

# Transforming Core Engineering:

How to be 30% faster, cut 30%  
of your costs, and stay innovative







# Introduction:

Companies need a step  
change in efficiency



Under the pressure from fierce competition and hyper-volatile markets, engineering companies – from aerospace, to telecom, energy, automotive and beyond – are being pulled in two directions.

On one hand, they must innovate faster without compromising safety. On the other, they must dramatically cut costs. In many cases, remaining competitive can mean doing things 30% faster, at 30% of the cost.

New challengers are rewriting the rules. Established carmakers struggle to compete with Chinese EV manufacturers, [who produce quality vehicles 20% cheaper](#) and twice as fast. This is not just due to lower labor costs, but better

mastery of supply chains, smart manufacturing technologies, and agile, collaborative cultures.

Even in America and Europe, new entrants – unburdened by legacy systems – are creating better products for less by embracing automation and digital manufacturing technologies.

Some estimates suggest [SpaceX has reduced the per kg cost of putting payloads into space by 40-90%](#), demonstrating how engineering breakthroughs can redefine entire industries.

This pace of transformation raises a critical question: How can leaders of long-standing engineering companies dramatically reduce

the cost of their core engineering (in which we include production, operations, upgrades, supply chain management) and their product design – while continuing to innovate and deliver on safety and compliance?

The solution – we believe – is Engineering Factories: a next-generation approach to outsourcing that integrates world-class engineering talent, digital technologies, optimized factory setups, and cross-industry collaboration. These engineering factories deliver cost savings and continuous innovation at scale, in a way that traditional outsourcing never could.

In this paper, we will explore the existential challenge facing established engineering intensive companies, and how Engineering Factories provide a new path forward.





# Part 1:

Why companies struggle to go beyond incremental improvement and deliver big change





Our recent [Engineering Trends report](#) – which surveyed 300 engineering leaders – found that optimizing core engineering was considered key to the future of their business (see Chart 1). Reducing costs may be the obvious benefit (highlighted by 38%), but nearly as many respondents said it was essential to profitability, speeding time to market, and as a sustainable competitive advantage.

This must go beyond incremental optimization. Ever greater efficiency serves you well, until it doesn't. For example, a recent [Economist article on the challenges facing the German economy](#) noted that, “German industry, especially its Mittelstand firms, has focused on incremental innovation, leaving it unprepared for technological shocks like the advent of electric vehicles.” In the face of unprecedented competition, engineering companies need the sort of dramatic efficiency improvements delivered by

the internet and offshoring booms of the 1990s and early 2000s.

But established companies struggle with big transformation. They generally see two routes for improving cost and efficiency without harming output: technology and outsourcing. Both have limits.

## Technology and its limits

New technology offers endless small improvements – all worth doing (see Chart 2). Many believe it will offer wholesale transformation – observe how Tesla delivered unheard of efficiencies by building factories from the ground up, using the latest digital, automation and collaboration technologies.

But the reality is that this is hard for companies with legacy systems and cultural resistance to the change these technologies bring. Our survey showed nearly three quarters saw skills, and cultural resistance as barriers to optimizing the core, amongst

Chart 1:

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



Chart 2:

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

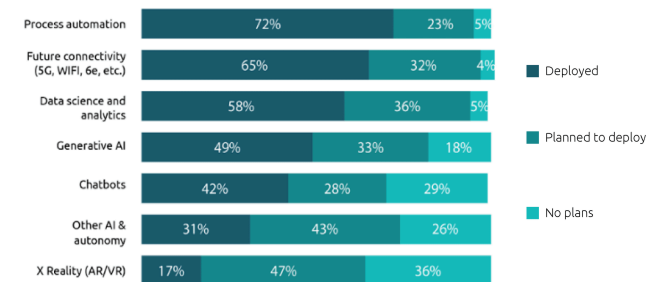
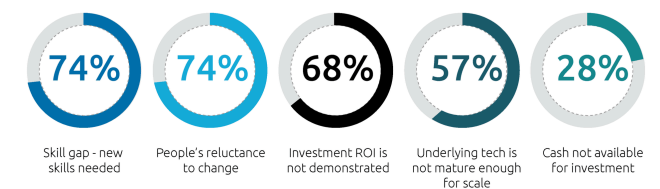


