Capgemini engineering

Engineering and R&D *trends*

Strategies for a fast changing world

Foreword

Welcome to Capgemini's first annual report on Engineering and R&D trends. Today's leaders in Engineering and R&D (ER&D) intensive firms operate in a complex business environment. An environment shaped by a dynamic series of interconnected macro-forces: supply chain disruptions, geo-political tensions, and economic uncertainty to name but three.

Adapting and thriving in this environment involves decisions about how a company's ER&D operating model should work at scale. Leaders must also reconcile objectives about their future business while also optimizing for the present. This is a world of trade-offs: safeguarding profits from current product lines, sustaining innovation for future high margin products, ensuring core engineering is efficient and that the overall engineering operating model is agile enough to adapt to future changes.

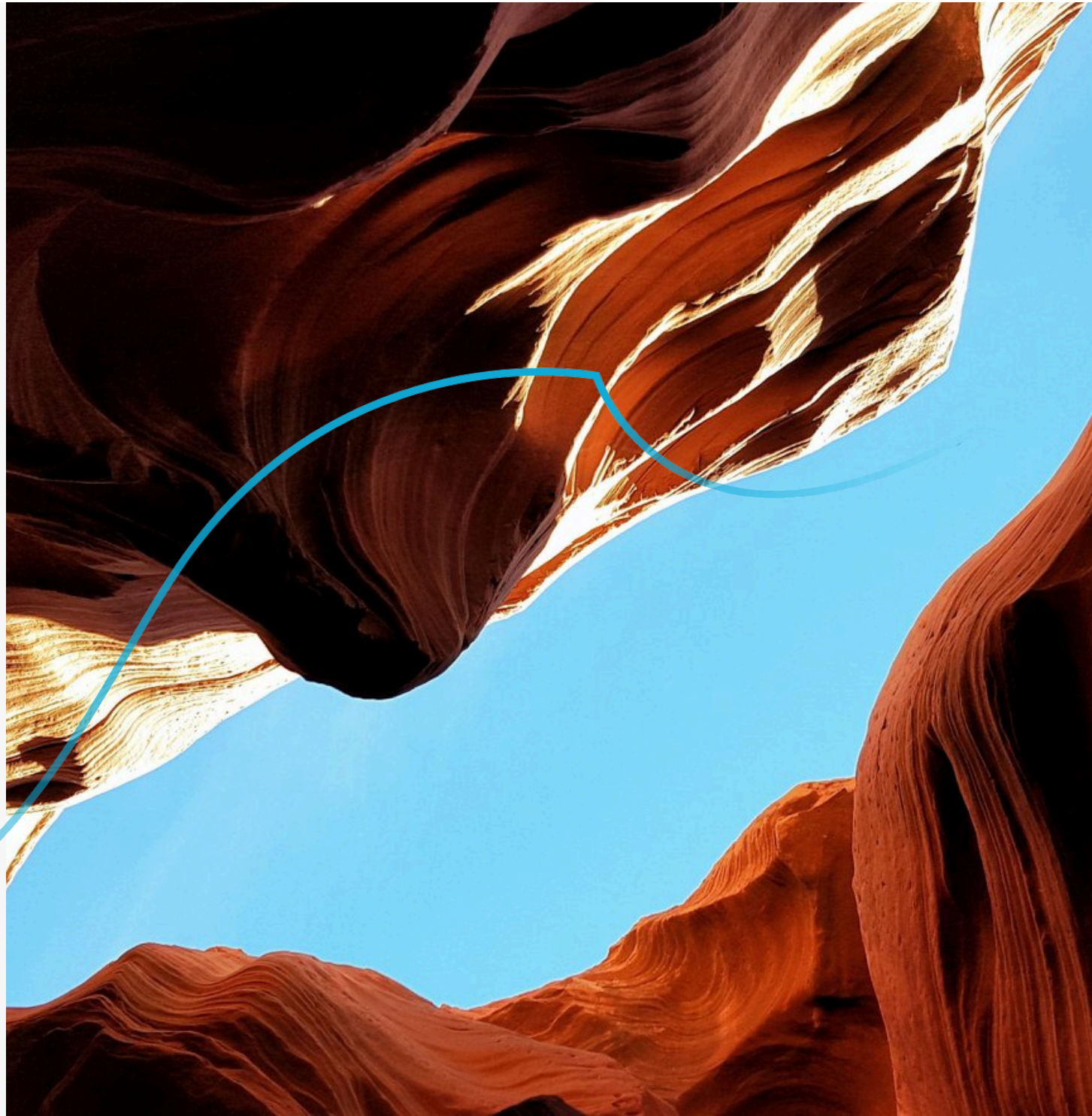
In short, we face a rapidly changing world, where companies – some producing products with 20 year lifespans, need to innovate, adapt, and respond rapidly – for the short and long term - and to do this cost-effectively without compromising quality.

This report explores the thinking of current leaders; how they expect their organizations to be impacted by external macro-forces, what enterprise-scale ER&D challenges this creates for them, and how they are responding. The report is based on the input of leaders from a range of businesses and framed by our experience working with the world's largest ER&D intensive companies. Some of this success has been built on enterprise-scale outsourcing of ER&D services. We see no reason why this will change.

I hope you find the perspectives of your peers insightful and helpful in your own reflections on ER&D strategy.

William Roze
CEO, Capgemini Engineering

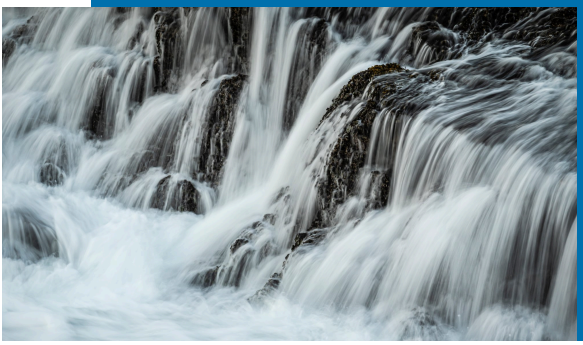
Introduction



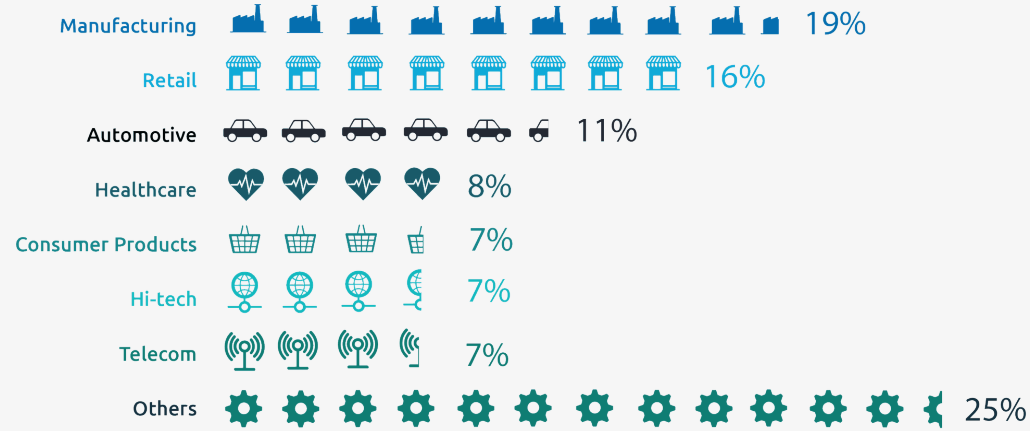
Long-standing companies – those who make physical things in highly regulated industries like automotive, aerospace, consumer products, life sciences or who operate cyber-physical systems like utilities, power companies or communications services providers – must prepare for a future in a dynamic and less stable world.

On the one hand, they need long-term strategies that stay the course in order to deliver high-quality, safe products and systems that will last a decade or more. On the other hand, they must do this in a highly complex and unpredictable world. Customer expectations change rapidly, supply chains and geopolitics are in flux, regulators demand ever more sustainability, and challengers – unburdened by legacy systems – are finding ways to do things faster, cheaper or better.

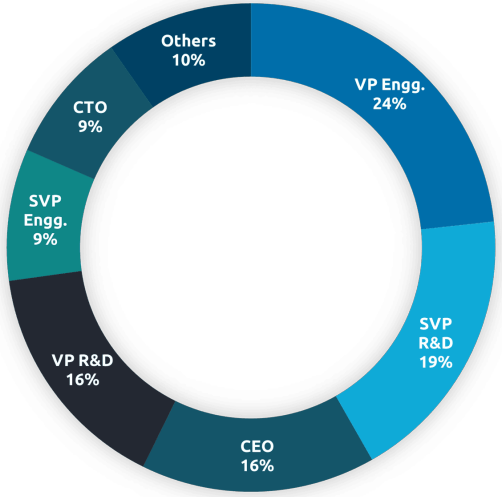
This report draws on research with 300 senior (VP and above) decision-makers at global ER&D intensive companies. It aims to understand and share the challenges they see arising in the coming years and decades. Looking at four critical business themes, it explores their perspectives on the current state of their firms, and their future plans in each area.



