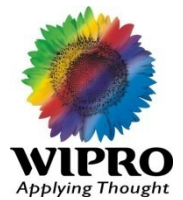


## Partnering with Design Services Providers

*Key Insights on Preferences, Concerns and Decision-Making Criteria Involving Partnering with Design Services Providers*

Research Partner



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## EXECUTIVE SUMMARY

Design services providers have been a part of the semiconductor industry for nearly 20 years, and the design services industry continues to grow and evolve. With increasing chip cost and time-to-market being significant concerns for semiconductor companies, design services providers play an increasingly important role in the semiconductor value chain to help alleviate pain points in these areas.

Design services have the greatest impact on the cost, manufacturability and overall system of semiconductor devices and the industry is becoming an extremely important phase of product development. Semiconductor companies must possess a high-quality design team, the right tools and technical expertise to meet the stringent design requirements within a short time period. Additionally, as semiconductor companies continue to outsource to stay competitive, building the expertise internally can be unbeneficial and undermine expansion plans. Third-party design services providers focus on developing vast technical expertise and can effectively amortize infrastructure costs across multiple clients to lower the cost of development.

The Global Semiconductor Alliance (GSA) and Wipro Technologies jointly conducted this survey and subsequent analysis to provide insight into the trends shaping this unique segment of the semiconductor industry. The report aims to:

- Educate design service firms on their customers' priorities and challenges, therefore effectively serving and meeting their needs
- Inform semiconductor companies of various factors being considered by their peers in the design services industry, which will help them make valuable design services partner choices

Key findings include:

- Timely product launch and ensuring first-pass success are a semiconductor company's crucial product development focus area and concern, respectively.
- 70% of respondents currently work with a design services provider, and more than half of survey respondents intend to partner with a design services provider during the next 24 months.
- While various business engagement models are evolving, the reduced risk of a fixed-price project is considered as most favorable.
- Dual-sourcing is preferred by companies currently working with design services providers – most respondents choose outsourcing to a local firm and an offshore firm.

## PRODUCT DEVELOPMENT AND CHALLENGES

Survey results indicate that while close to 50% of respondents currently use 130nm or older technology, more than 50% of respondents are also planning to move toward 45nm or newer technology (Figures 1 and 2). The preferred process technologies currently used are 130nm and 90nm, according to 51% of respondents. Since these technologies have been prevalent for a number of years, significant investments have been made in design, test and product engineering, and software to solve their technical manufacturing problems.

At the same time, according to Figure 2, the survey results reveal an interest towards process shrinkage from companies looking to reduce cost, size and power consumption of their chips. As 90nm technology becomes mainstream, 76% of the respondents expect to move to 32nm, 45nm and 65nm technology in the near future.

Due to significant design challenges, most respondents have resisted moving to new geometries. A majority of these respondents serve industries such as automotive electronics and industrial automation and control where overall low volumes and demand for high reliability discourage using new process technologies. The respondents serving high-volume industries such as computing, consumer and data processing use 90nm or lower technology as their current process or plan to in the near future.

**Mature Process Technologies**  
n=32

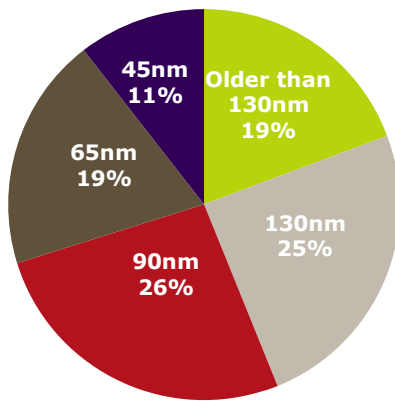


Figure 1. 51% of respondents are currently using 130nm and 90nm as their main technology.

**Future Process Technologies**  
n=32

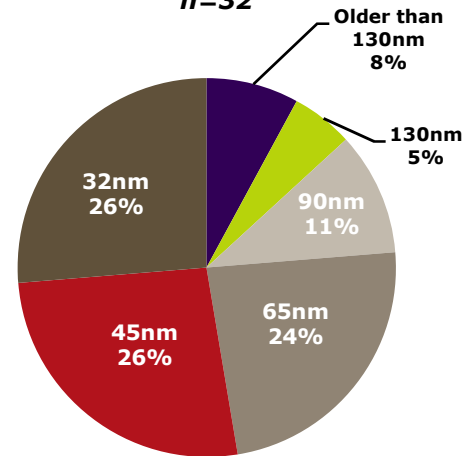


Figure 2. 76% of respondents plan to use 45nm, 32nm and 65nm technology.

**Phased Out Process Technologies**  
*n=32*

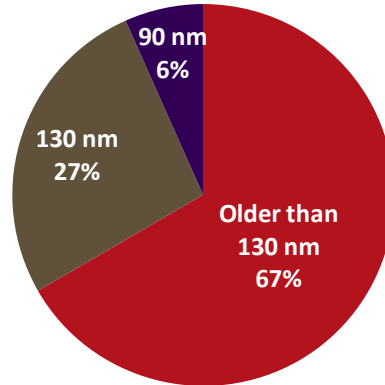


Figure 3. 67% of respondents have phased out older than 130nm technology.

**Product Development Focus Areas**

Figure 4 shows that releasing a product to the market without schedule slippage and zero/minimal defects is a key focal area for semiconductor companies. Survey results also reveal that the cost of development is an important priority amongst respondents, while accurate market sizing is a top focus area for those working in sales & marketing.

