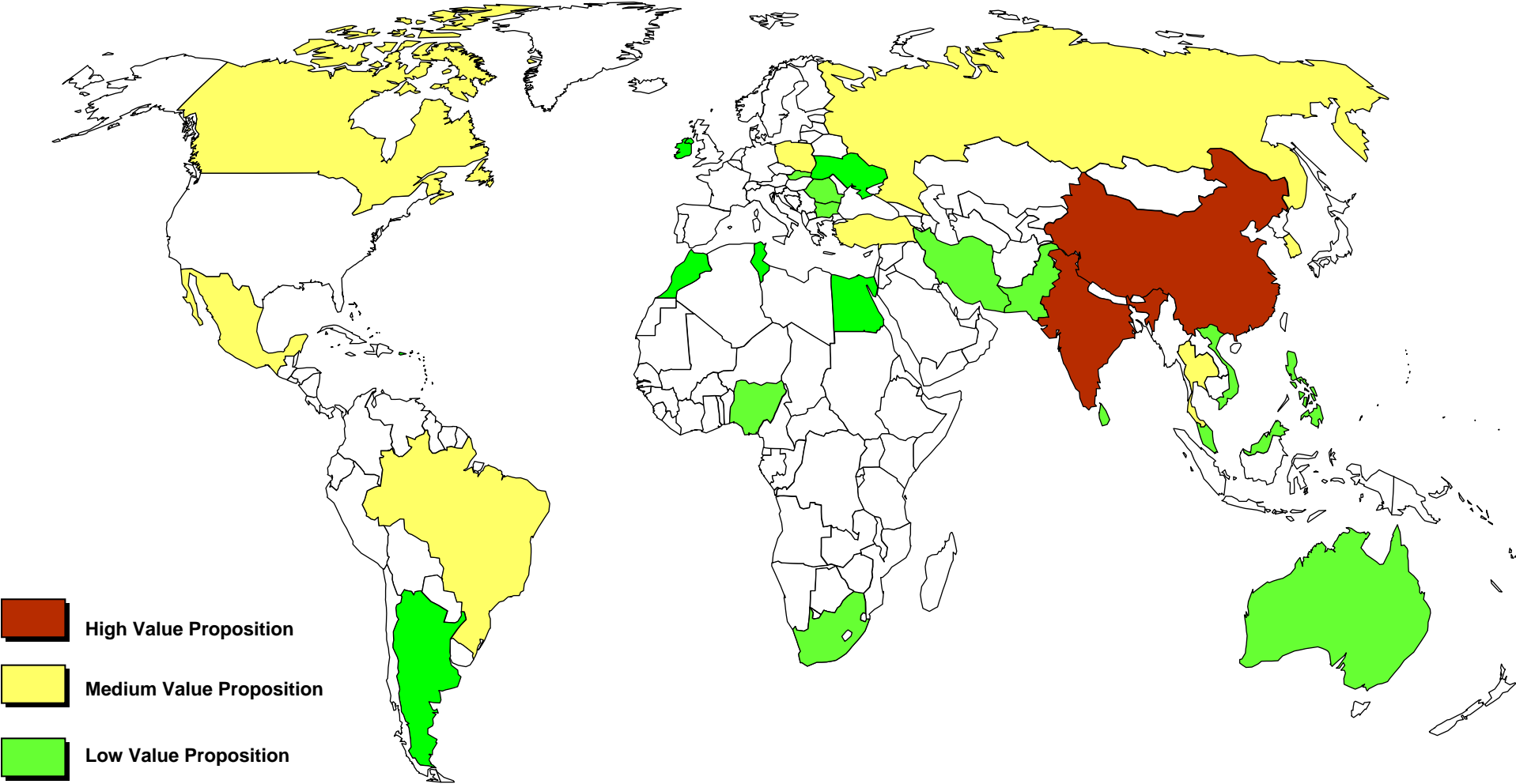
# In time, the value proposition of offshoring is expected to shift -- lower costs will be complemented by more strategic value drivers