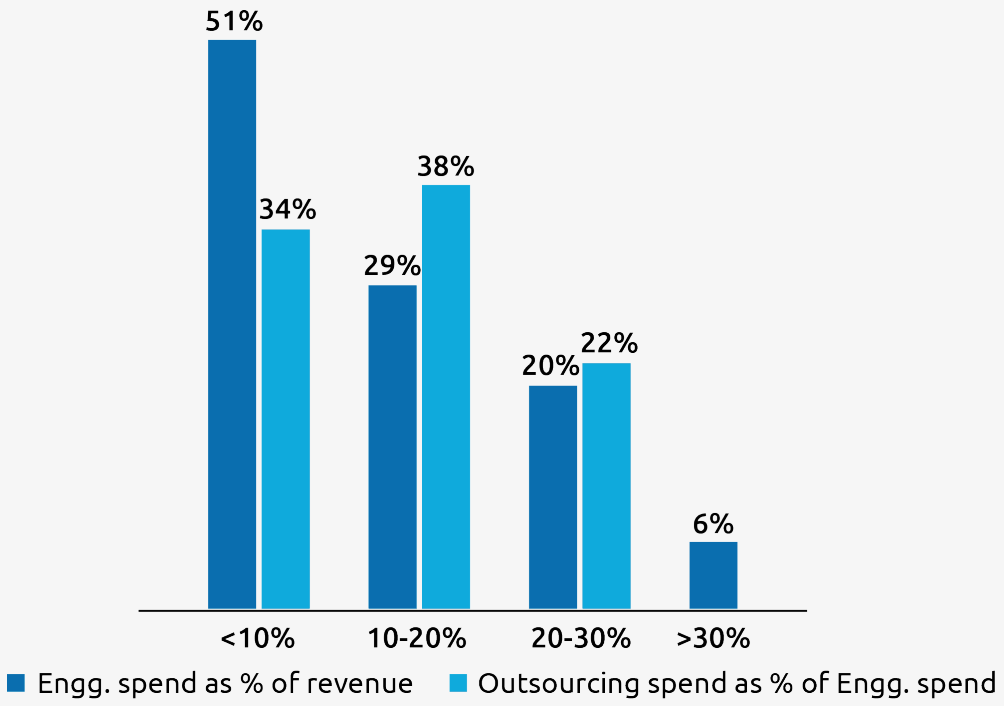
Industry profile



Leadership profile

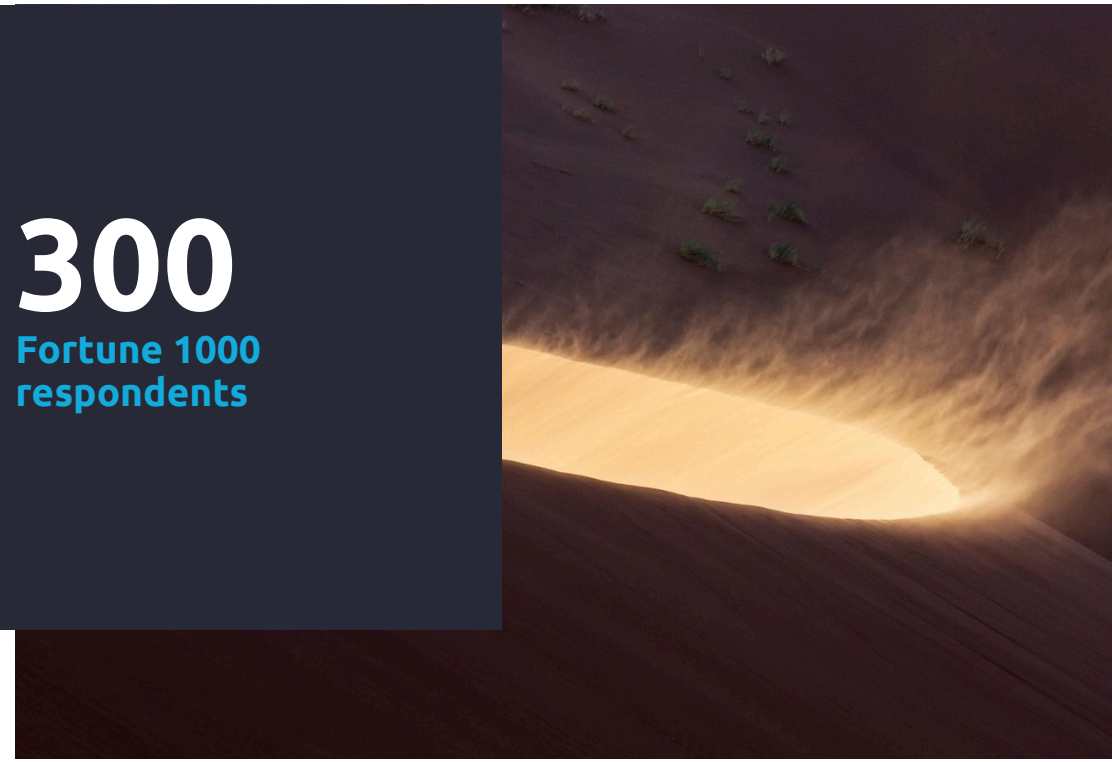


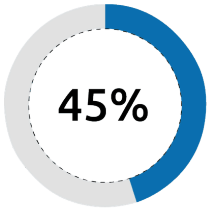
Spending profile



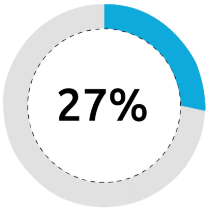
300

Fortune 1000 respondents

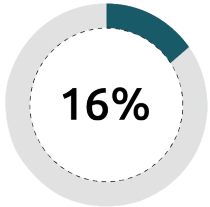




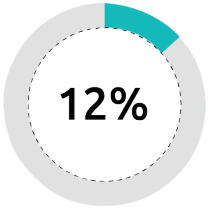
Europe



APAC



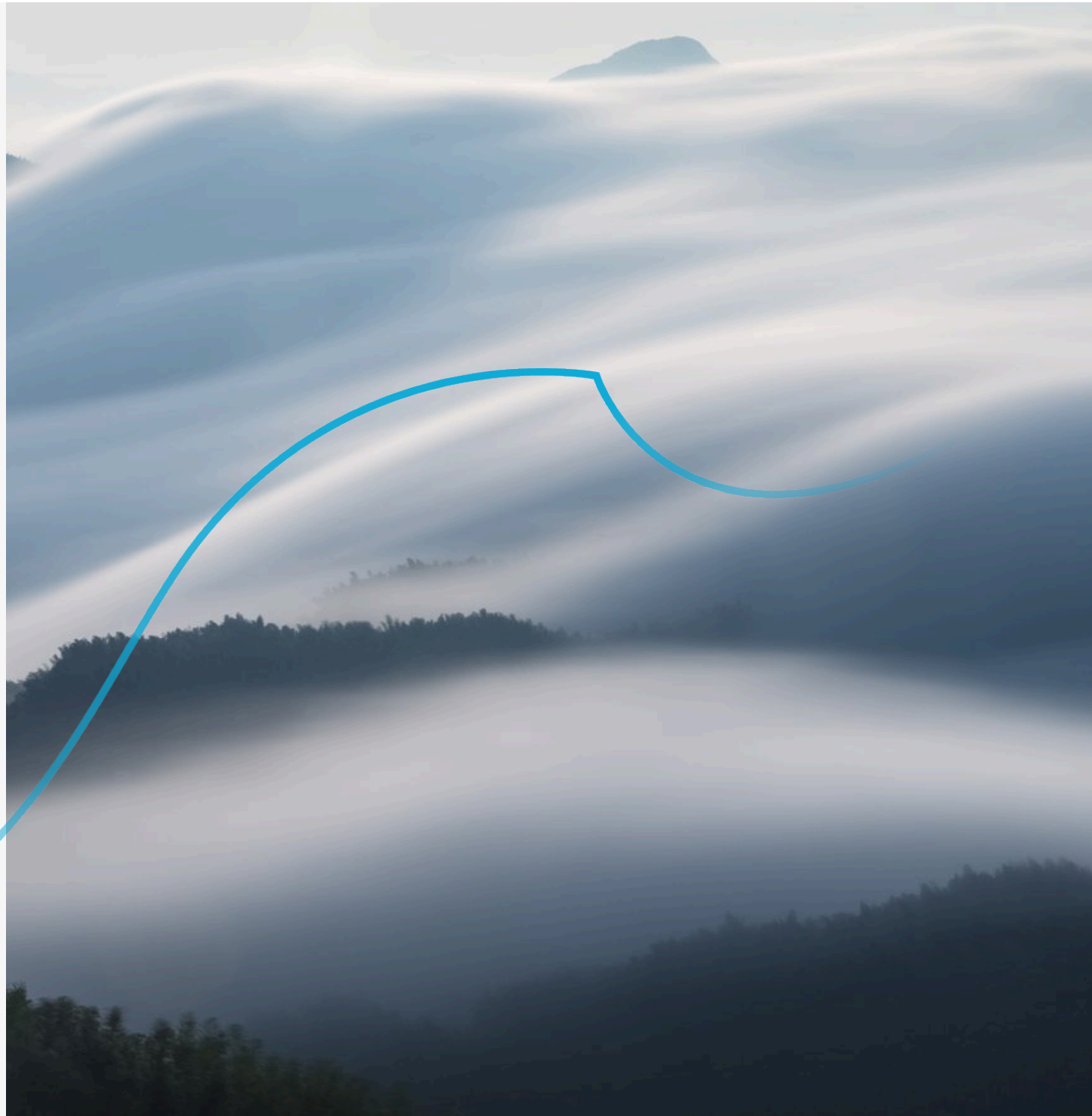
North America



LATAM

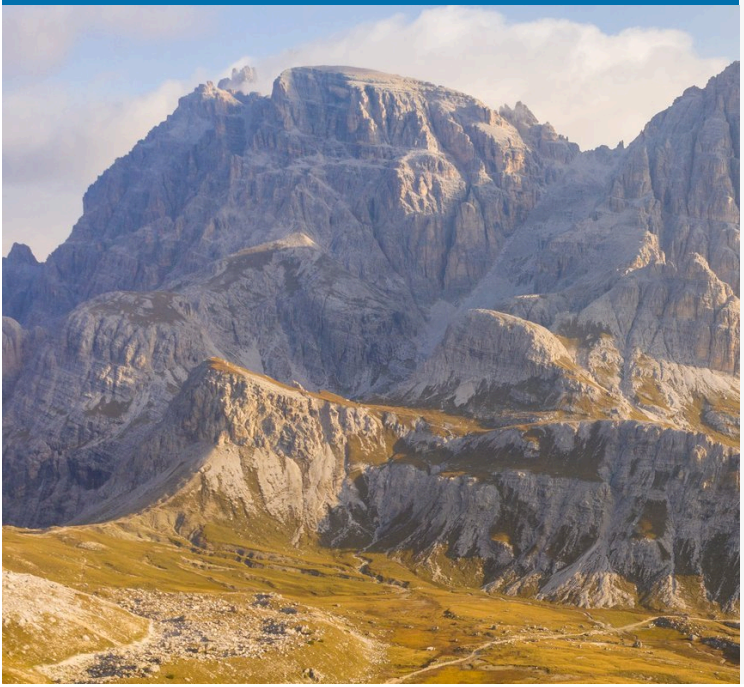
Setting the scene

What do ER&D intensive firms want?



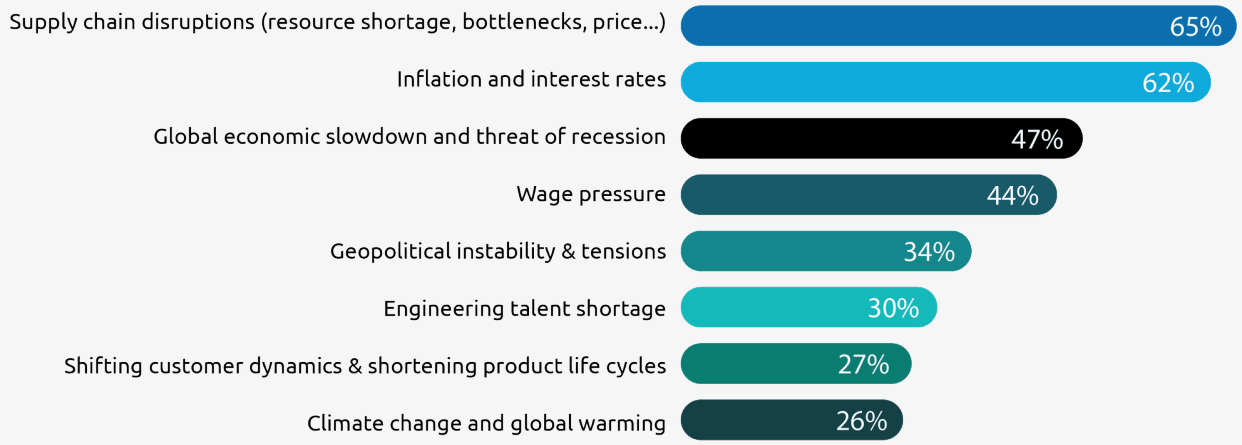
Firms are pursuing multiple strategic business objectives.