**What are the top areas of focus for your company's product development?**

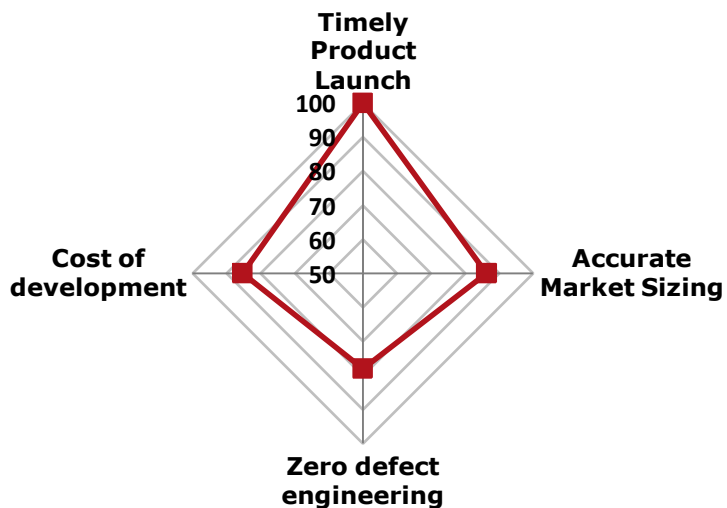


Figure 4. Respondents believe timely product launch is the most important focus area as companies begin to adopt next-generation, smaller process technology.

### Engineering Concerns

Survey respondents found ensuring first-pass success as their biggest engineering concern (Figure 5). A re-spin can cause a lengthy delay and add engineering and mask cost to the overall program. First-pass success concern is expected to be the top product development concern as timely product launch was deemed the key focus area for product development.

As design costs nearly double with each process shrinkage, the biggest development concern following ensuring first-pass success is the product development cost. This cost comprises the non-recurring engineering (NRE) costs and the chip cost.

#### What are the top development concerns for your company?

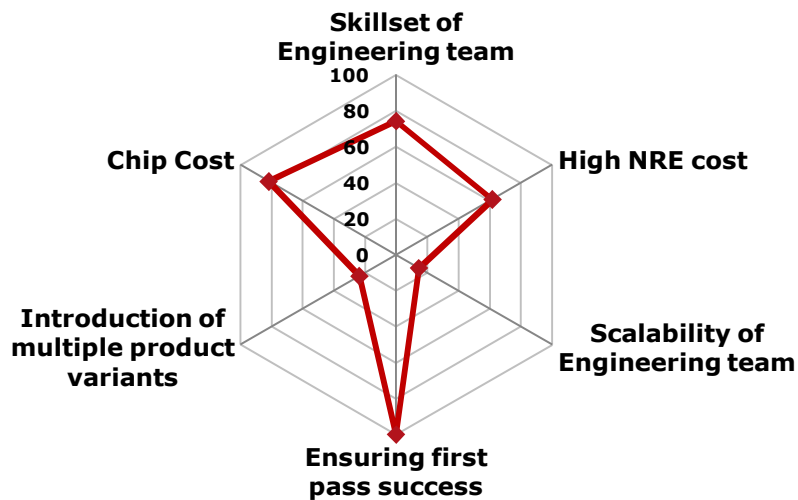


Figure 5. Respondents rank ensuring first-pass success as their top product development concern.

### Addressing NRE Cost Concerns

With design complexity rising at each node, average design costs have reached significantly high numbers such as \$70 million at 45nm technology from an average of \$9 million at 130nm technology. Survey participants are actively working to diminish the effect of these high costs to maintain competitiveness while keeping margins intact.

Figure 6 indicates that close to 60% of survey respondents reveal they are currently maximizing or planning to maximize the reuse of components to control costs. These components (hardware, software cores or knowledge database) also ensure increased productivity if they were developed as a part of a platform and minimize the design modification and re-verification required.

Purchasing IP from external vendors is also a viable solution to increasing NRE costs, according to nearly 50% of respondents. The costs to secure IP are the provider’s license fees and royalties. When calculated, the IP investment is easily offset by the potential revenue loss due to significant design errors that may sneak in.

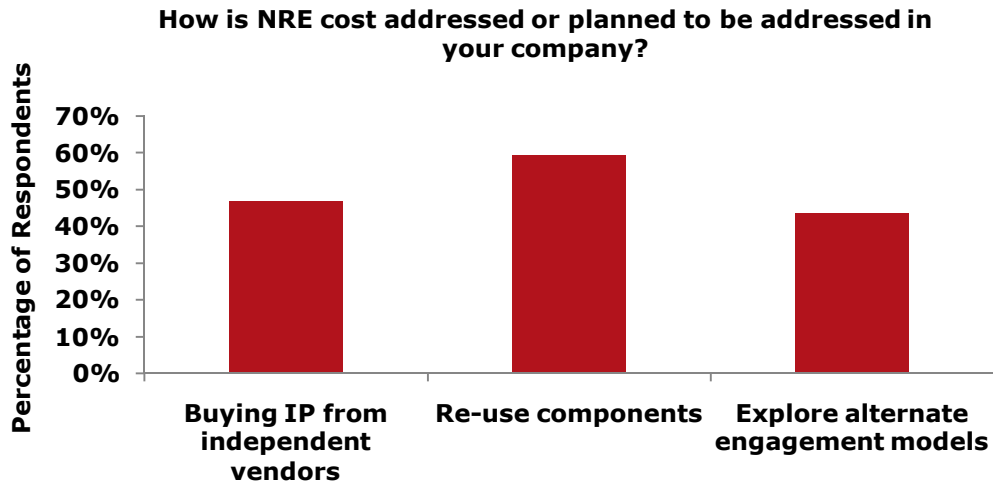


Figure 6. Nearly 60% of respondents are currently or planning to control NRE cost through component re-use.