Source: Booz Allen Hamilton interviews and analysis

# Companies have a wide array of options in building a global footprint for engineering and technical services

Global Offshoring Supply Footprint

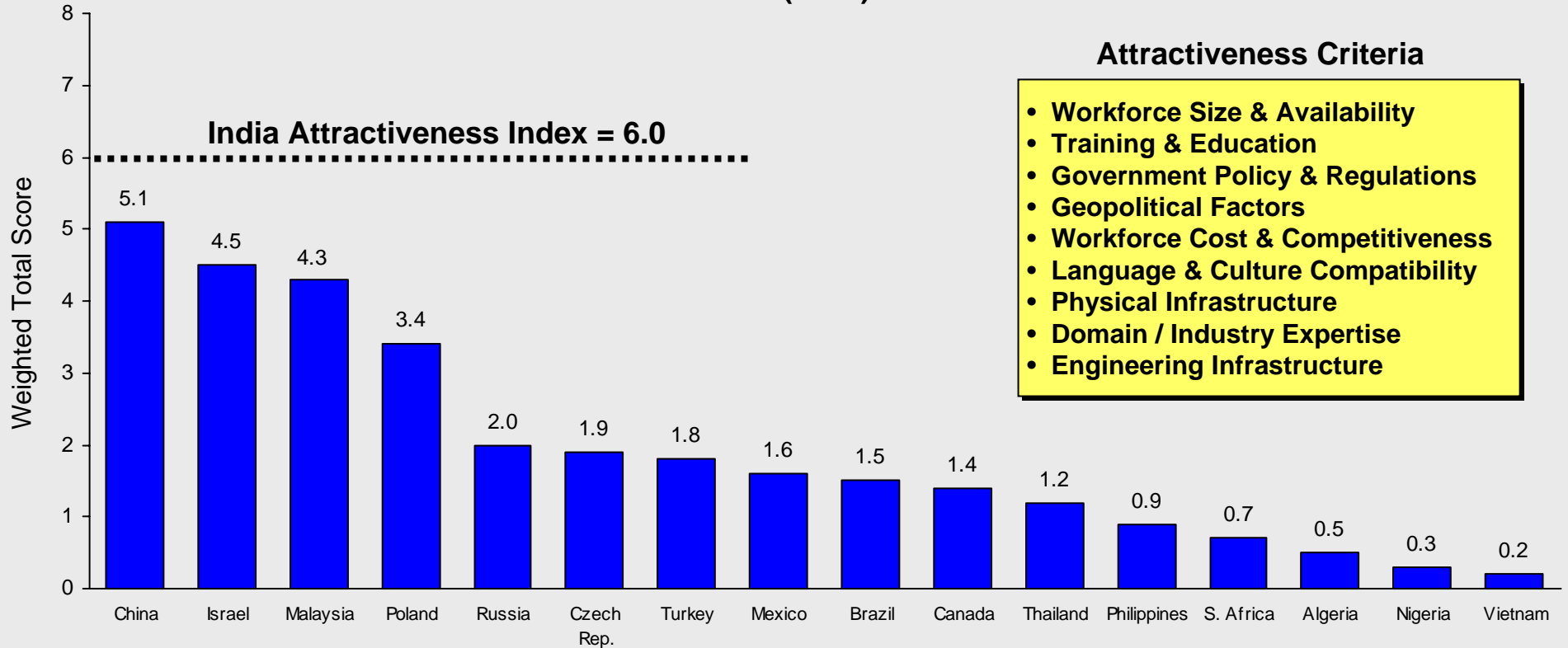


## Agenda

- ▶ Engineering Services Market Opportunity
- ▶ **Competition for Offshored ES Market**
- ▶ Corporate View of Offshoring Engineering

# India, China, and Eastern Europe are attractive sources of engineering services

Engineering Offshoring Industry  
 India's Overall Competitive Position vs. Competitors  
 (2005)



Source: World Investment Report; U.N. Developing Countries Report; Booz Allen intellectual capital and analysis

# India offers a unique combination of attributes that will make it a viable and sustainable source for engineering

## India's Position Across Offshoring Value Drivers (2006-2020)

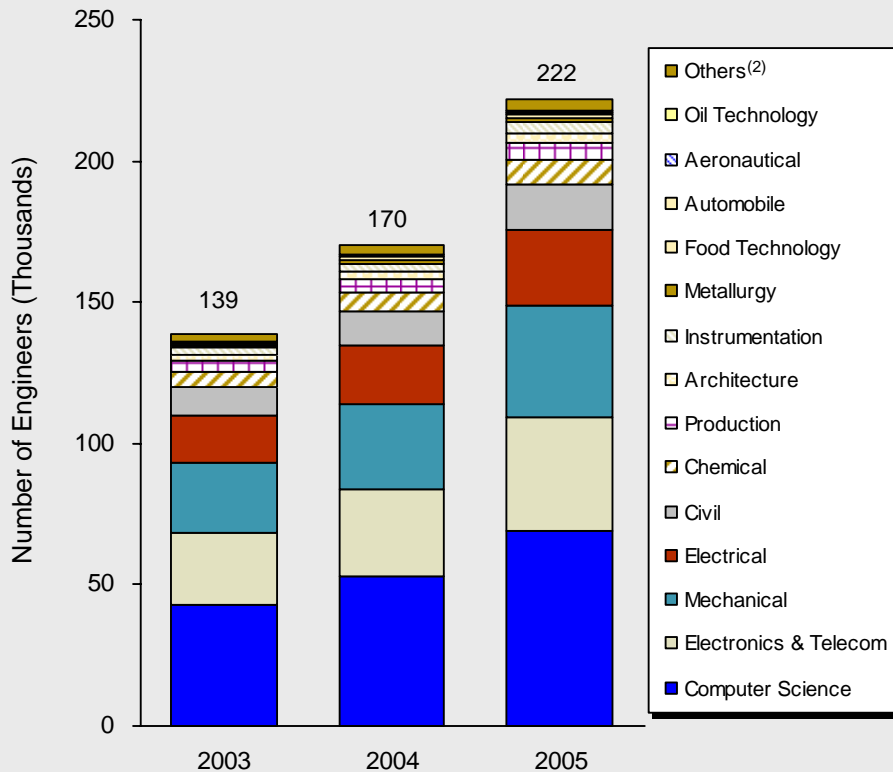
Value Proposition	India's Position (2006)	Discussion	India's Potential Position (2020)
Lower Cost	●	India has one of the lowest labor costs	◐
Talent Pool	●	India dominates the talent pool needed to support offshoring	●
Quality of Talent	◐	India's talent pool is capable of meeting global standards	●
Delivery Capabilities	●	ITO helped develop delivery model and vendor base for offshoring	●
Supply Base	◐	India has a vibrant and expanding supply base to support offshoring	●
Local Market	◑	India is one of the fastest growing markets in the world	●
Time to Market	◐	India's geographic position offers the possibility of a 24-hour cycle	●
Growing Capacity	◐	India offers an economic way of expanding technical capacity	●
Increasing Productivity	◐	India offers high-quality talent pool	●
Support Customer	◐	Corporations are setting operations for offshoring, and local markets	●
Government Incentives	◐	The Indian government is working on incentives to attract FDI	◐

◐ Weak Position      →      ● Strong Position

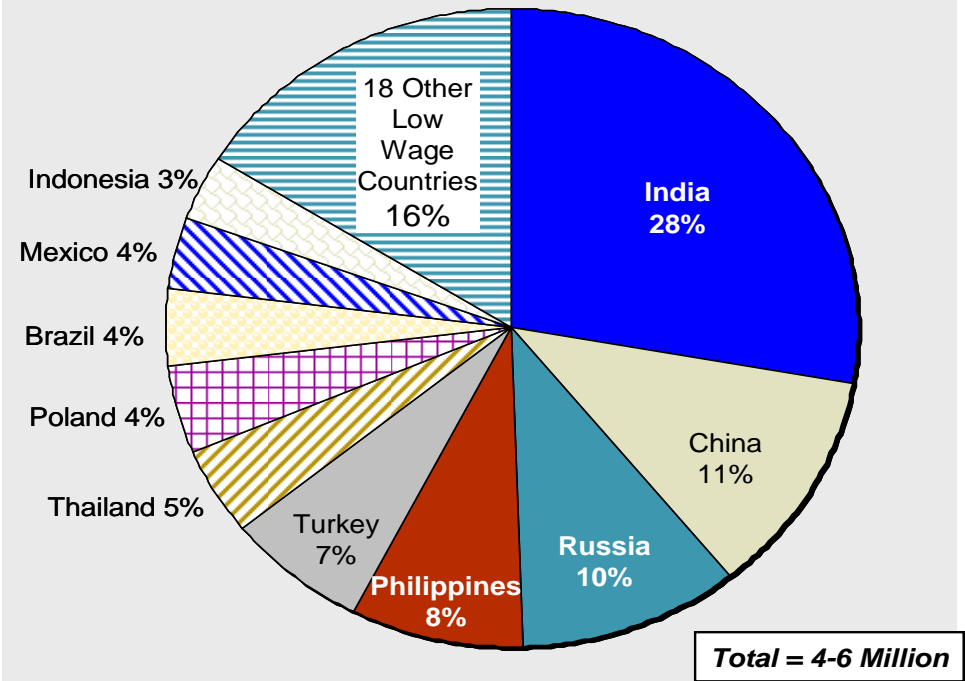
Source: Booz Allen Hamilton interviews and analysis