Chart 3:

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





## Outsourcing and its limits

Outsourcing has had more success delivering big cost savings for established companies – especially in the US where leading companies are known to outsource 60%+ of their activities (Europe is significantly lower at 30-40%). Various sources suggest outsourcing saves companies 20-30% or more in costs, by reducing expenses, accessing hard-to-find expertise, and even improving efficiencies by moving work to purpose-built facilities.

But outsourcing has traditionally been about shifting a defined work package from one place to another. This delivers a big initial cost-saving amongst other benefits, but its value diminishes over time.

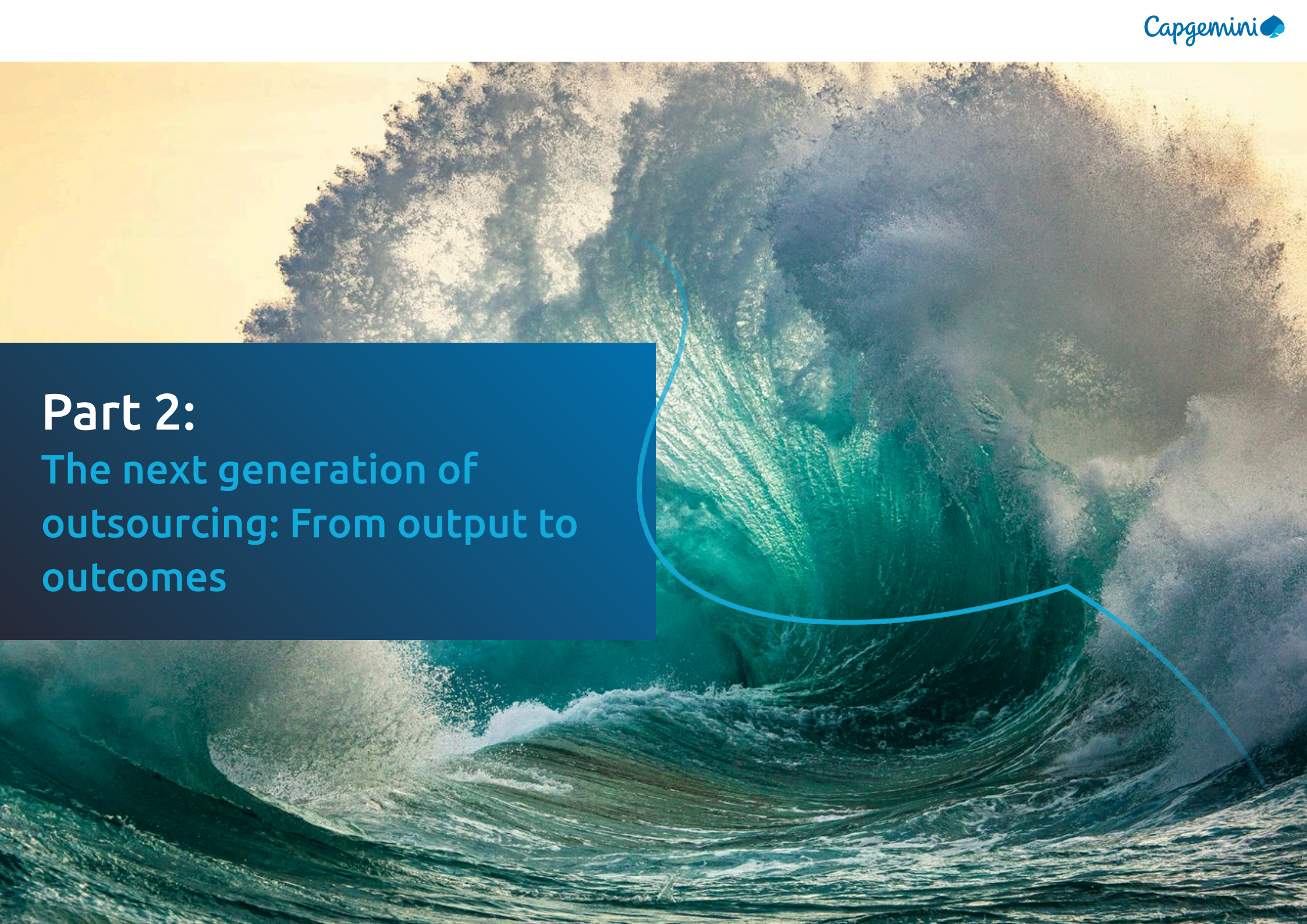
This is because a team built for a single outsourced task will focus on doing one thing efficiently, and will not be able to see the bigger picture, spot new ideas, or identify new technologies from other sectors that could bring improvements.