**Ensuring First-Pass Success**

**How many chips go to production with only one re-spin?**  
n=32

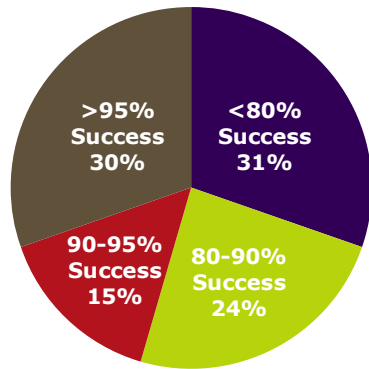


Figure 7. 31% of respondents indicate that less than 80% of their chips go for a re-spin only once.

**What is the number-one cause of re-spins?**

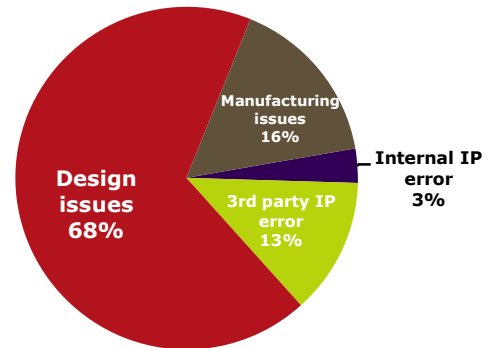


Figure 8. 68% of respondents indicate design issues as the top cause of recent re-spins.

According to In-Stat, the average re-spin cost is \$1.3 million at 90nm technology and rises to \$1.9 million at 65nm technology. While this has been a primary area of concern for most companies, 31% of survey respondents reveal that less than 80% of their chips go to production with only one re-spin (Figure 7). When asked what the number-one cause for re-spins was, 68% of respondents said they were design issues (Figure 8).

Figure 9 shows that most respondents have a schedule slippage of 21%-30%, while a fair share indicated having a slippage of close to 41%-50%, and in some cases, taking twice the amount of time initially estimated for their IC development. Beyond design errors, having insufficient resources and underestimating the complexity of a chip design and development time are the main causes that delay the overall program schedule (Figure 10).

**What is the typical schedule slips for first-generation IC development at your company?**

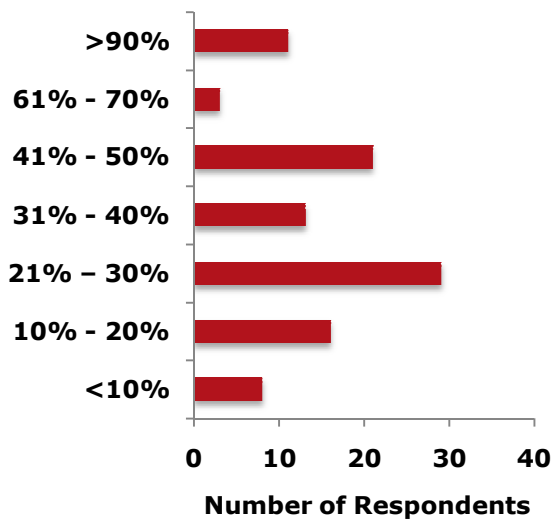


Figure 9. A majority of respondents reveal having a schedule slippage of 10% to 40%.

**What are the root causes for schedule slippage?**

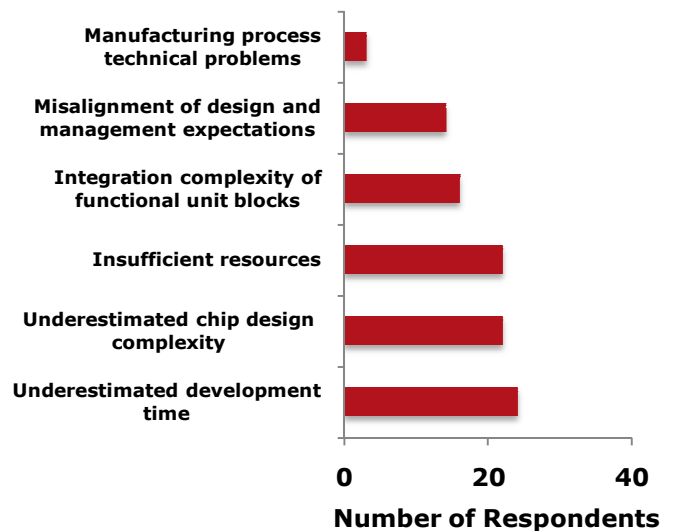


Figure 10. A majority respondents believe underestimated development time is the root cause of schedule slippage, while insufficient resources closely follows.

**How do you ensure first-pass success?**

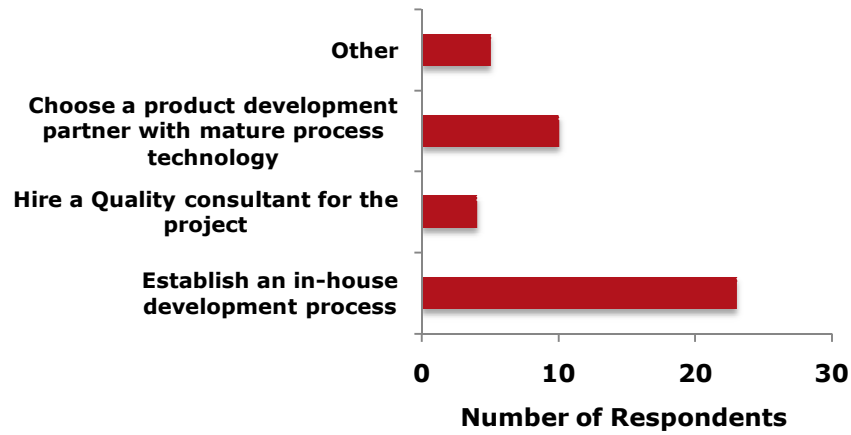


Figure 11. A majority of respondents believe establishing an in-house development process will ensure first-pass success.