The leading ones are revenue growth, sustainability, optimizing supply chains, reducing costs, and improving products and services.



Companies' strategic objectives

What are the main macro forces impacting your industry?



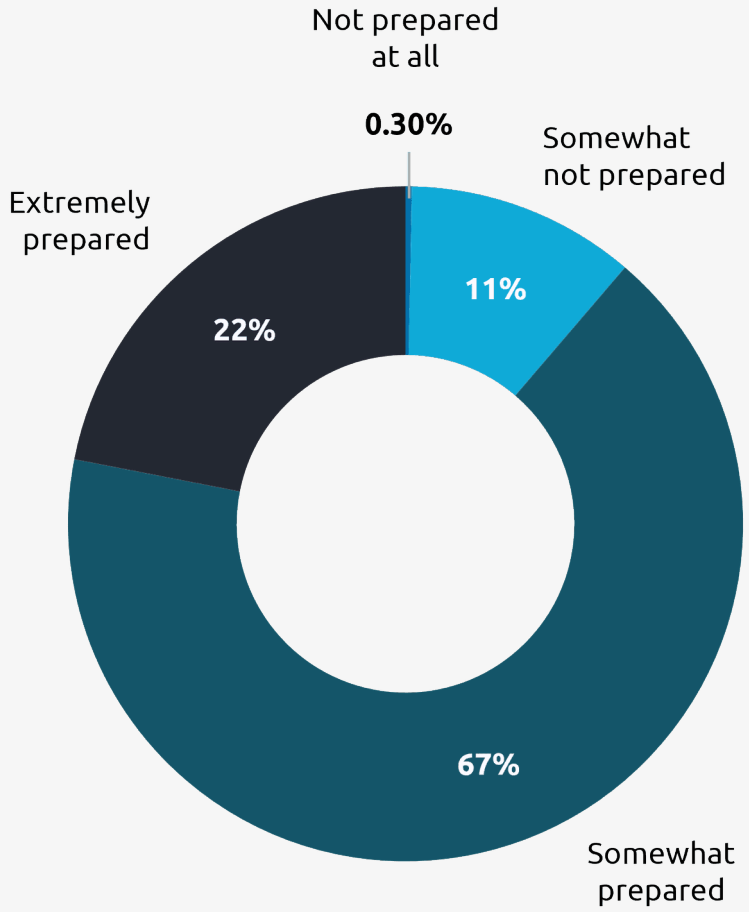
To deliver these objectives they must **make long-term decisions** in an environment lacking long-term stability, and shaped by multiple dynamic macro forces.

Supply chain risk and economic pressures rank highest on this list, but several other factors score highly.

Happily, most firms say they are ‘somewhat prepared’ or better to work in this environment.

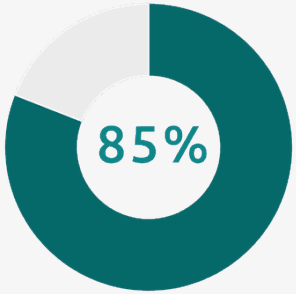
This is positive, but leaves room for improvement in a world showing few signs of return to long-term stability.

How prepared is your firm to tackle these shocks?



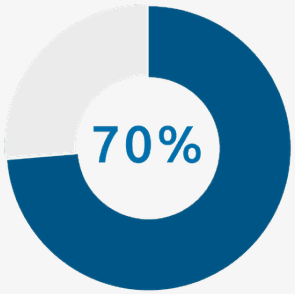
What does all this mean for engineering intensive firms and how are they preparing their organization to thrive?

In this report, we explore the responses of leaders along four strategies driving today's engineering transformation



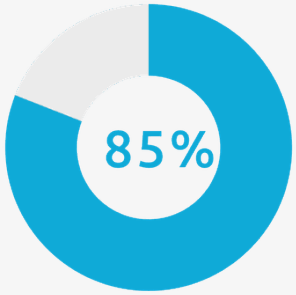
Reconcile business & planet

expect their industry to be transformed by the sustainability imperative in the next 5 years.



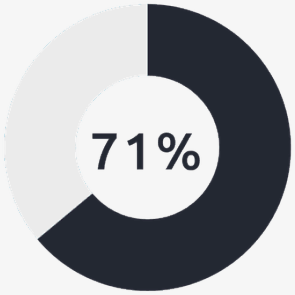
Accelerate to Value

intend to reach scale in their digital engineering roll out in the next 3 years.



Upgrade core engineering

see cost saving potential in their product engineering practice.



Build Agile engineering organizations

intend to increase their use of outsourcing partners for engineering workflows.

Capgemini engineering

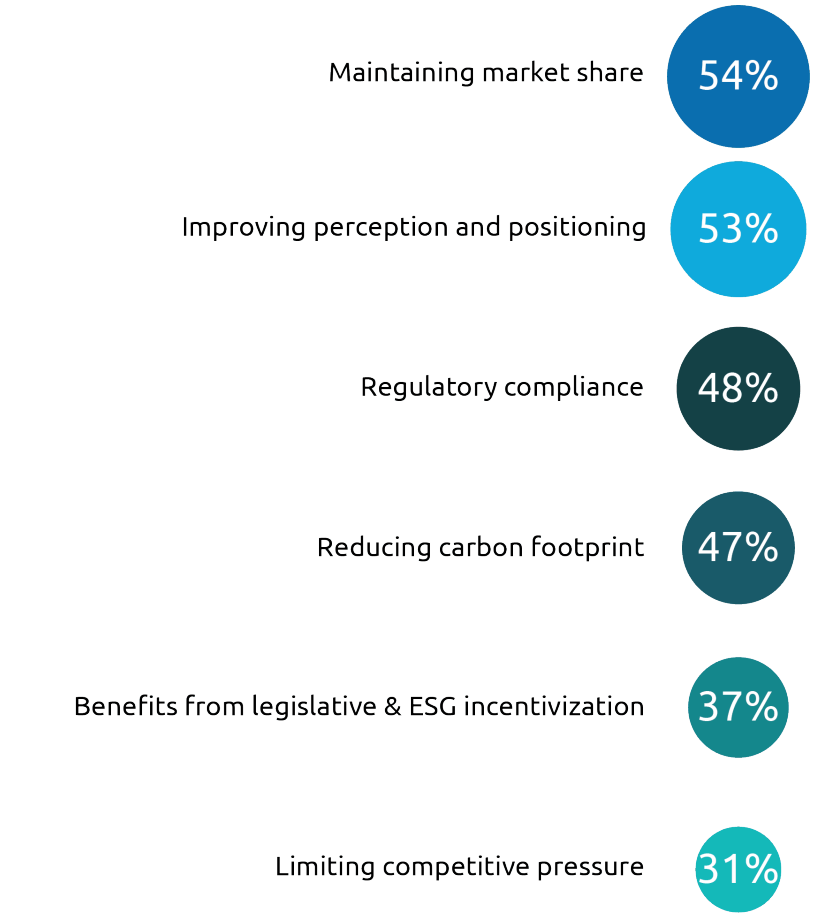
Reconcile business & planet

How are companies reorganizing to thrive in a net zero future, while maintaining a profitable business?

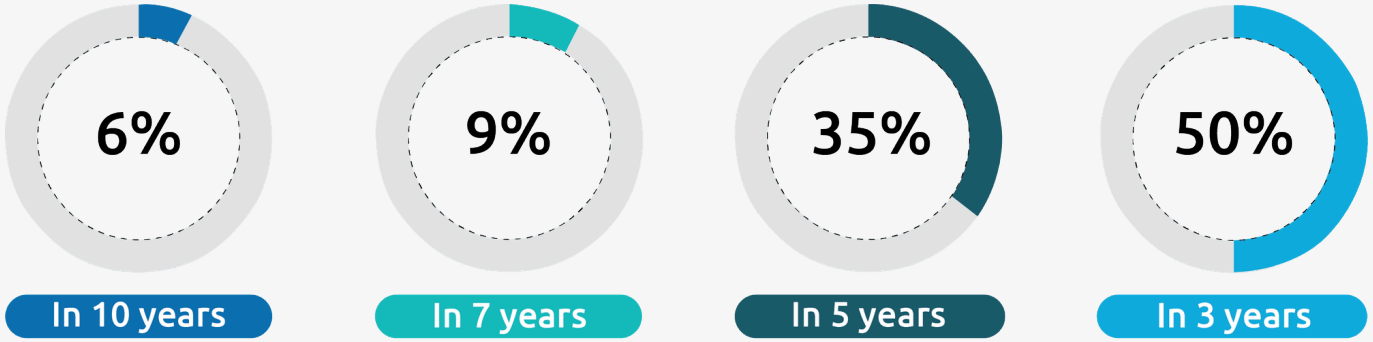
Many firms see sustainability as **essential** to the future of their business and **critical** to maintaining market share.

More practically, they also see it as a route to regulatory compliance and ESG incentives, to create a good reputation with customers and investors.

What are the main benefits of investing in Engineering for Sustainability for your firm?



When do you estimate the sustainability imperative to significantly transform your industry?



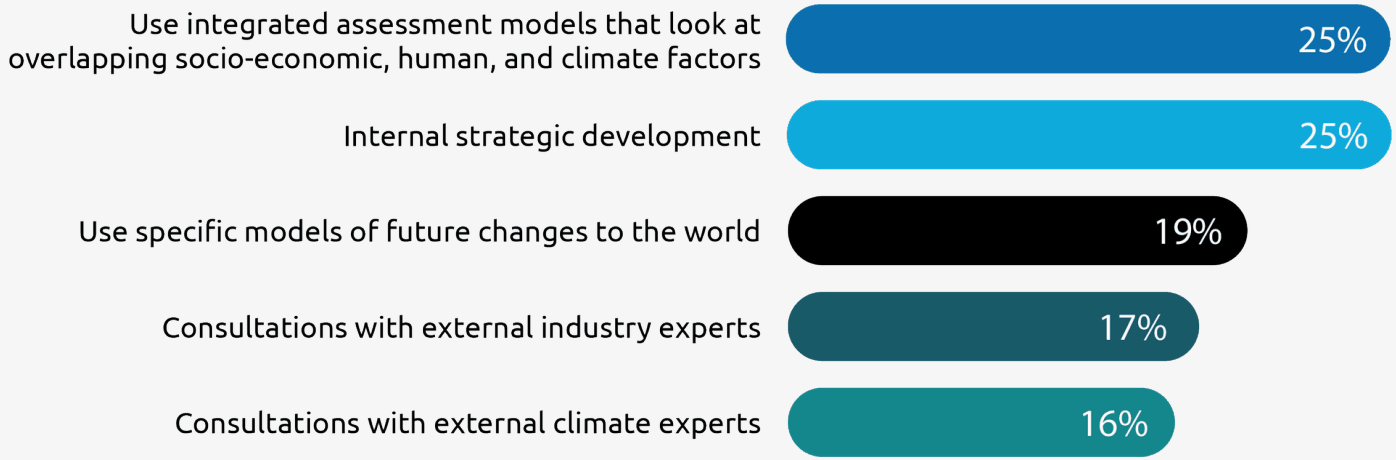
Most feel the ticking of the sustainability clock, and believe that **sustainability will transform their industry** within five years or less.