Gradually, they will fall behind companies with more innovative approaches.

Over time, costs rise as specialist teams expect higher pay. Under this highly formalized approach, it can be hard to maintain the desired pyramid structure of a few managers at the top and lots of people delivering at the bottom (unless you constantly fire people whenever they deserve a promotion, which is not a good look these days).

Finally, narrowly focused teams, each with their own siloed approaches to quality control, can make outsourcing complex and safety-critical components more trouble than they are worth, limiting outsourcing's potential.





## Part 2:

### The next generation of outsourcing: From output to outcomes





Outsourcing transformed businesses from the 1990s onwards, as the world globalized. It remains valuable as a cost improvement tool. But outsourcing as we know it was designed for a different world. Then, the watchword was 'specialization', and one of the unwanted side-effects has been to break businesses into silos.

Today's businesses are about cross-functional collaboration, and constant innovation in a rapidly changing world. A new outsourcing model is needed: one built for purpose for the 2020s and beyond, using new technologies and thinking.





Engineering Factories do not just shift work packages, they transform how engineering is done. They don't just execute; they optimize, innovate, and industrialize performance with AI, automation, and cross-industry best practices. This is the next-generation outsourcing model for engineering.

## Enter Engineering Factories

Capgemini Engineering is addressing this problem with 'Engineering Factories' – a whole new approach to outsourcing.

Each factory is designed around particular engineering domains and business goals, such as producing products at a specific cost or weight; or managing specific operations, such as the supply chain; or delivering specific capabilities, like Validation & Verification (V&V).

The factory is a single entity – or group of entities – that combines skills, assets and frameworks in that domain.

Each benefits from targeted investments in technologies and labs for prototyping, simulation, automation, and increasingly Gen AI – to create hyper-efficient processes that are hard to deploy at in house facilities.

Critically, whilst each factory has a focus, it works across all sectors. That is a radical change from traditional siloed outsourcing. Factory teams interact, allowing cross-fertilization of ideas and insight into new technologies. That changes the outsourcing game - from a team delivering a list of tasks, to a team that is constantly improving to deliver customer goals in the best, most efficient way possible. It's about outcomes, not just outputs.



## The benefits of Engineering Factories vs traditional outsourcing

Service centers that serve multiple industries – instead of being designed around one task – are inherently more innovative and adaptable, since they tap into a broader range of knowledge and technologies.

For example, a computer vision testing system developed for TV user interfaces has proven hugely valuable for automotive infotainment systems.

Adapting these testing tools to in-vehicle infotainment proved much more efficient than developing them from scratch. But to actually do that, you first need people in your factory who are talking to other industries and know about the techniques they are using. A testing facility with a wide view of cross-industry testing possibilities can quickly identify if a solution already exists, reducing cost, time and risk.