With low first-pass success and schedule slippage as primary development concerns, a majority of respondents will establish an in-house development process to address these challenges (Figure 11).

**PARTNERING WITH DESIGN SERVICE PROVIDERS**

**Does your company currently work with a design services provider?**  
n=170

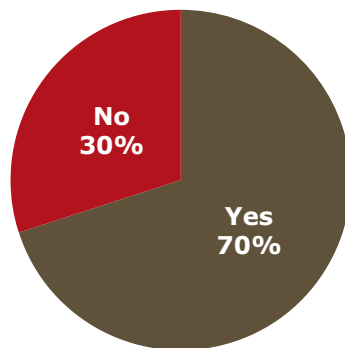


Figure 12. Survey results indicate that most companies are partnering with design service providers.

**When does your company plan to work with a design services provider?**

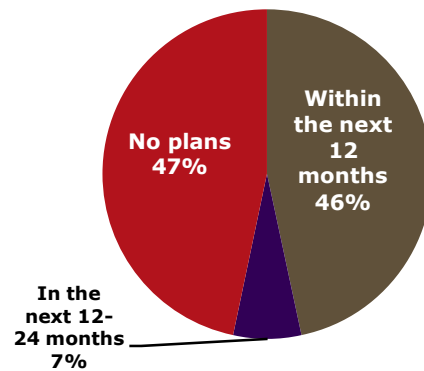
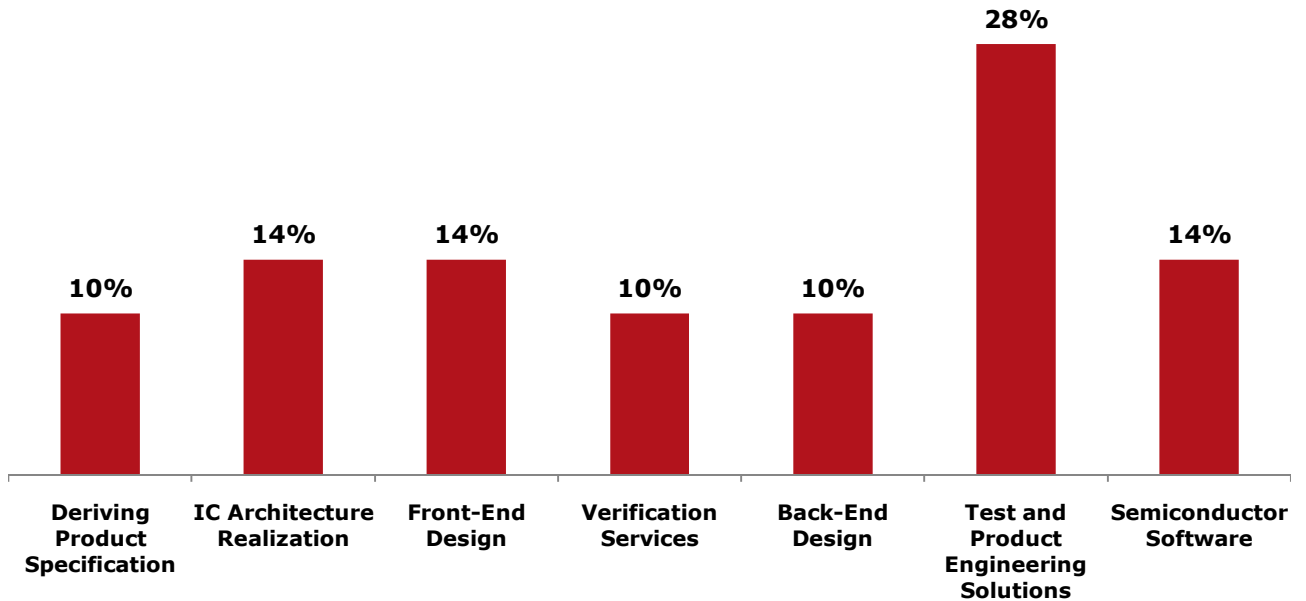


Figure 13. 46% of respondents plan to work with a design services provider within the next 12 months.

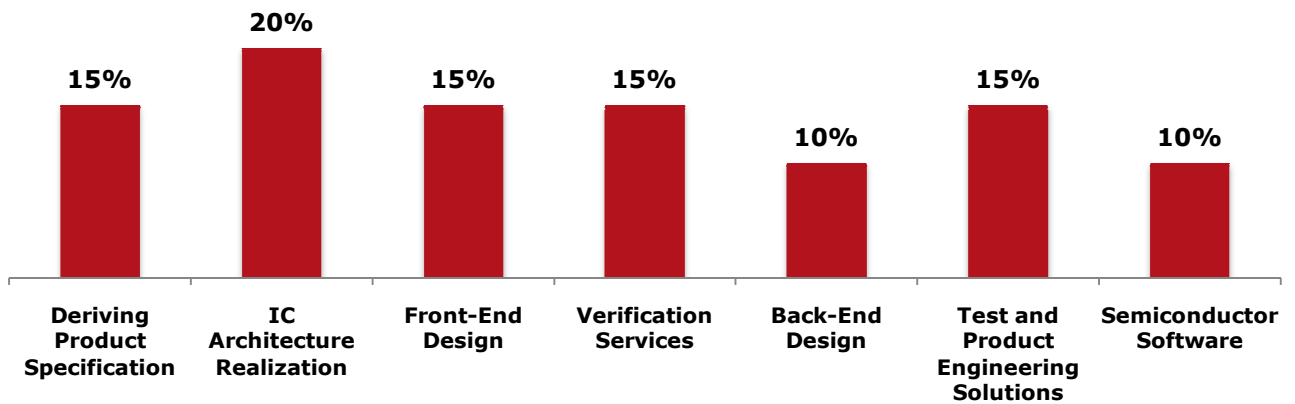
Figure 12 confirms that design services providers play a major role in the semiconductor industry, with 70% of survey respondents currently working with a provider. More than half of the respondents intend to partner with a design services provider over the next 24 months (Figure 13).