To go from 'business as usual' to 'sustainable business as usual' at scale in such timescales is a dramatic change.

With time pressing, ER&D leaders explore multiple threads to build their long-term strategy

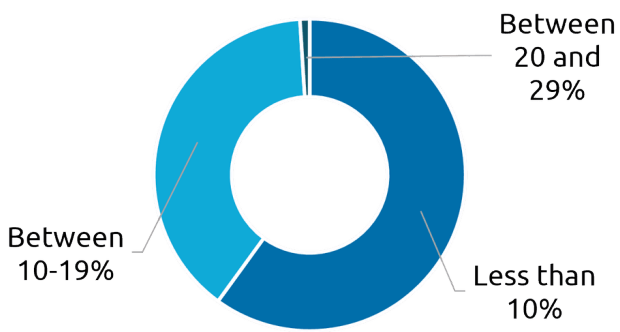
What avenues does your firm currently leverage to design its long-term engineering for sustainability strategy

(% of survey respondents listing as their top avenue)

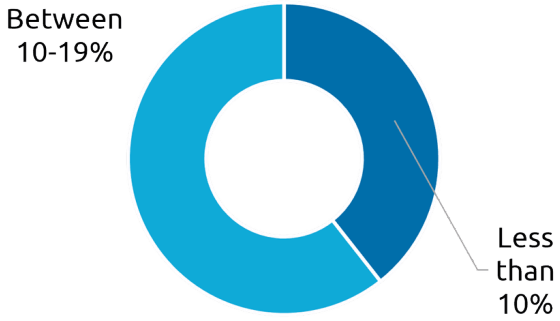


How much of the following budgets are dedicated to making your products/services more sustainable?

Engineering budget

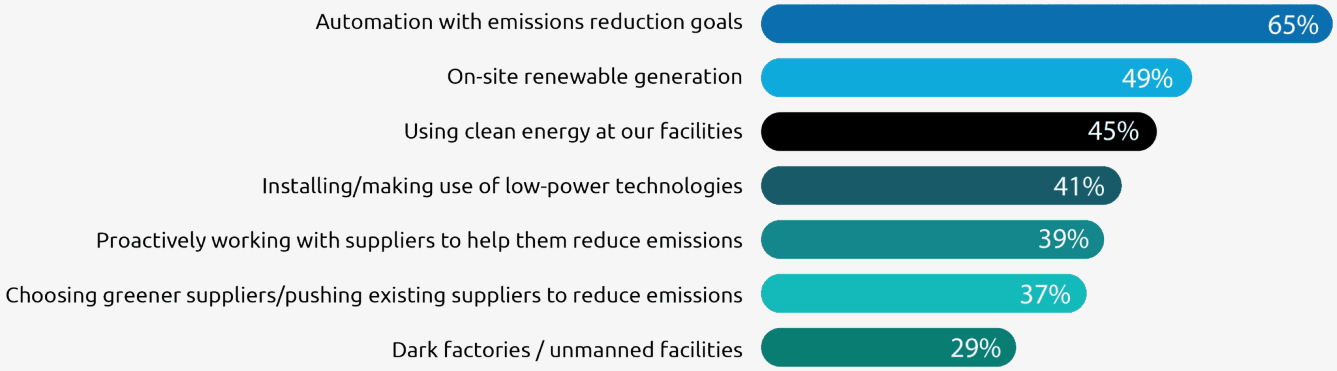


New Product development budget



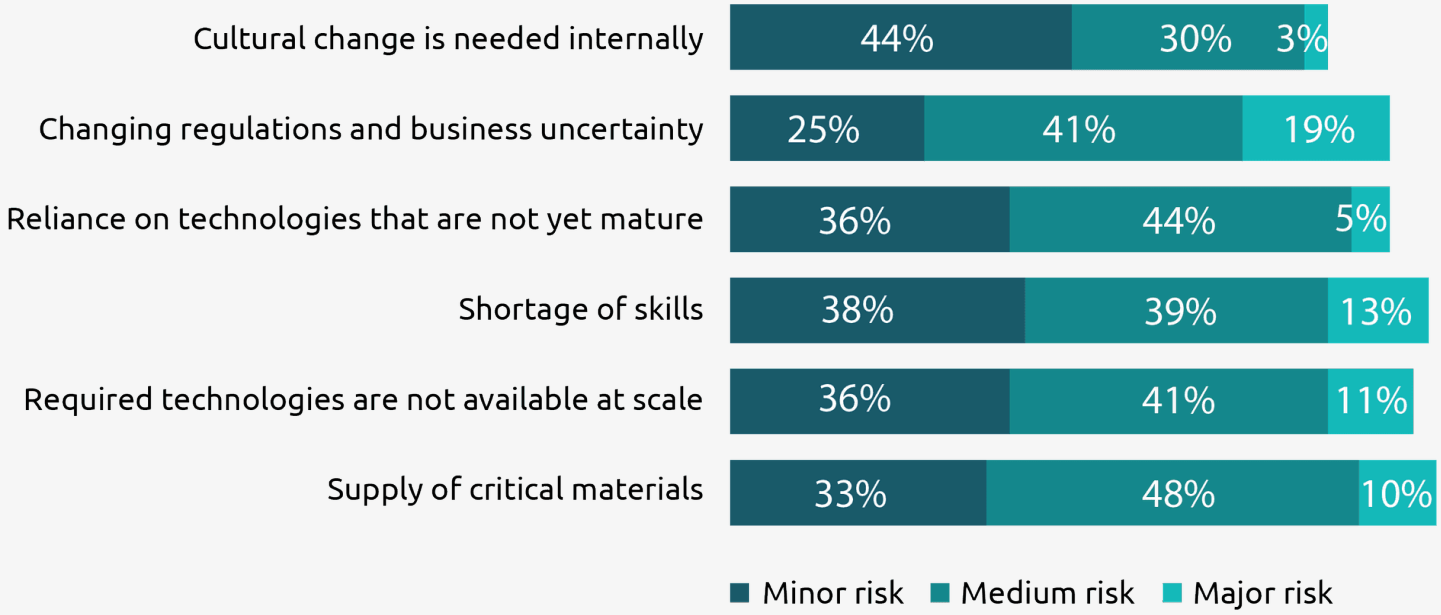
To address the urgency of the challenge, they are dedicating significant portions of their engineering and new product development budgets to **making products sustainable**, and making their operations more sustainable.

How does your firm plan to transform operations to move towards sustainability goals?



But they see **risks along the way**, from the availability of the technologies and materials they need to decarbonize, to skills shortages, to culture.

How much do you consider the following to represent risks to your sustainability plans?

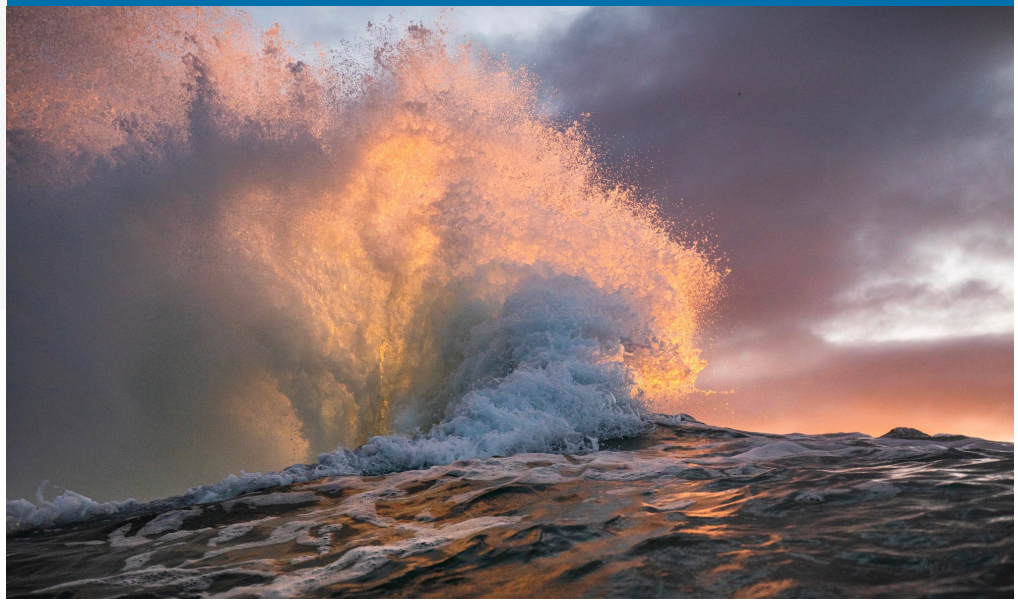


86%

of global enterprises leverage engineering service providers for their sustainability efforts

Working with expert partners

Given the extent of these challenges, and their rapidly changing nature, it is no surprise that almost all use **engineering service providers** to help them navigate these choppy waters.



Case study

With the aviation industry accounting for **3-4% of global emissions**, and at least **800 aircraft being dismantled** each year, the adoption of circular economy practices is becoming an important part of the sustainability strategy for aerospace manufacturers.

Increasing the reuse rate of manufactured aerospace parts is an important step on this journey, but determining if a part can be reused must be made easier and less time consuming.

Accelerate to value

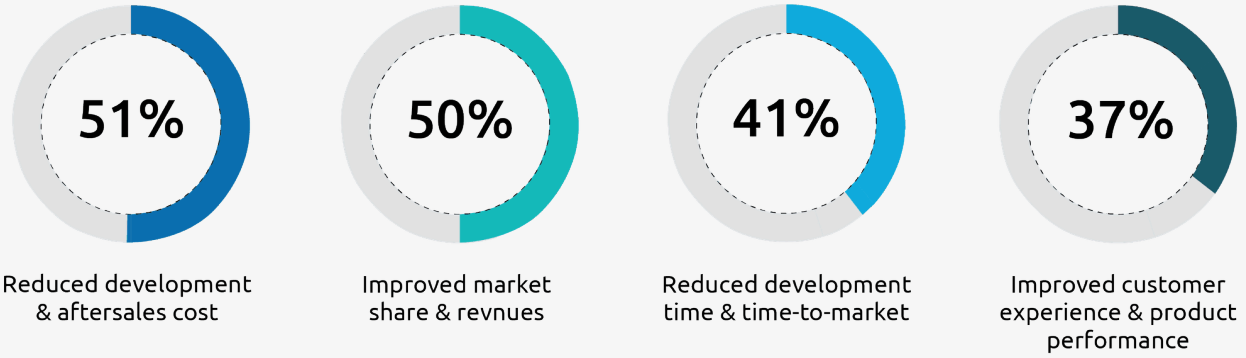
Where are companies placing their bets on digital technologies to reinvent offers and processes, and create new cost savings and revenue streams?

Organizations are making **bold bets on digital engineering**, driven equally by cost reduction and topline improvement.