This factory approach also allows flexibility across teams, which helps control costs. Because these factories perform processes that are complex, but not highly specific to one company, they can move people and teams between projects as needed.

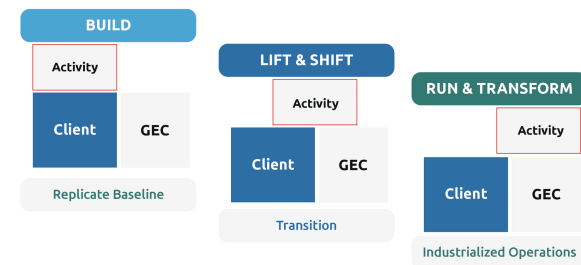
That allows us to offset the natural salary inflation impact on client projects, by recomposing team pyramids when needed, drawing on a wide pool of talents from across the engineering factory. It is also a lever to adapt to fluctuating business cycles without a constant cycle of hiring and firing. Of course, we also guarantee the confidentiality of clients' IP through carefully designed security measures.

The scale of these factories also means they can take a systems-based approach to quality across the board. Often companies rely on training people in quality control for a specific product. That locks them into doing quality control at the specific places where the people and training are set up. But when quality is ingrained into a system – with quality gates, automated controls, and defined standards – even safety-critical components can be quickly moved to a lower cost, better located, or more efficient facility, without risk.

To manage outsourcing to our factories, we have a proven 'lift and shift' process. This does not involve

trying to replicate a company's capability elsewhere, but to understand the goals, set KPIs, and design an appropriate setup within our factories that will deliver the best long-term outcomes, not just the outputs.

And, yes, we also do the reverse - if you ever want to take things back in house or spin out the new capability.



In short, these factories allow our clients to outsource complex work packages quickly and efficiently, whilst providing long-term cost control, quality guarantees, and ensuring the work package continually benefits from ongoing technological innovation. In fact, we are so confident it works, that we commit to cost savings – **often 30% or more** – in the contract.