**During the next 12 months, what design services area will your company focus on?**



*Figure 14. 28% of respondents plan to focus on test and product engineering solutions in the next 12 months.*

**During the next 12-24 months, what design services area will your company focus on?**



*Figure 15. 20% of respondents plan to focus on IC architecture realization in the next 12-24 months, while the rest of the focus areas closely follow.*

Figure 14 shows that 28% of respondents seeking to initiate a design services partnership during the next year plan to focus on test and product engineering solutions. During the next 12-24 months, survey results conclude that companies are interested in focusing on many different areas, with IC architecture realization slightly leading with 20% of respondents (Figure 15).

### Factors Impacting Design Services Partnership

Factor	Effect on the Partnership
Size of the Design Services Provider	The partner’s size provides the risk mitigation to the partnership. From a long-term perspective, this enables effective scaling to execute more programs
Technical Expertise	Possessing significant technical expertise minimizes the time required and risk associated with the product in development.
NRE Cost	The non-recurring engineering (NRE) costs are directly related to the development budgets of a program - these include cost of engineering and IP licensing and tools.
Engagement Model	The engagement model involves how a company interacts with its partner and the measurement/charging methods. The traditional models are time & material and fixed-price, however recent models are largely revenue sharing-based.
Geographic Location	The geographic location of a design services partner affects the direct control over the extended team and adds transportation costs and time for physical goods.

### How important are the following factors in influencing your decision when partnering with a design services provider?

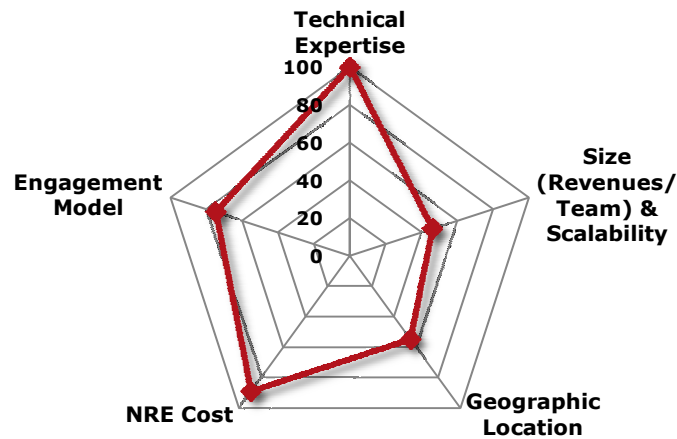


Figure 16. Survey results show that technical expertise ranks as the most important factor influencing choosing a design services provider. Engagement model and NRE cost follow.

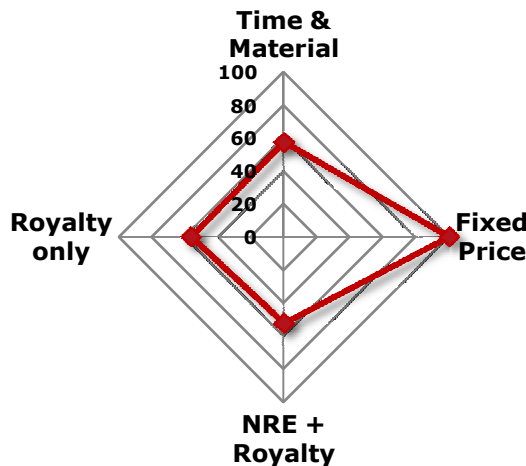
The design challenges of timely product launch and cost of development mentioned earlier in the report correlate with the factors involved with choosing a design services partner. Figure 16 shows that technical expertise is the most important factor influencing respondents when they choose a design services provider. For a specific development program, technical expertise of the design team (in-house or outsourced) directly impacts the capability to estimate the complexity and time requirements accurately, ensuring schedule adherence. However, the importance of a design services partner

exhibiting vast technical expertise tends to be program-specific or short term. From a long-term perspective, the questions of economic viability of a partner and their geographic location arise.

### Design Services' Engagement Models

Engagement Model	
Time & Material	The engagement is pay-per-use of a partner's hourly development efforts. This model, which is largely used in the software development industry, is useful when the scope, specification and implementation plans of a project are not easily defined at the outset.
Fixed-Price	A pre-negotiated fixed price for the complete project is determined with payouts linked to well-defined deliverables.
NRE + Royalty	A fixed and sometimes subsidized development fee is paid to the partner during the product realization stage. When the product is released to the market, a volume-based royalty is paid to the partner.
Royalty Only	Payments are entirely based on a pre-negotiated per-piece royalty, and there is no upfront payment to the partner. This model shifts the entire risk to the partner, and significant trust between the two parties is vital to work effectively.

**Preferred Engagement Model**



*Figure 17. Survey results show that fixed price is the most preferred engagement model.*

The engagement model provides partnerships short-term and long-term relevance. When asked what engagement model they prefer, survey respondents overwhelmingly believed fixed price to be the most effective (Figure 17).