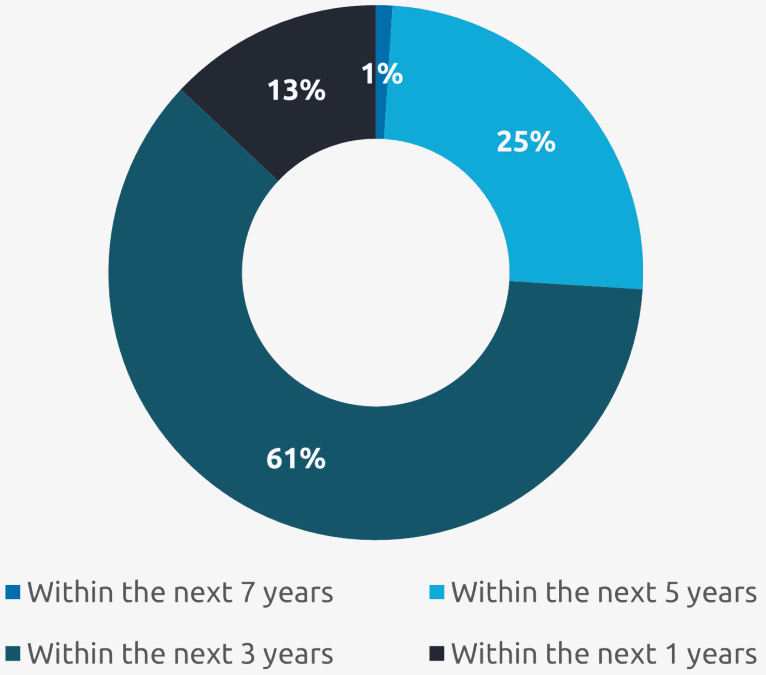
Over half aim to save in development and after-sales costs, and to improve their market share through better or more cost-effective offers.

Nearly as many also see digital technologies as a route to **reducing time to market** and improving their **customer experience**.

What are the top benefits your firm will realize with the integration of digital technologies in products and operations?



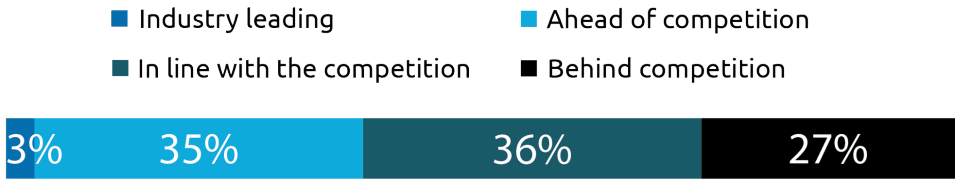
By when does your firm plan to achieve scale with its digital engineering endeavors?



Firms are ambitious about their timescales for digital engineering at scale…

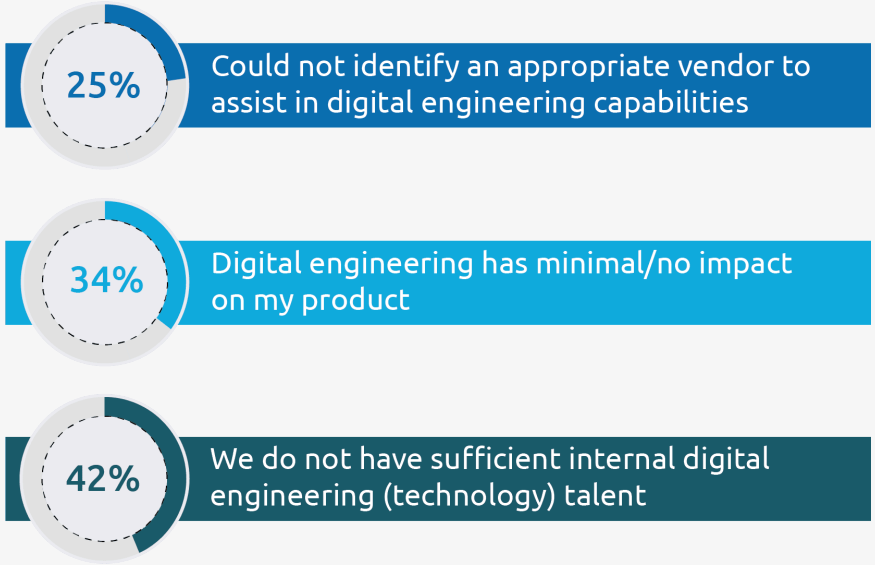
…but firms are not very confident about their existing capabilities

How would you rate your current digital engineering capabilities?



Why do you think you are behind the competition in your digital engineering capabilities?

(of those behind)



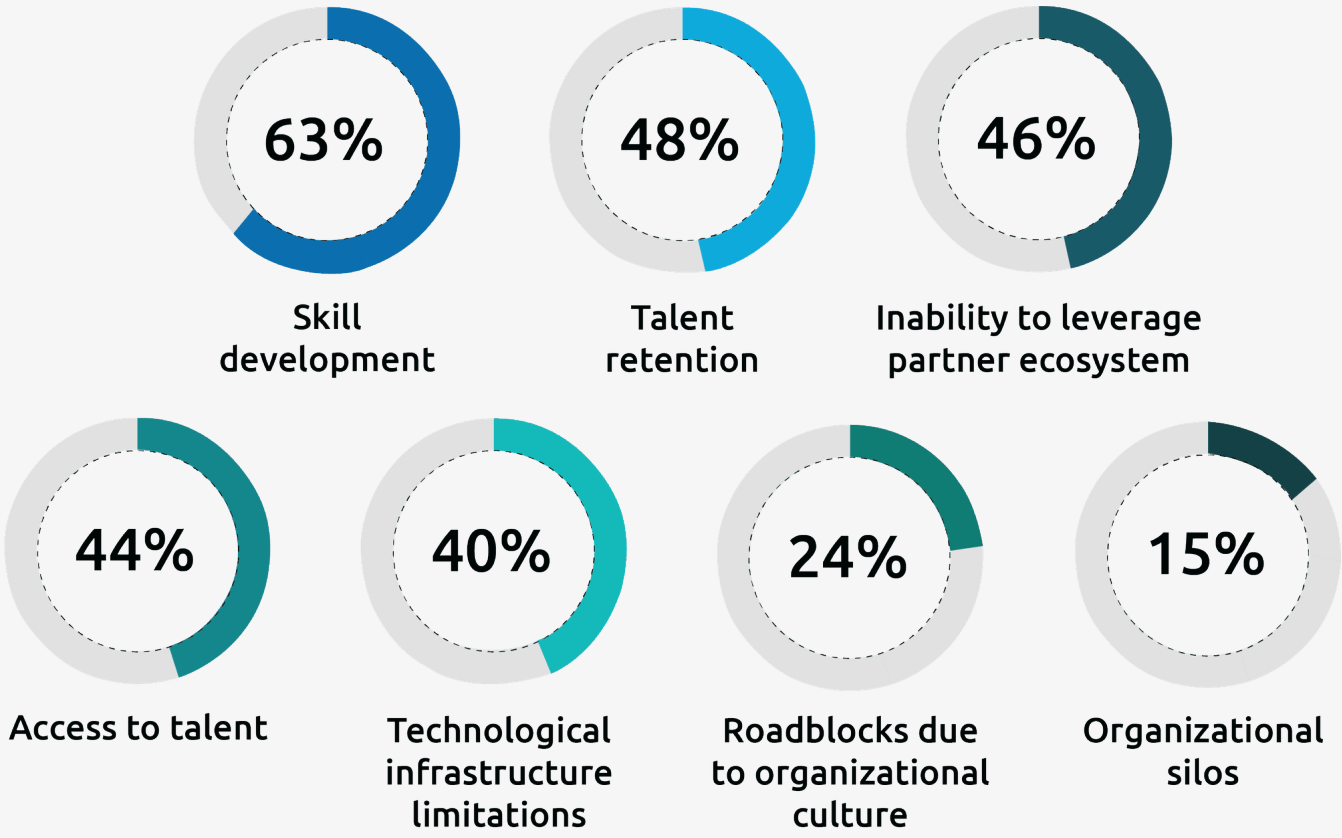
…and those that are trying to catch up with their competition, state they face challenges finding the right digital engineering talent and technology vendors

In fact, **skills and talent retention** are seen as big problems at all firms, even the most advanced.

This can largely be attributed to the **competition for skilled professionals**, especially from fast-moving tech firms. Organizational silos and cultural roadblocks further exacerbate digital progress.

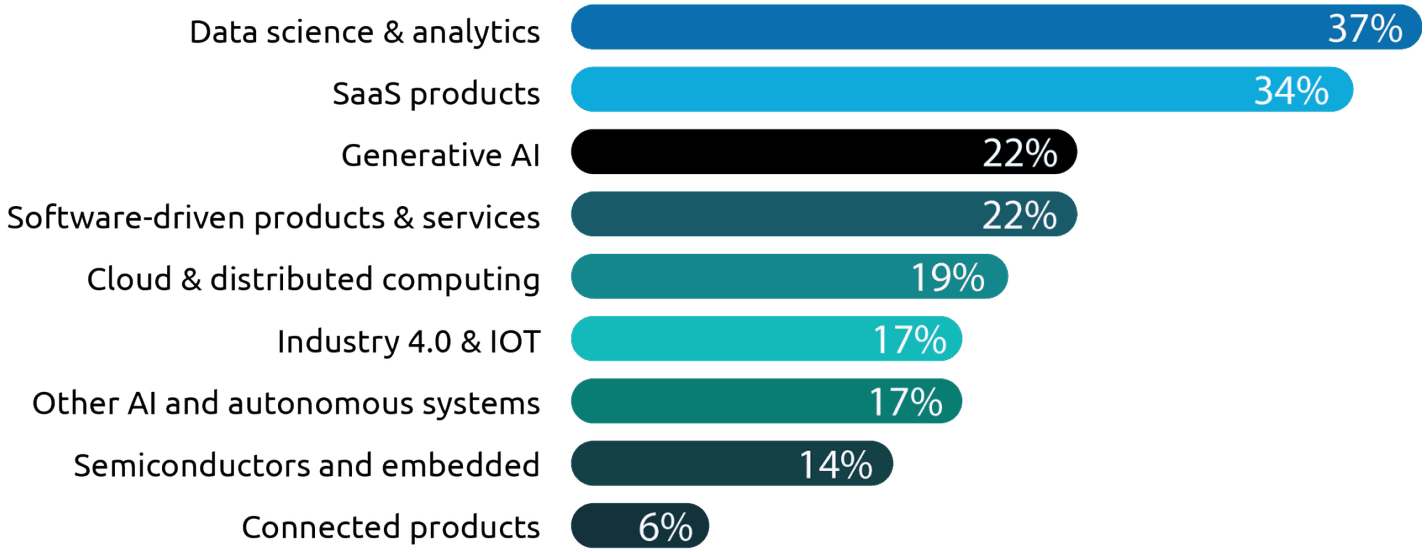
What are the top internal challenges your firm faces in implementing its digital engineering strategy?

(% listing challenge in their top three)



What are the top three threads incorporated into your digital engineering capabilities?