# For example, India produces more than 200,000 engineering graduates per year

Number Of Engineers Graduating – By Major (2003 – 2005)



Aggregate Suitable\* Graduate Talent Pool for Offshore ES & BPO

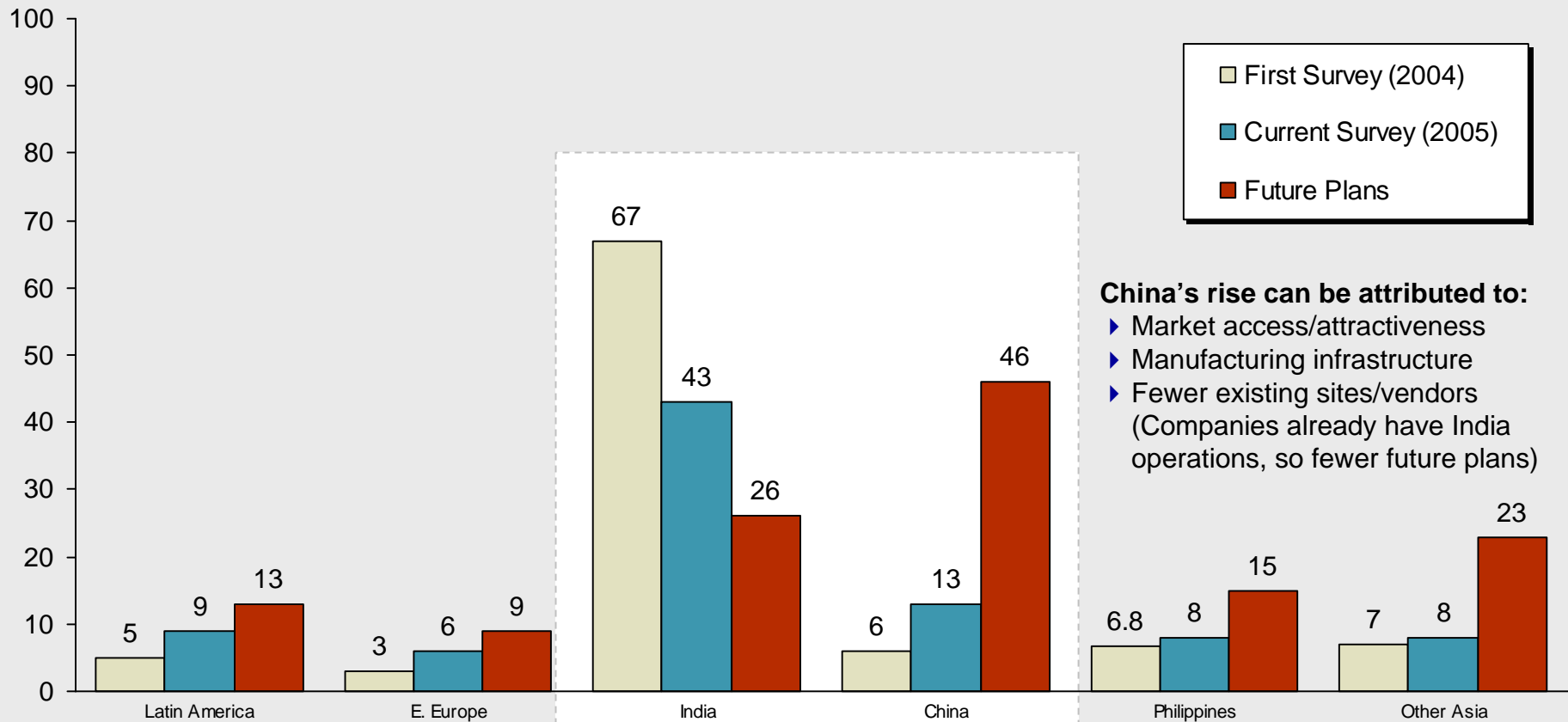


\* Graduates with skills for direct employment in IT/BPO and ES (does not consider willingness and accessibility of talent)  
Source: NASSCOM reports, Booz Allen Hamilton intellectual capital

# China and other regions attractiveness as an offshoring location continue to grow

Attractiveness as an Offshoring Base (2005)