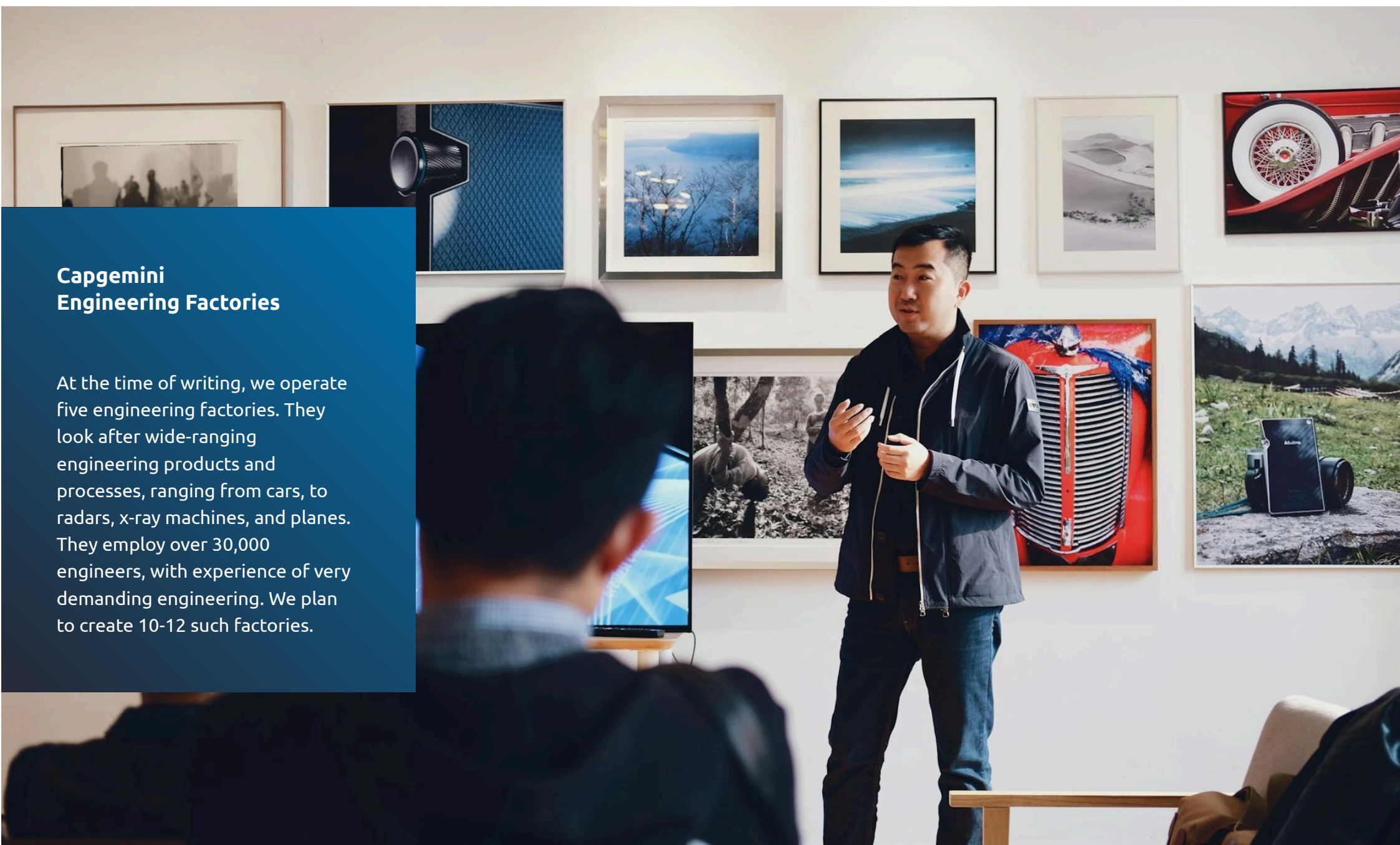


## Capgemini Engineering Factories

At the time of writing, we operate five engineering factories. They look after wide-ranging engineering products and processes, ranging from cars, to radars, x-ray machines, and planes. They employ over 30,000 engineers, with experience of very demanding engineering. We plan to create 10-12 such factories.

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## Our existing factories include:

- **Design-to-X Factory:** Helps companies design products to meet specific goals, such as engineering products for weight, cost, or sustainability targets, all whilst ensuring compliance.

Our Factory applies systematic, AI-driven optimization to meet specific design targets. It has delivered projects including battery module optimization, acoustic shields, and structural components to provide lighter, stronger, and more cost-effective designs – with some projects delivering **30% weight reductions**.

- **Supply Chain Management Factory:** A fully outsourced supply chain management capability that runs supply chains, delivering end-to-end management, optimizing for **cost, quality, delivery, performance, sustainability, and compliance**. We cover everything, from setting up and onboarding new suppliers, to managing inventories, real-time optimization, and arranging returns on rejected deliveries. For one customer, we work with their 2,000 suppliers worldwide, and have optimized 37 million shipments for cost and sustainability, saving approximately **€4m** and **150kt of CO<sub>2</sub>**.

- **Product Sustenance and Obsolescence Management Factory:** We manage non-differentiated product lines throughout their useful life, allowing companies to focus on their cutting edge, higher-margin activities – not just managing legacy products, but continually enhancing them.

For a medical OEM, we handle production, spares, repairs, software updates, customer support, and supply chain management. This includes ongoing product innovation, leveraging insights from multiple sectors to optimize designs, thanks to the factory's cross-fertilization of ideas between teams. For example, we made a design change that **reduced cost by 35%** and **extended useful life by up to 20%**. In 2024, this factory delivered one million product changes, with most resulting in **€0.5-1 savings per unit**.