(144 responses)



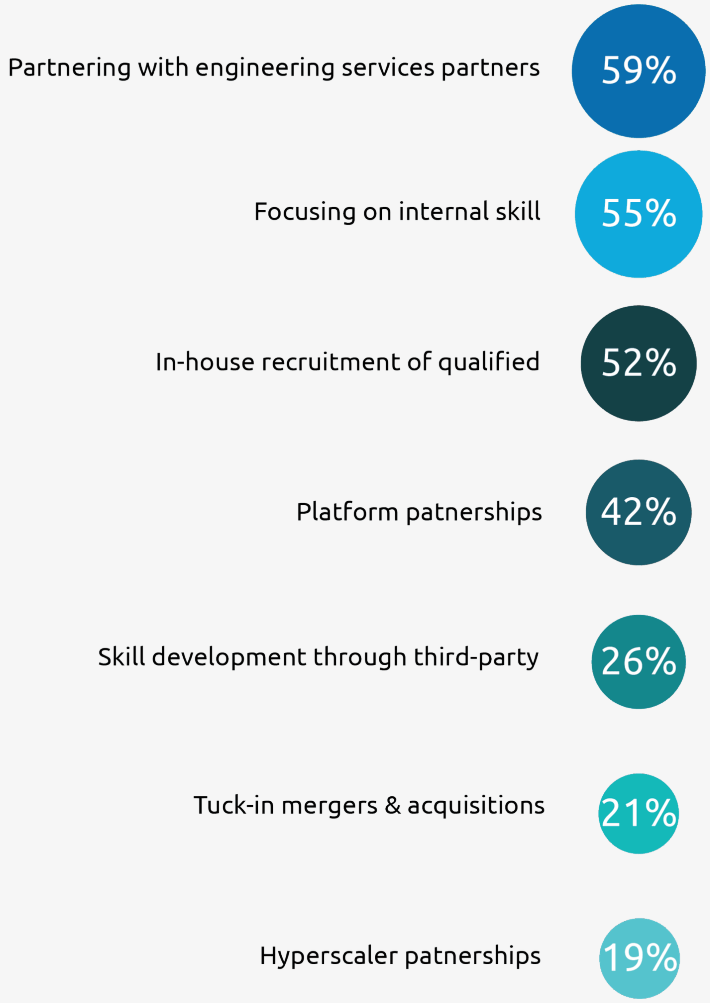
Two threads stand out in firms' digital engineering investments: **hybrid AI*** as a technology enabler and **as-a-service business** models.

Generative AI came in as a top three priority for **22% of companies** - impressive for such a new technology, though with some way to go to realize its promise.

* Hybrid AI merges Gen AI with other types of AI and other engineering and scientific models.

To solve the skills problem, firms are deploying a mix of in house training, recruitment, and, to a lesser extent, outsourced training programs.

How do you meet or plan to meet requirements for your digital engineering endeavors?



Digital is the great disruptor. Companies are creating entirely new digital product lines, like autonomous driving and remote health monitoring. They are embracing cloud and data to build connected product ecosystems that enable new as-a-service business models.

They are applying AI – and increasingly GenAI – to R&D and customer data, to home in on new product possibilities faster, and using cutting edge digital engineering technologies to reinvent how they design and simulate their products. These bold bets promise big benefits, but can also place significant demands for change on the business, which can be hard to navigate.

Case Study: Sanofi

Since 2010, the average cost of launching a new medicine has risen by 67%, with clinical trials accounting for two-thirds of R&D costs alone. As a key industry player, Sanofi's trial protocols must incorporate personalized and new therapies, while developing more flexible designs to address patients' and sites' needs.

Capgemini engineering

Upgrading the core

How are companies modernizing their established engineering practices to deliver greater efficiency at a lower cost?

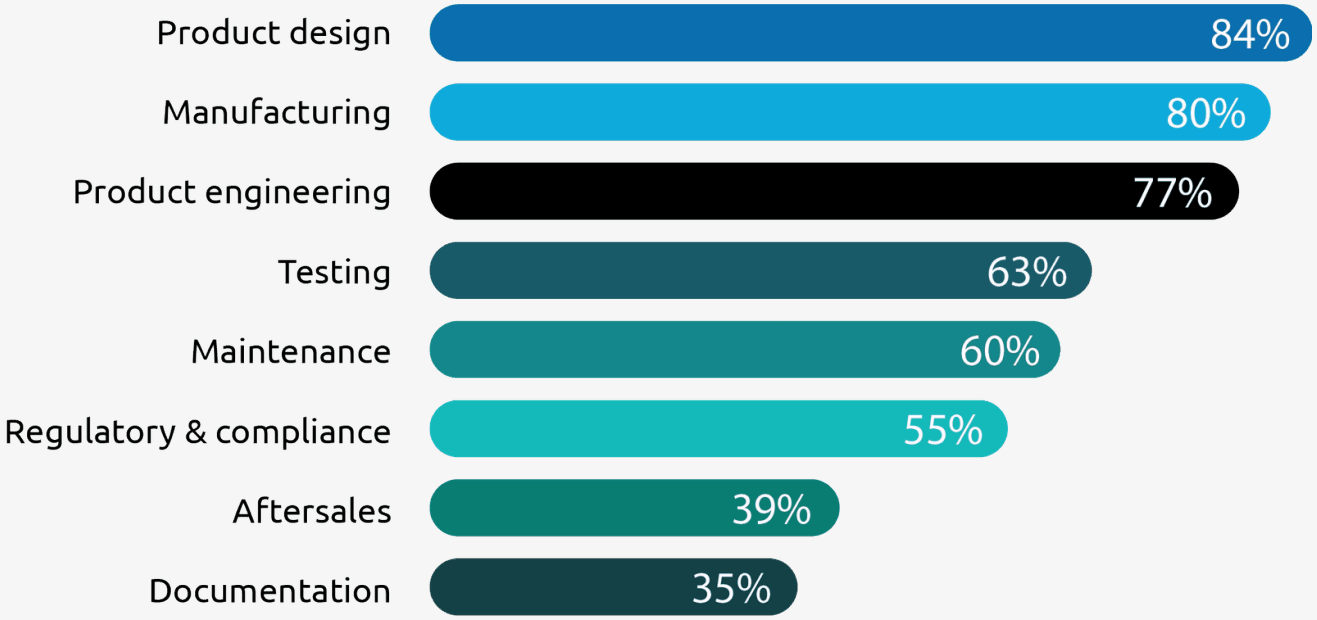
Companies' motivations for optimizing core engineering vary. Some see it as a straightforward cost-cutting opportunity, while others see it as a route to being more competitive or streamlining their operations to get products to market quicker.

38%

of companies are optimizing core engineering processes to maintain profitability

What are the top benefits you aim to realize with the optimization of core engineering processes?

Expected cost savings potential across core engineering workflows



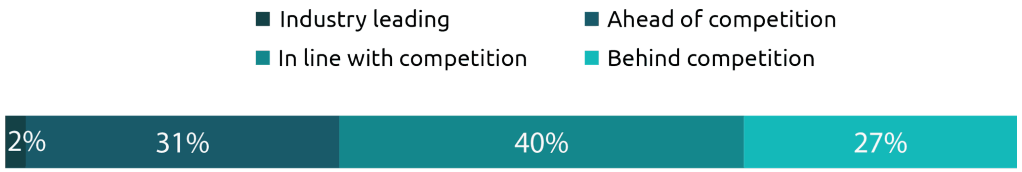
The top three areas with the biggest potential benefits are design, engineering and manufacturing.

Over

80%

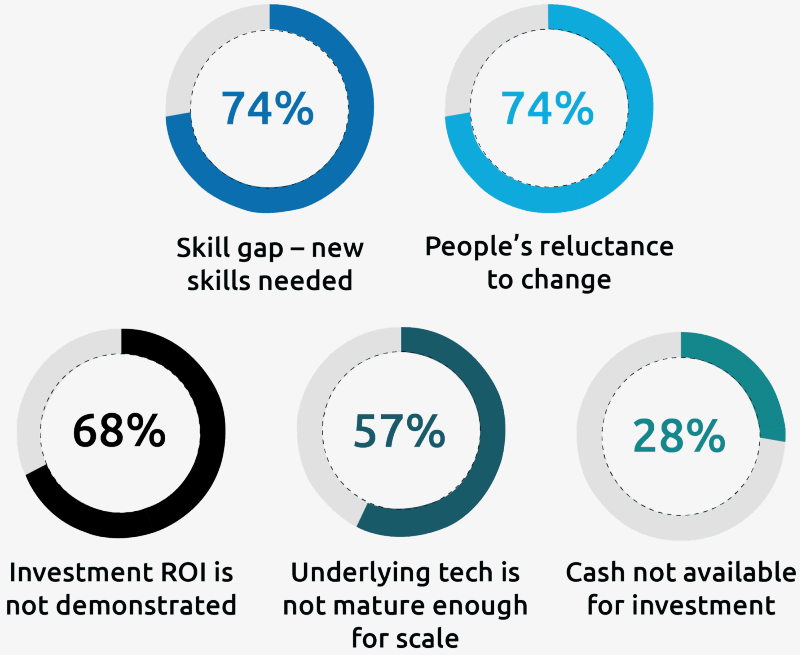
of companies see product design and manufacturing as the biggest benefits of optimizing core engineering

How would you rate your current core engineering optimization initiatives?



But many firms are not where they want to be. Only **2% consider themselves industry leading** and nearly **27% of organizations** say they are **lagging behind their competition**.

What are the top three internal challenges your firm faces while implementing its core engineering optimization strategy?



Core engineering optimization proves to be a people challenge. Skillset evolution and teams' ability to adopt change stand out as the main challenges, way ahead of technology or financials. The overall sentiment of leaders towards their transformation journey is mixed.

Operational technology is seen as at least part of the solution to optimizing core engineering.