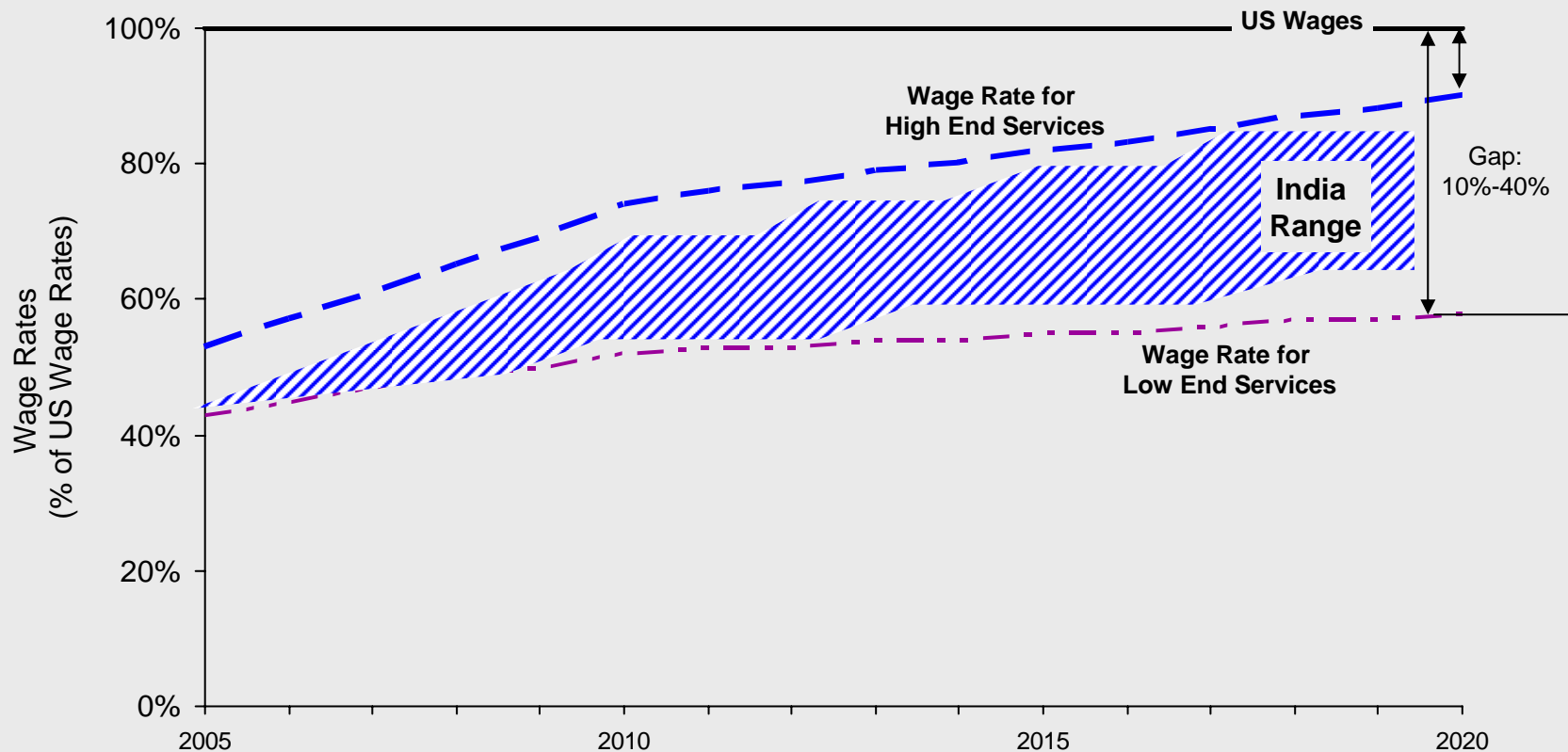
Percent of Companies



Source: Booz Allen Hamilton – Duke / CIBER Study

# As maturing offshoring locations move toward offering premium services, labor cost advantages are likely to diminish

Example: India-US Projected Wage Rate Differentials\*



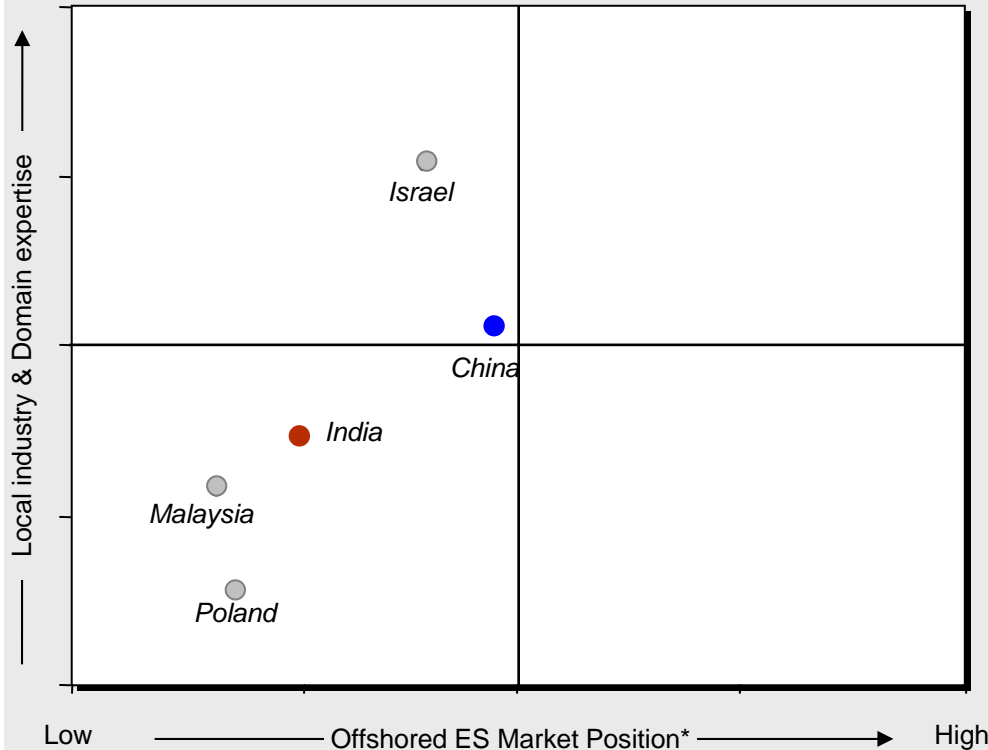
\* Wage Rate Differential is calculated as (India's Average Medium Skill Wage Rate / US Average Medium Skill Wage Rate)

Note: Wage rates are fully loaded – include all benefits, office, hardware & software expenses