**Location of Design Services Providers**

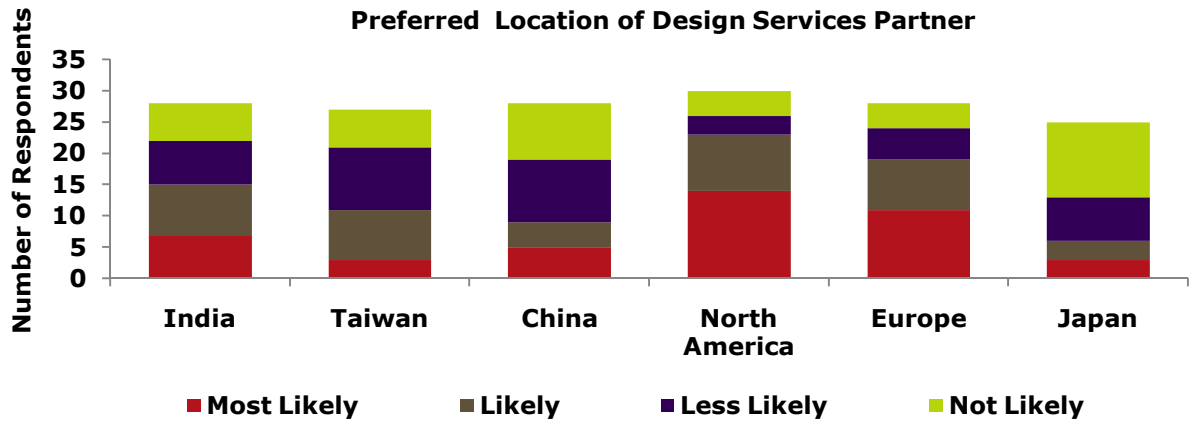


Figure 18. The majority of respondents chose North America as the preferred location of their design services provider, followed by Europe and India.

**Confidence in Design Services Partner**

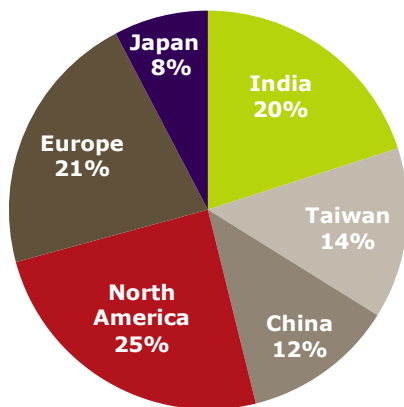


Figure 19. 25% of respondents choose North America as their preferred design services firm location because they are confident in the firm's services .

**Assurance IP Will Be Handled Legally and Confidentially**

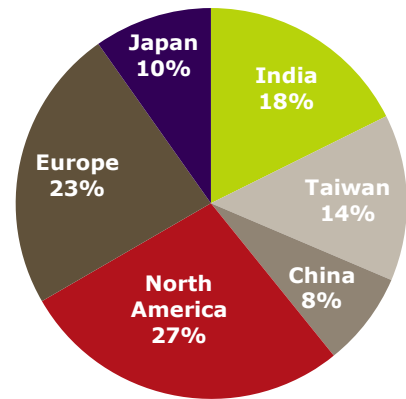


Figure 20. 27% of respondents choose North America as their preferred design services firm location because they are assured their IP will be handled legally and confidentially.

**Proximity**

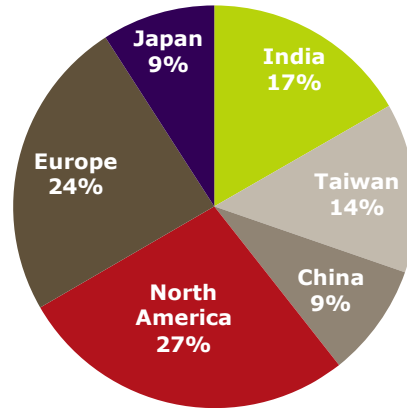


Figure 21. 27% of respondents choose North America as their preferred design services firm location because of its proximity to their development site.

**Who do North American companies prefer partnering with?**

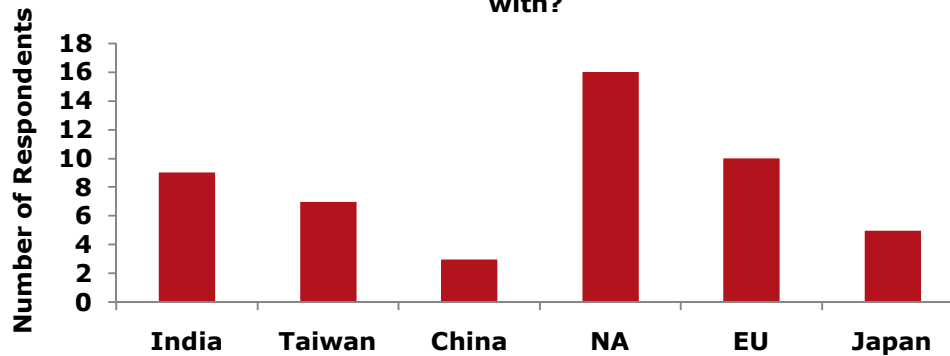


Figure 22. North American respondents prefer partnering with a local firm. Europe follows as the next desirable location of a design services partner.