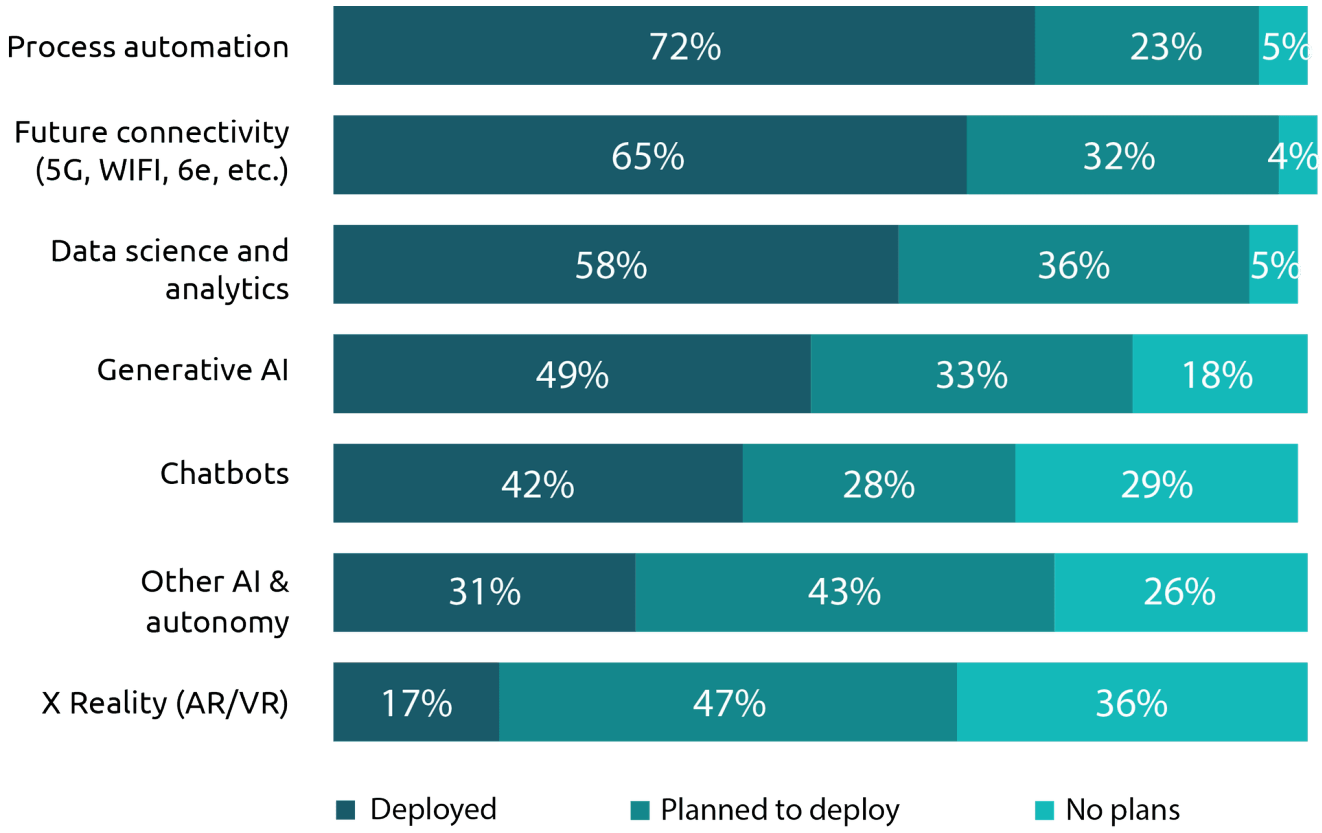
Many are fairly advanced in deploying the more mature operational technologies: automation, connectivity, data science, and analytics.

Though even in these areas, a quarter to a third are still only in the planning stage, showing the struggles companies face deploying technologies at scale.

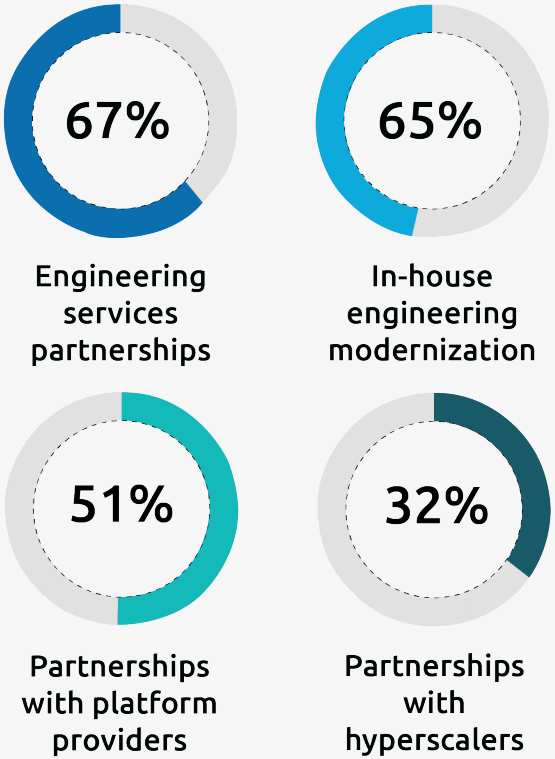
Generative AI was further behind, but progressing fast for such a new technology.

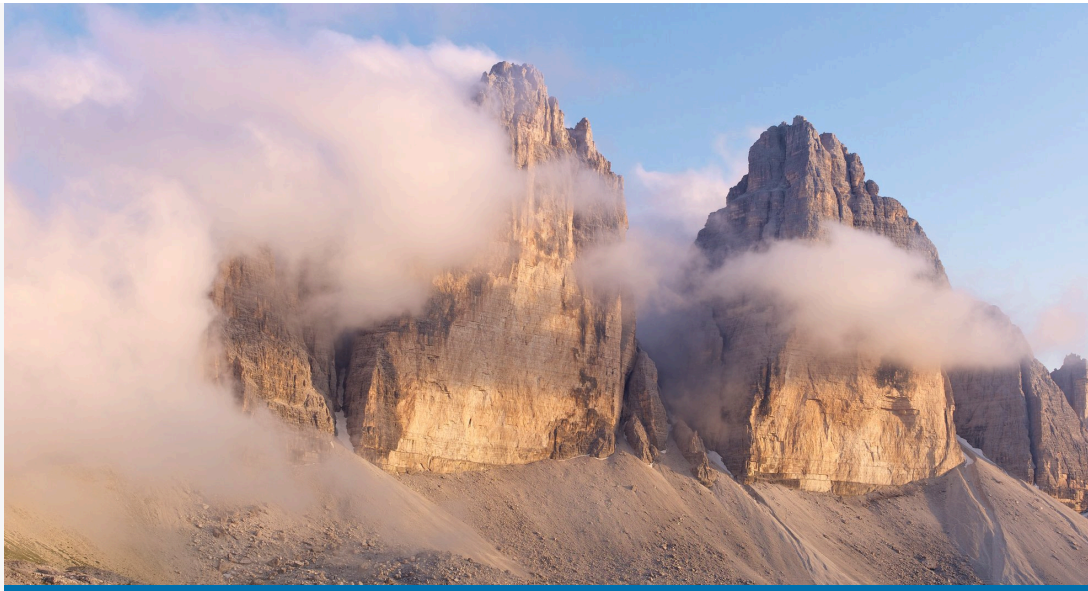
XR has by far the furthest to go, despite half saying it had potential.

How would you rate your adoption of technologies for optimizing core engineering processes?



What avenues have your firm adopted or is planning to adopt for its core engineering optimization?





Companies are exploring a mix of strategies to improve their core engineering, from **in-house modernization programs**, to **partnerships with service companies, technology and platform providers.**

Many discussions on strategy focus on the big visionary plays that companies should be making. That's important. But the truth is that one of the top concerns is **maintaining quality** and **reducing costs**. This is not about wholesale transformation – it is about doing what you already do, more efficiently.

Case study

CSi Palletising provides smart solutions for automated pallet processing and handling. Their machines, robots, and other technologies help customers save time, space, and costs. Pallets are efficiently loaded, moved through the logistics process, and prepared for transport. However, each installation was custom-made, which took too much time, resources, and effort. To improve this, CSi partnered with Capgemini to create a standardized architecture. This change aimed to save time and resources, offering more flexibility and better custom solutions.

Capgemini engineering

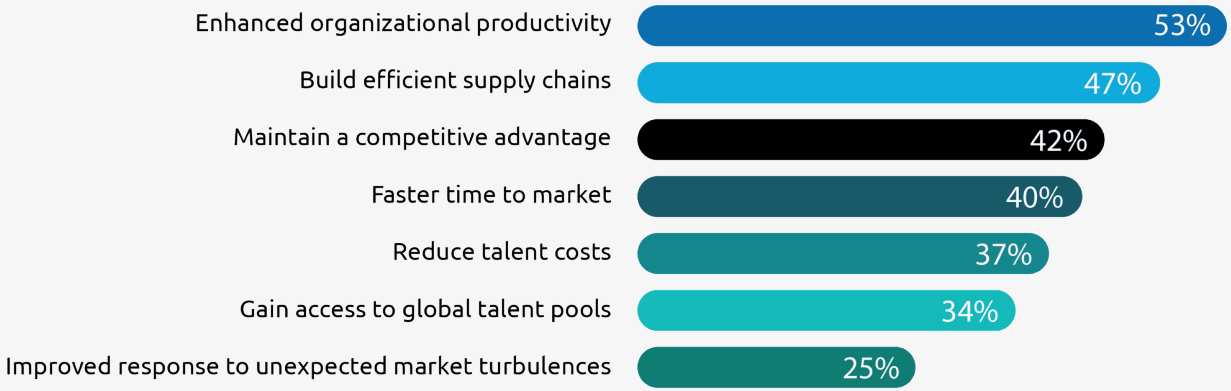
Building agile engineering operations

How are companies leveraging global talent to increase efficiency and adapt to change without disrupting business?

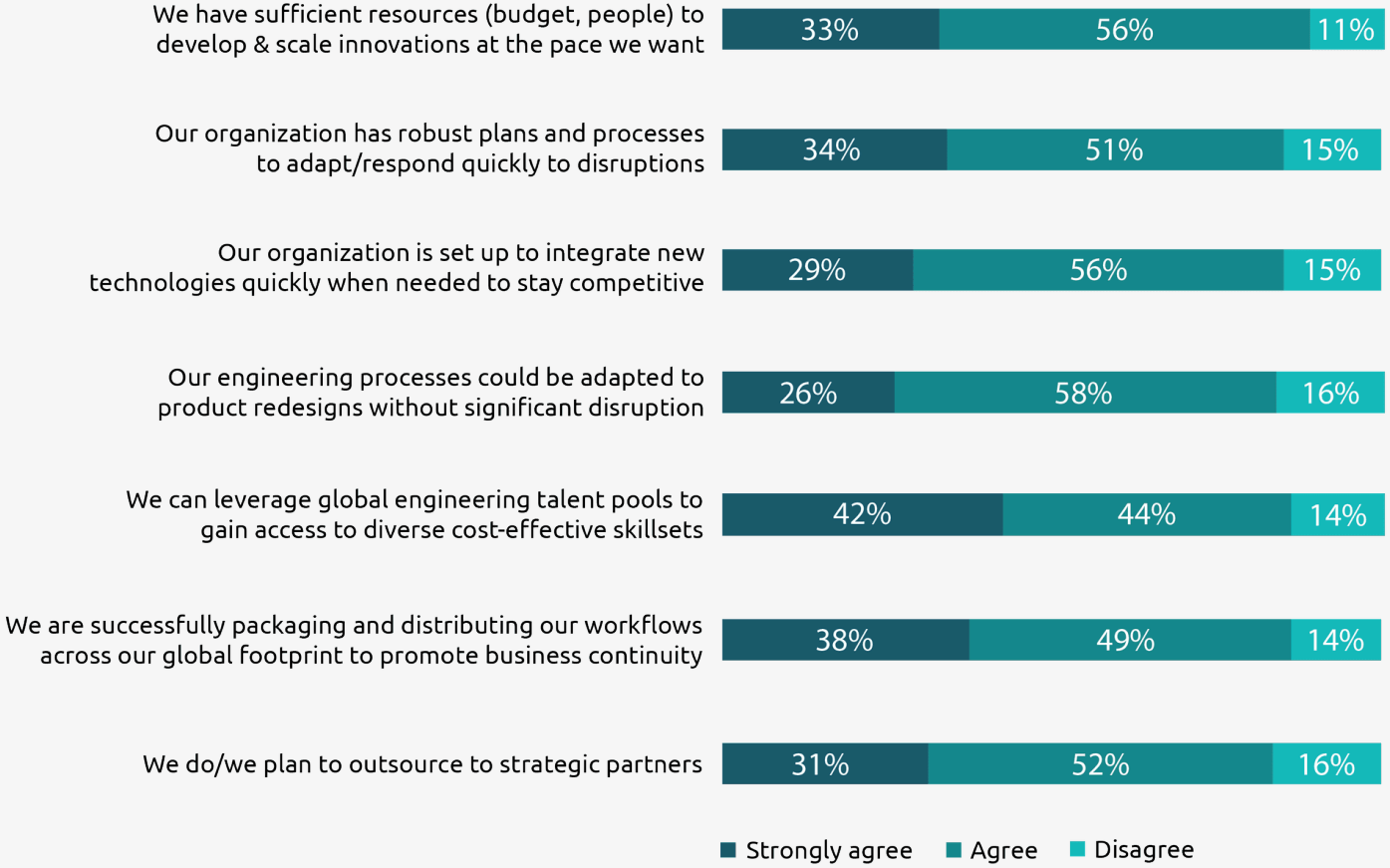
Leaders recognize they will benefit from ever-more resilient engineering practices, including improved responses to market turbulences, access to global talent pools, cost reduction, and enhanced productivity.