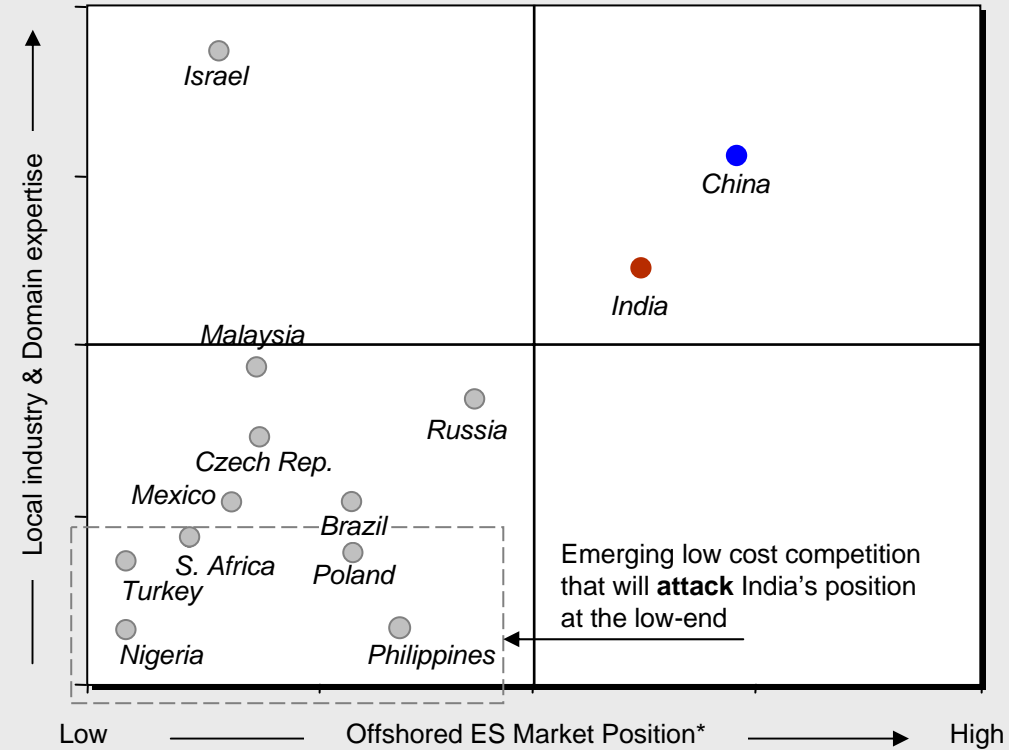
Source: World Investment Report; U.N. Developing Countries Report; Booz Allen intellectual capital and analysis

# The opportunity in engineering services offshoring market will attract many new, low-end entrants

Domain Expertise vs. Market Position  
Overall  
(2005)










Domain Expertise vs. Market Position  
Overall  
(2020)



Emerging low cost competition that will **attack** India's position at the low-end

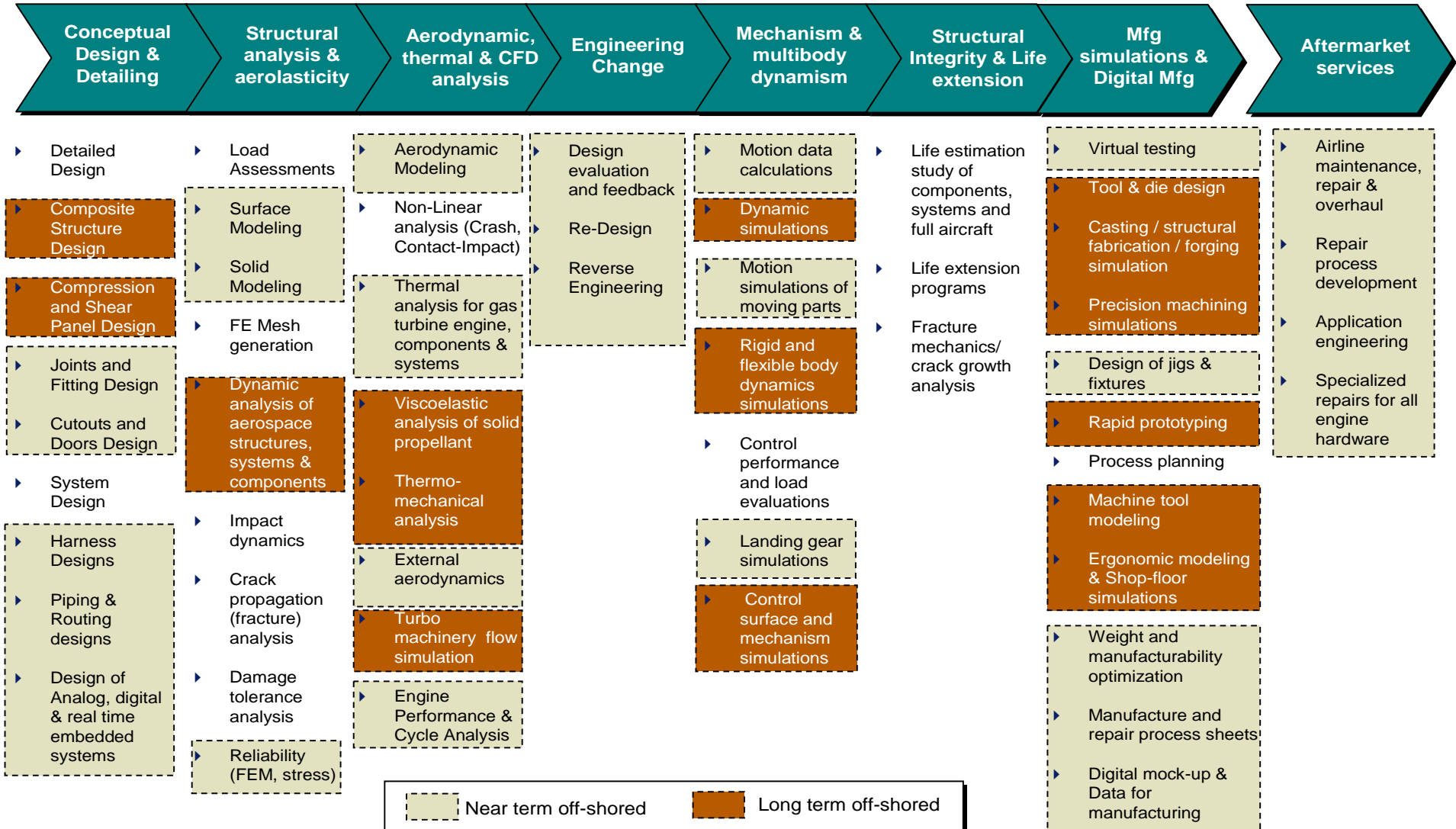
\* Market position represents relative strength of the country's position in market and considers factors like market share, sustainability etc., and accounts for captive and vendor models. Note: Charts are directional and position of data points estimated based on expert interviews and research; Scores for countries based on Booz Allen Country Assessment framework Source: World Investment Report; U.N. Developing Countries Report; Booz Allen intellectual capital and analysis