**Who do Asia-Pacific companies prefer partnering with?**

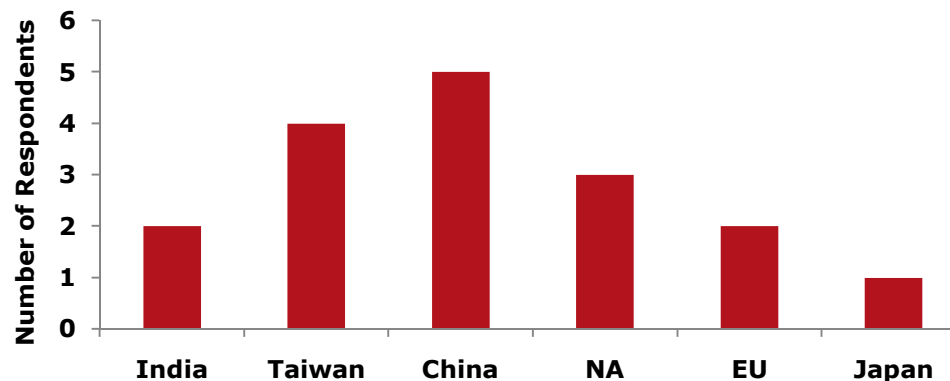
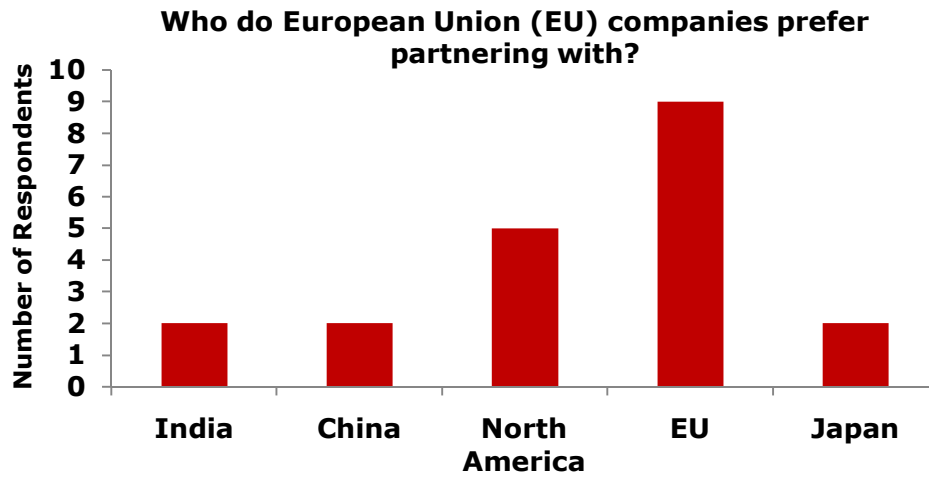


Figure 23: Taiwanese and Chinese respondents prefer partnering with a local firm. North America follows as the next desirable location of a design services partner.



*Figure 24: European respondents prefer partnering with a local firm. North America follows as the next desirable location of a design services partner.*

In terms of choosing the location of a design services partner, Figure 18 indicates that a majority of respondents prefer partnering with North American firms. The reasons most respondents prefer partnering with a North American firm were having strong confidence in their partner’s services and assurance their IP would be handled legally and confidentially (Figures 19-20). Another factor contributing to respondents’ preference of North American firms was the proximity these providers have to their own design teams or manufacturing units (Figure 21).

When analyzing the location preferences of respondents from different geographies, survey results reflect that companies worldwide choose to hire firms in their region. Figure 22 shows that with the exception of local and European firms, North American respondents favor outsourcing to India significantly more than other locations. European and Asia-Pacific respondents both select partnering with North American firms as their second choice following local firms (Figures 23-24).

*Note: Of the survey respondents choosing North America as their preferred location, 90% selected another location as well.*

## CONCLUSION

As fabless companies and integrated device manufacturers (IDMs) target a wide array of end markets, the overall semiconductor design portfolio spans multiple process technologies ranging from 130nm and older technology to cutting-edge 45nm technology. This brings a unique challenge in identifying internal strengths from an organizational perspective and determining how complimentary skills from design services providers can be leveraged effectively.

The survey assessed the benefits design services providers offer in terms of shortening the product development time and related costs. Survey results conclude that 70% of respondents are currently working with design services providers, reinforcing the need for insight on preferences, concerns and decision-making criteria regarding third-party design services.

The time-to-market concerns were the most prominent to respondents. Schedule slippage due to design problems, estimation errors and insufficient resources impact not only the opportunity costs of semiconductors companies but add significant costs to the development programs due to re-spins. To further reduce these risks in overall development, a majority of respondents prefer dual-sourcing between a local and offshore design services provider.

The survey finds that the key expectations of design services providers are to:

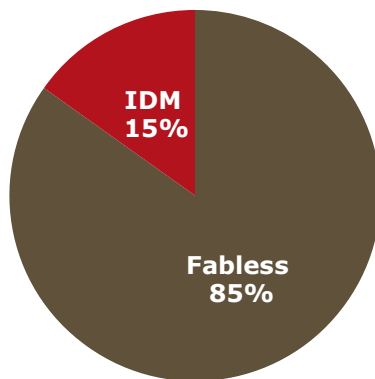
- Adhere to schedule, which many believe is the most important aspect of the engagement.
- Provide complimentary technical expertise to minimize development risk and ensure first-pass-success.
- Provide consultation at the initial stage to accurately determine the design complexity and development time and thus, be able to take up product development at a fixed-price.

## METHODOLOGY

The diverse market segments and industry expertise of the survey respondents allowed a broad analysis of the survey results. GSA and Wipro surveyed fabless companies and IDMs around the world to measure the adoption of the design services model. The survey was administered through an online survey and physical survey during December 2008 to February 2009. Survey respondents held titles of President, Vice President, Director of Engineering and General Manager. The close-ended survey question types varied from multiple-choice, likert-scale and ordinal.