These are not just defensive moves; many also saw resilient practices as a source of competitive advantage and a route to faster time to market.

What do you see as the top benefits of establishing resilient global engineering practices?



Of all the strategies explored in this report, **resilience** and **agility** are where leaders are most positive about their operating model.

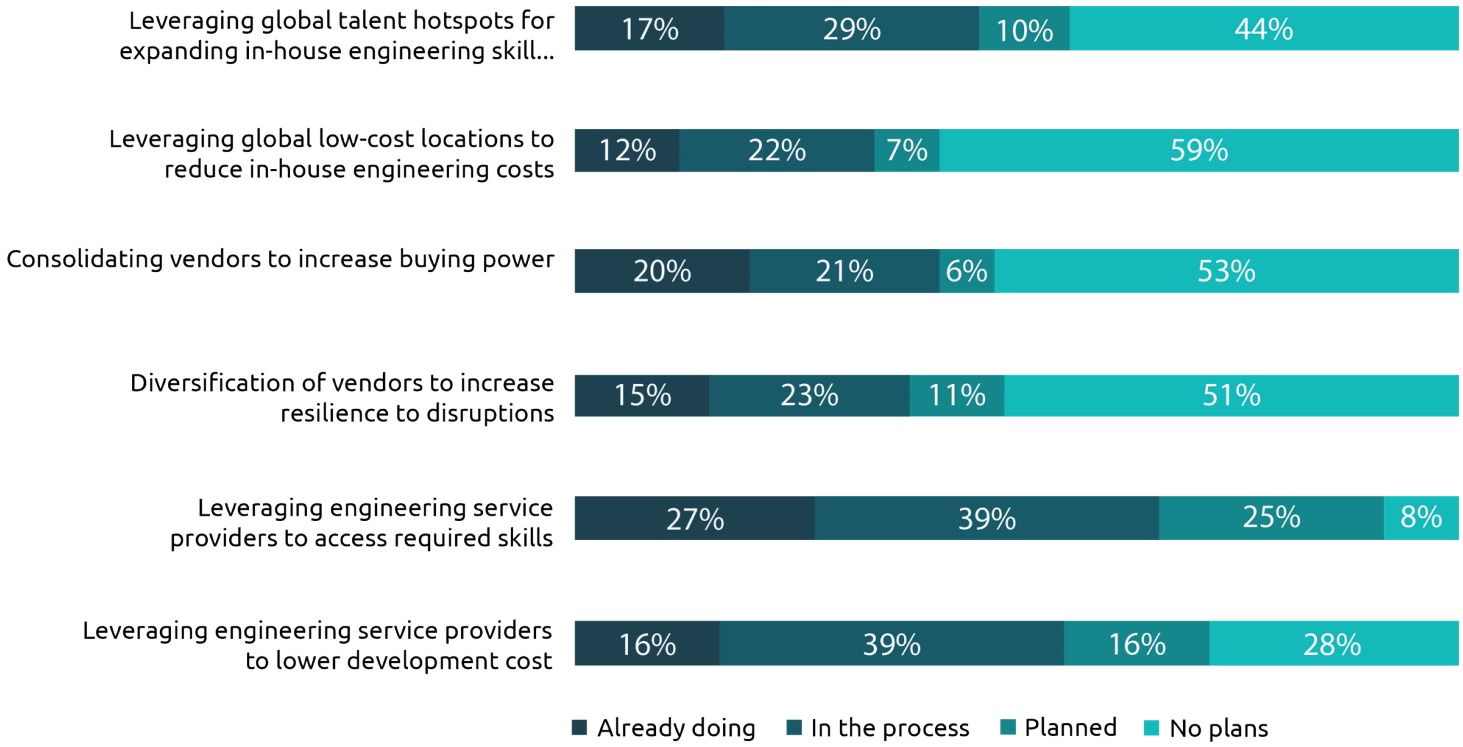


But companies are not done yet. They continue to diversify their own operations and make strategic use of outsourcing.

This helps them to take advantage of global talent hotspots to access specialist skills, and low-cost centers to reduce costs for lower skilled tasks.

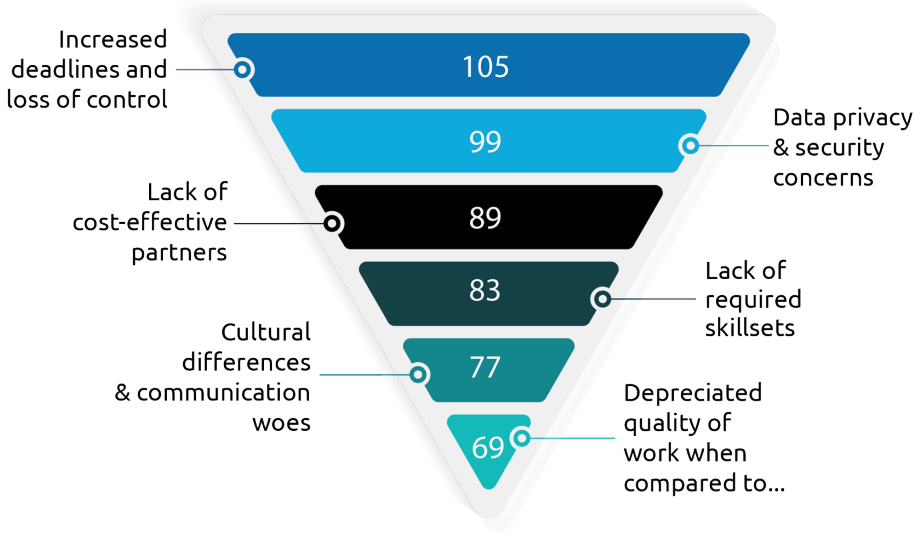
To that end, ER&D decision makers tend to prefer working with ER&D service providers to leverage these talent hotspots - rather than setting up a new office or organization in the area themselves.

Are you currently doing the following/do you have a plan to do any of the following in the next five years?



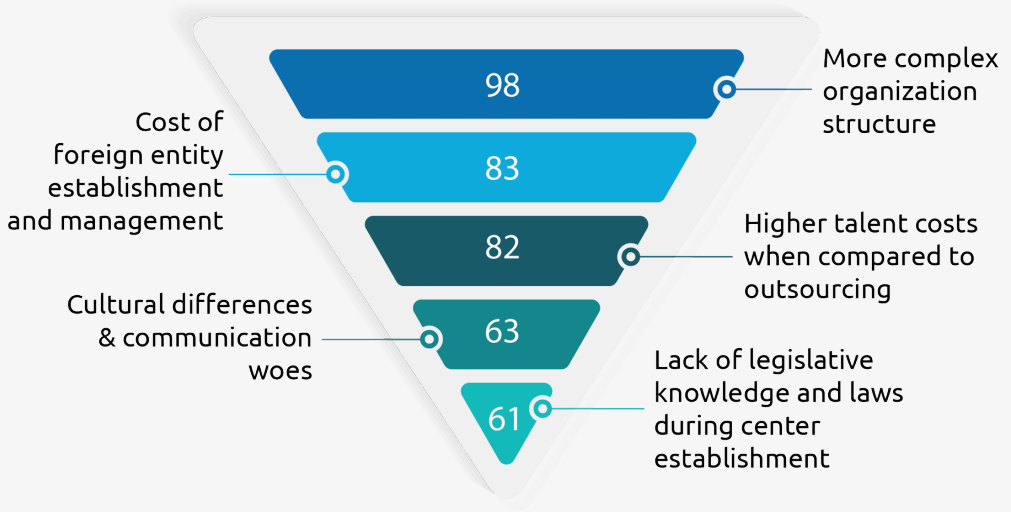
And, while outsourcing with engineering service providers comes with challenges…

What are the top 3 challenges your firm faces/ would face with engineering outsourcing?



…it solves bigger problems than it creates.

What are the main challenges your firm faces/ would face with a global in-house engineering team?

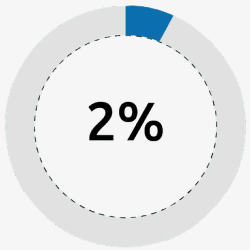


Outsourcing is well-established today.

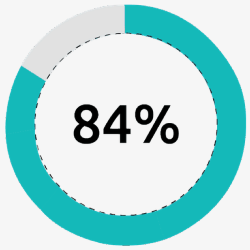
It is often seen as a strategy to lower costs, and indeed this was borne out in our research.

But our respondents also showed an appetite for expanding outsourcing to more value-driven engagements.

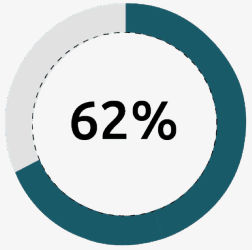
Which of these statements best describes your current approach to partnering and outsourcing engineering work packages?



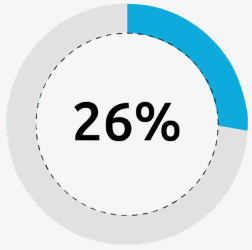
None, we do everything in-house



We do or plan to oursource routine low-value activities to optimize costs



We do or plan to partner with technology service providers to enable ramp-up of skills when required



We do or plan to strategically partner with service providers along the lifecycle of our products & services

Case Study: Op’n Soft

Working with Capgemini, the automotive manufacturer grew its Op’n Soft entity, adding onto the team’s capabilities in order to improve its ability to drive innovation in areas like assisted driving, electrification, personalization, and sustainability.

Read more

Conclusion

Closing thoughts

Leaders' responses demonstrate that they recognize the need for change to fuel growth, drive competitiveness, and ensure relevance in an ever-evolving world. All are transforming their ER&D scale operations to do this, albeit at different speeds and from different starting points.

Leaders recognize that it takes a village to raise a child. No individual player, no matter how brilliant, can do it all; success requires a well-coordinated cast of actors. For engineering-intensive businesses, this means working with an ecosystem of partners on their transformation journey.

In business, as in life, choosing the right friends and partners is the key to happiness. While the four strategies for improvement have been presented as discrete topics, they are, in reality, connected. Partners who operate at scale on all axes, understand their interdependencies, and have a broad partner base themselves will be critical to making sure you reach your destination safely.