# There are many companies who will contend for this future opportunity

Segment	Description	Examples Companies
IT Offshoots	<ul style="list-style-type: none"> <li>▶ IT focused solutions – embedded electronics for automotive, avionics for aerospace, etc.</li> </ul>	
Pure Engineering Captives	<ul style="list-style-type: none"> <li>▶ Dedicated centers for international companies</li> <li>▶ Preferable for offshoring strategic activities</li> </ul>	
Independent Startups	<ul style="list-style-type: none"> <li>▶ Focused expertise in specific areas</li> <li>▶ Preferable for offshoring high-domain expertise/ customization required activities</li> </ul>	
US Transplants	<ul style="list-style-type: none"> <li>▶ US-based engineering services providers which move to India for cost arbitrage</li> </ul>	
Upstream Offshoots of Mfg Companies	<ul style="list-style-type: none"> <li>▶ Companies whom the core business is manufacturing but leverage their manufacturing expertise to capture engineering services market share</li> </ul>	
Joint Ventures	<ul style="list-style-type: none"> <li>▶ Partnership between customer and engineering service provider to jointly share the investments and operational costs</li> <li>▶ Provides know-how sharing</li> </ul>	
Engineering & Mechanical Captives	<ul style="list-style-type: none"> <li>▶ Comprehensive solutions—design through manufacturing</li> <li>▶ Have deep domain experience and capability</li> </ul>	

# Companies in many industry sectors are offshoring activities across the engineering value chain

## Aerospace Industry Example



## Agenda

- ▶ Engineering Services Market Opportunity
- ▶ Competition for Offshored ES Market

▶ **Corporate View of Offshoring Engineering**

# Engineering Offshoring offers a multitude of strategic benefits

## Economic

- ▶ Dramatically lower direct employee costs — which are only partially negated by additional overhead expenses such as travel, telecommunications and training
- ▶ Fully loaded cost differential of 50-60% between East Asia and US or Europe — Cost differentials will not disappear over the next years
- ▶ Serve local demand — play in emerging markets

## Quality Personnel

- ▶ Engineers are utilized for design services and design support in Asia as compared to re-skilled draftsmen in the US or Europe
- ▶ Large pool of highly qualified resources available — Quality engineers(1M+) and technically trained people (1.7M diploma holders) available in India alone

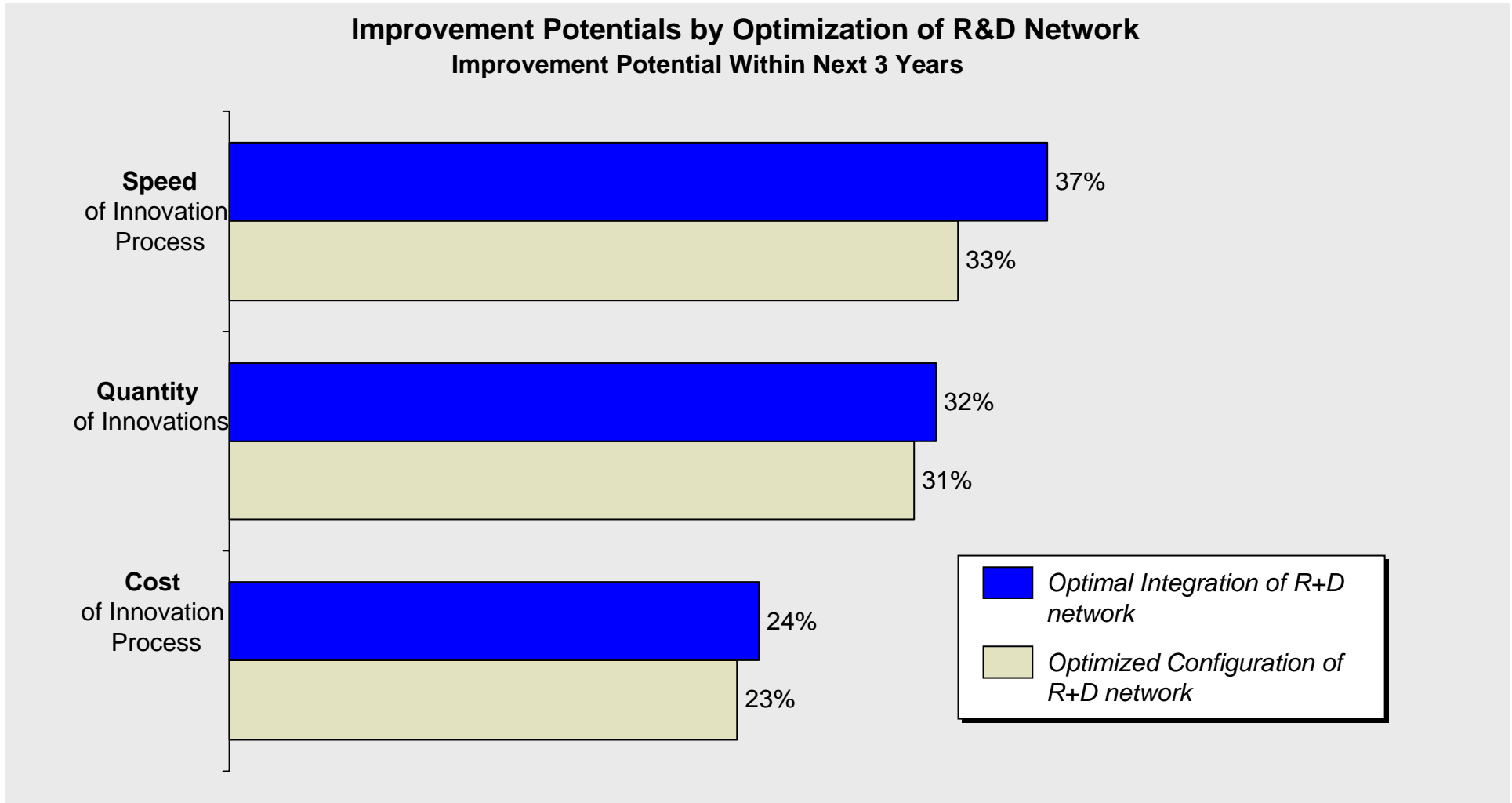
## Reduced Time to Market

- ▶ Time difference with the US or Europe enables efficient 24 hour working
- ▶ Operation can be up-scaled quickly to meet increased demand