- **Regulatory, Quality & Compliance Factory:** We take the hassle out of ever-evolving global regulatory compliance for industries like pharmaceuticals. We leverage a shared pool of resources, from PhD-level expertise to hands-on shop floor experience, ensuring that products meet reporting and compliance requirements.

The factory's Regulatory, Quality & Compliance Line handles product compliance, including Periodic Vigilance Reports, Continued Process Verification, Product Quality Reviews/Annual Quality Reviews, and Stability Reports. We handle deviation and corrective and preventative action (CAPA) management, identifying and fixing unexpected changes or non-conformance issues, as well as resolving complaints.

The Commissioning, Qualification & Validation Line handles testing, verification and validation of computer systems (CSV), software (CSA), equipment and processes, and provides compliance-ready documentation for all of the above.

- **Technical Publications Factory:** We simplify the process of creating and updating the technical publications needed by today's complex products, from user manuals, to technical specifications, operational guides, maintenance procedures, and safety guidelines. Combining expertise with purpose-built Gen AI, we ensure content stays up-to-date, whilst keeping costs and time requirements under control.


Our work for clients in aerospace, defense and MedTech consistently delivers **30%+ cost savings** through reduced manual work and optimized resource use, with **97% on-time delivery** and stringent SLA compliance.



A full-page background image of a massive ocean wave crashing, with white foam and blue water. A thin, light blue line graphic starts near the top of the wave's crest and curves downwards and to the right, ending near the bottom right of the frame. A dark blue rectangular box is positioned on the left side of the image, partially overlapping the wave.

**In conclusion**





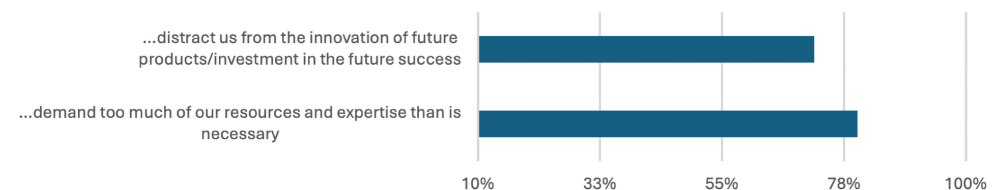
**For executives under pressure to drive sustainable profitability, the question isn't whether to optimize core engineering – *it's how.***

Engineering Factories offer an industrialized solution, ensuring ongoing cost control, quality, and innovation, without the risks of in-house reinvention.

Whilst some critical activities must always stay in house, we estimate that 80-90% could be safely outsourced. Most of these are highly inefficient, thanks to pile ups of legacy systems, and so can be done better elsewhere, with no risk to competitiveness.

Outsourcing legacy product management and standard business processes can reduce costs, whilst freeing up your talented engineers to work on the future of the business, instead of managing the past. In fact, in our survey, many companies acknowledged that core engineering is too costly, and demands too much time, distracting from more innovative business activities (see Chart 4).

### **Product lines that generate significant revenue... (% who Agree/Strongly Agree)**





As companies do so, they would do well to consider moving beyond the traditional approach of outsourcing a defined work package to a dedicated team. A better strategy is to harness newer outsourcing models to deliver ongoing innovation and cost control – both for products, and the processes and technologies used to create them. Doing so allows businesses to grab the cost benefits of outsourcing, whilst staying at the cutting edge of innovation and production technologies.

The success of the new wave of innovators in EVs and other engineering domains is significantly due to technology-led production efficiencies that long-established engineering companies did not think possible. Much of this is because these new companies had the advantage of starting from scratch - designing factories from the ground up around new technologies and cross-functional collaboration to achieve both high efficiencies and an innovative engineering culture.

Years of trying have shown that most established engineering companies cannot deliver this sort of transformational core engineering innovation in house. The legacy and cultural barriers are too high. But they can outsource this transformation to factories that can.



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## Authors



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