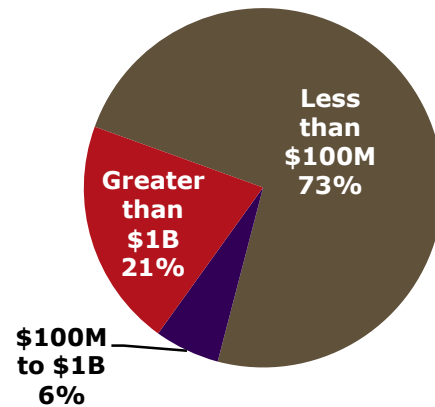
## COMPANY DEMOGRAPHICS

### Company Type



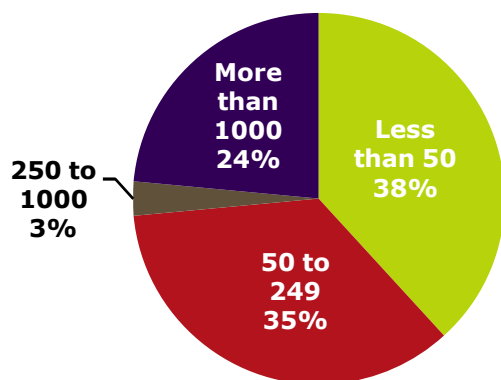
85% of survey respondents work at fabless companies.

### Company Revenue



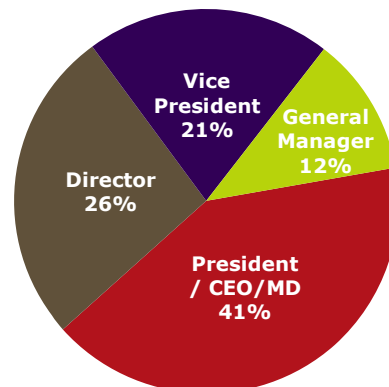
73% of survey respondents' companies generate less than \$100M in revenue.

### Size of Company R&D team



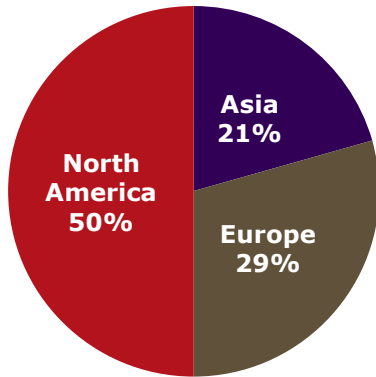
38% of survey respondents' companies have an R&D team of less than 50 employees.

### Work Titles



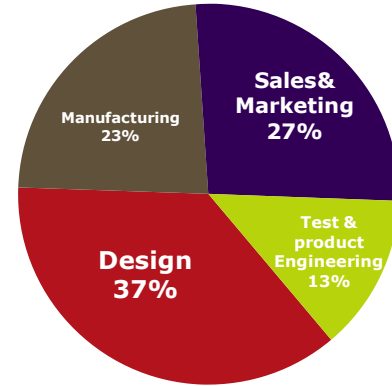
41% of respondents are C-level executives, while 26% are directors.

**Geographic Location**



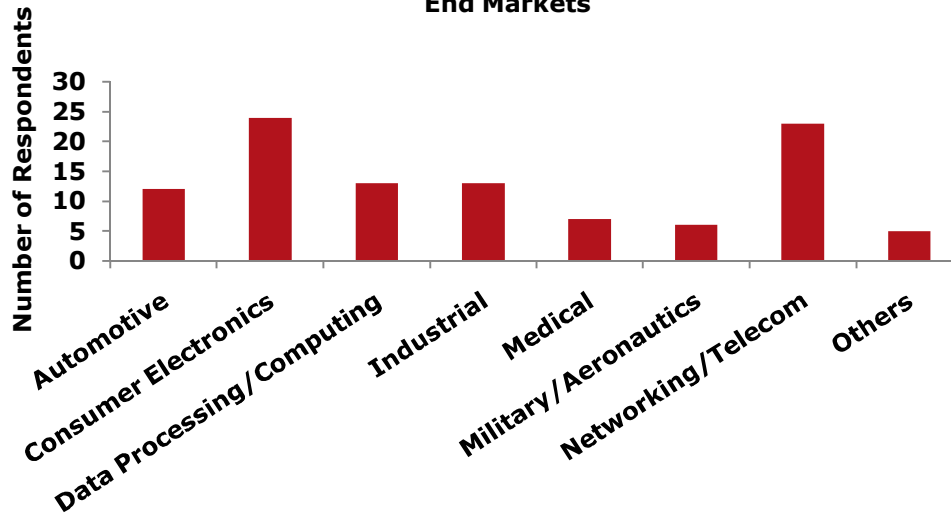
50% of survey respondents' companies are located in North America.

**Functional Area of Responsibility**



37% of respondents work in the design area, while 27% work in sales & marketing.

**End Markets**



A majority of respondents' companies serve the consumer electronics and networking/telecom segments.

## ABOUT GSA

The Global Semiconductor Alliance (GSA) mission is to accelerate the growth and increase the return on invested capital of the global semiconductor industry by fostering a more effective fabless ecosystem through collaboration, integration and innovation. It addresses the challenges within the supply chain including IP, EDA/design, wafer manufacturing, test and packaging to enable industry-wide solutions. Providing a platform for meaningful global collaboration, the Alliance identifies and articulates market opportunities, encourages and supports entrepreneurship, and provides members with comprehensive and unique market intelligence. Members include companies throughout the supply chain representing 25 countries across the globe. [www.gsaglobal.org](http://www.gsaglobal.org)

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## ABOUT WIPRO

Wipro Technologies, a division of Wipro Limited (NYSE:WIT) is the first PCMM Level 5 and SEI CMM Level 5 certified global IT services organization. Wipro Technologies was recently assessed at Level 5 for CMMI V 1.2 across offshore and onsite development centers. Wipro is one of the largest product engineering and support service providers worldwide. Wipro provides comprehensive research and development services, IT solutions and services, including systems integration, information systems outsourcing, package implementation, software application development, and maintenance services to corporations globally. Wipro is a leading engineering and technology service provider with wide presence in North America, Europe and Asia. Wipro provides product engineering services to telecom, manufacturing and hi-technology companies worldwide. [www.wipro.com](http://www.wipro.com)

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