## Out-of Cycle Improvements

- ▶ Lower cost resource base allows making additional bets – bets that couldn't have been made through resources based only in North America
- ▶ Innovation and R&D activities with long lead time and low customer interaction can be effectively handled remotely

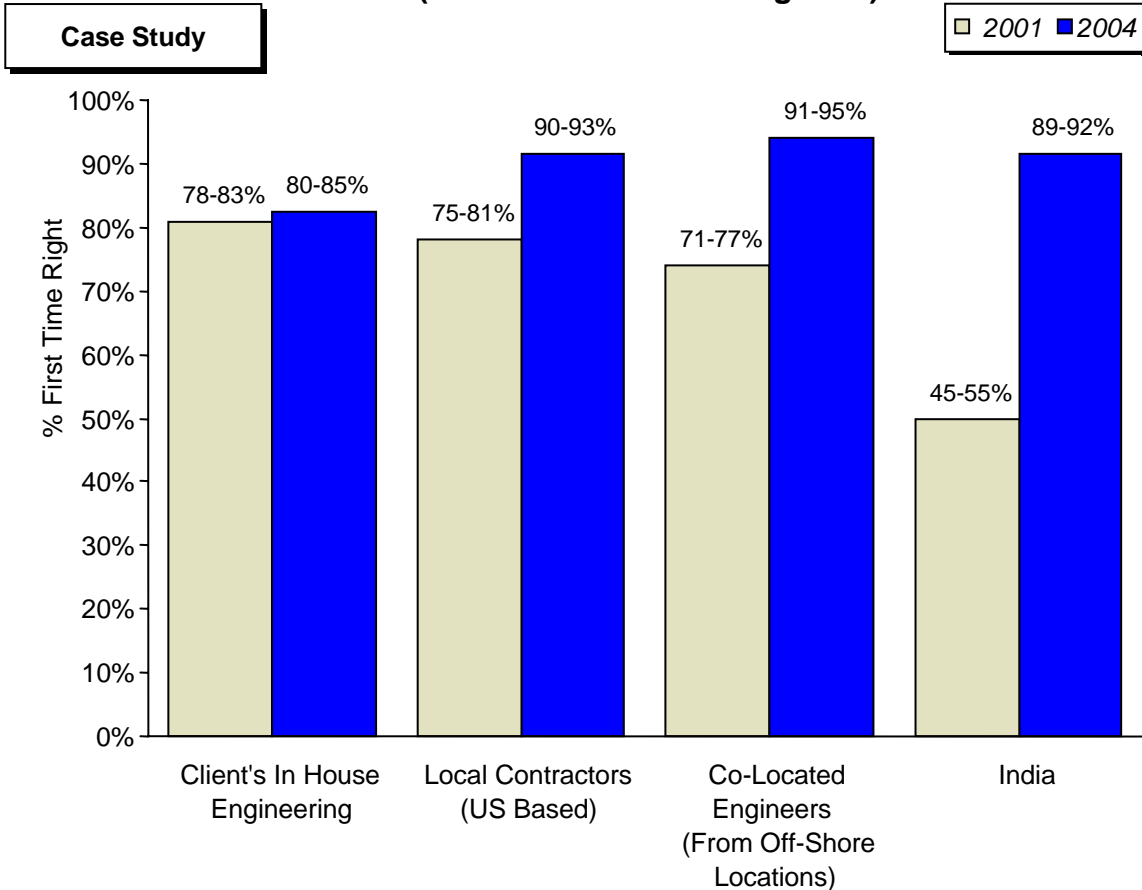
# Companies envision making gains in speed, cost, and innovation



Source: Booz Allen Hamilton – INSEAD Global Innovation Network Study

# For example, the talent pool is capable of learning quickly and, in time, operating at global standards

Measuring Quality Level: First Time Right Designs  
(For Similar Sets of Programs)

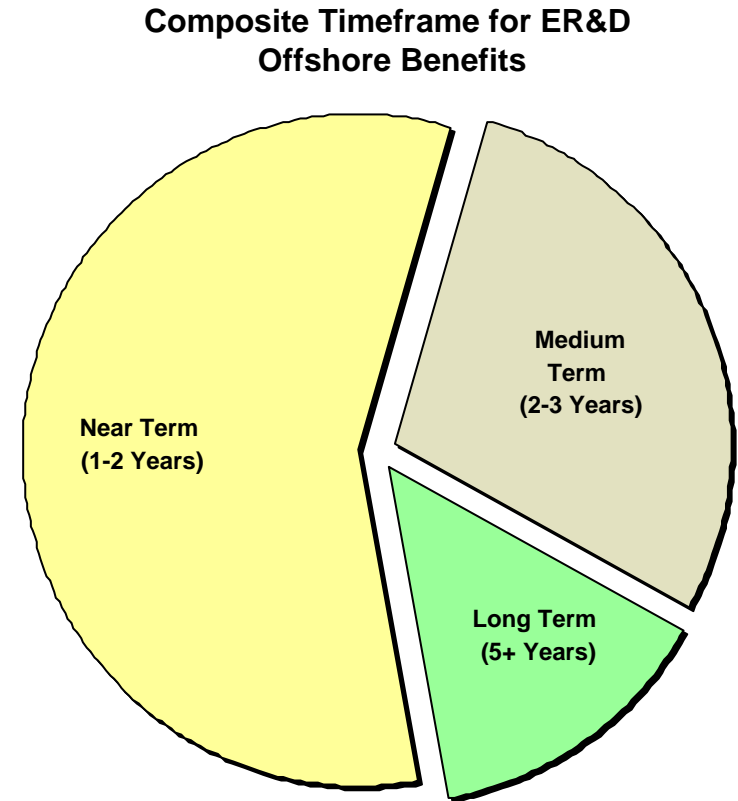
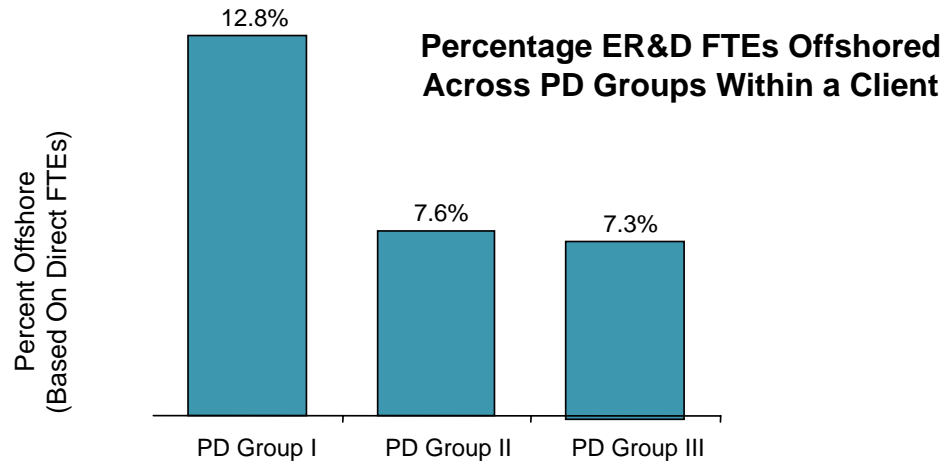
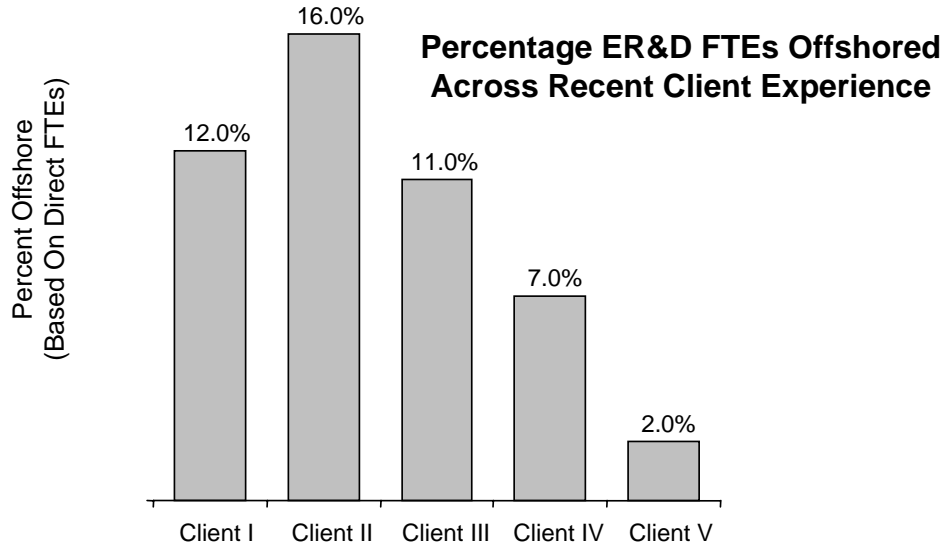


**Discussion**

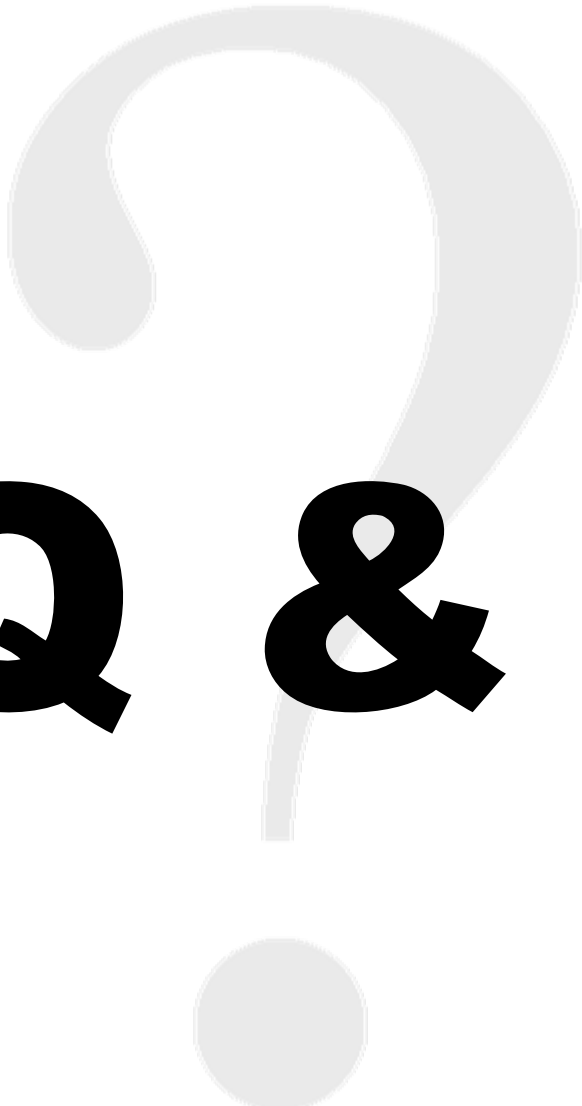
- ▶ **Client:** Automotive Tier I Supplier, USA
- ▶ **Governance Structure:** Vendor base business model
- ▶ **Situation/ Objective:**
  - Client off-shored more than 20% of engineering to India
  - Client tracked performance of Indian resources and compare performance to US resources
  - Client tracked performance as part of global Six Sigma initiative
- ▶ **Results/ Findings:**
  - Over time Indian resources outperformed US resources
  - Average experience – US - 10-15 years, India – 2-5years

Source: Booz Allen Hamilton client engagements and analysis

# Based on our experience, 20%-30% of engineering activities could be done offshore



Source: Booz Allen Hamilton client engagements and analysis



**Q & A**

# Additional Resources

**Slides and recording:** A recording of the event will be posted at:  
<http://www.strategy-business.com/webinars/archive>

**To read the article, “Innovators Without Borders,”**  
please use the following link:  
<http://www.strategy-business.com/press/article/06305>

**To read Smart Spenders: The Booz Allen Global Innovation 1000,**  
please use the following link:  
<http://www.strategy-business.com/press/article/06405>

**To obtain copies of the book, Mastering the Innovation Challenge; Unleashing Growth and Creating Competitive Advantage,** please use the following link:  
<http://www.strategy-business.com/innreader>

**Interested in receiving more information from Booz Allen’s Innovation Team?**  
Contact Kate Pinkerton, Innovation Director ([pinkerton\\_kate@bah.com](mailto:pinkerton_kate@bah.com))

