

# Think:Act

Leading thoughts, shaping vision

THE

NEW

BLUEPRINT

FOR

INNOVATION

HOW TO  
INNOVATE  
IN 2025

Think:Act #45 05 | 2025 INNOVATION PRICE \$ 19.95



## Fail better

Amy Edmondson on learning from mistakes

## X Man

Astro Teller reveals Alphabet's moonshots

Roland Berger





**"It's very easy to privilege the present over the future. You must not fall prey to that trap."**

**Amy Edmondson**  
"Good failure" guru and author  
of *Right Kind of Wrong*

[→ PAGE 72](#)

**"Confidence is the expectation that you'll win - somehow. The 'somehow' almost always depends on a team."**

**David Novak**  
Co-founder and former  
CEO of Yum! Brands

[→ PAGE 62](#)





**"We want to work on things that might take 10 years, but we want to be impatient every day about the learning."**

**Astro Teller**  
 Scientist, inventor and "captain of moonshots" at X

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PHOTO: WINNI WINTERMEYER | ILLUSTRATIONS: SIMON LANDREIN

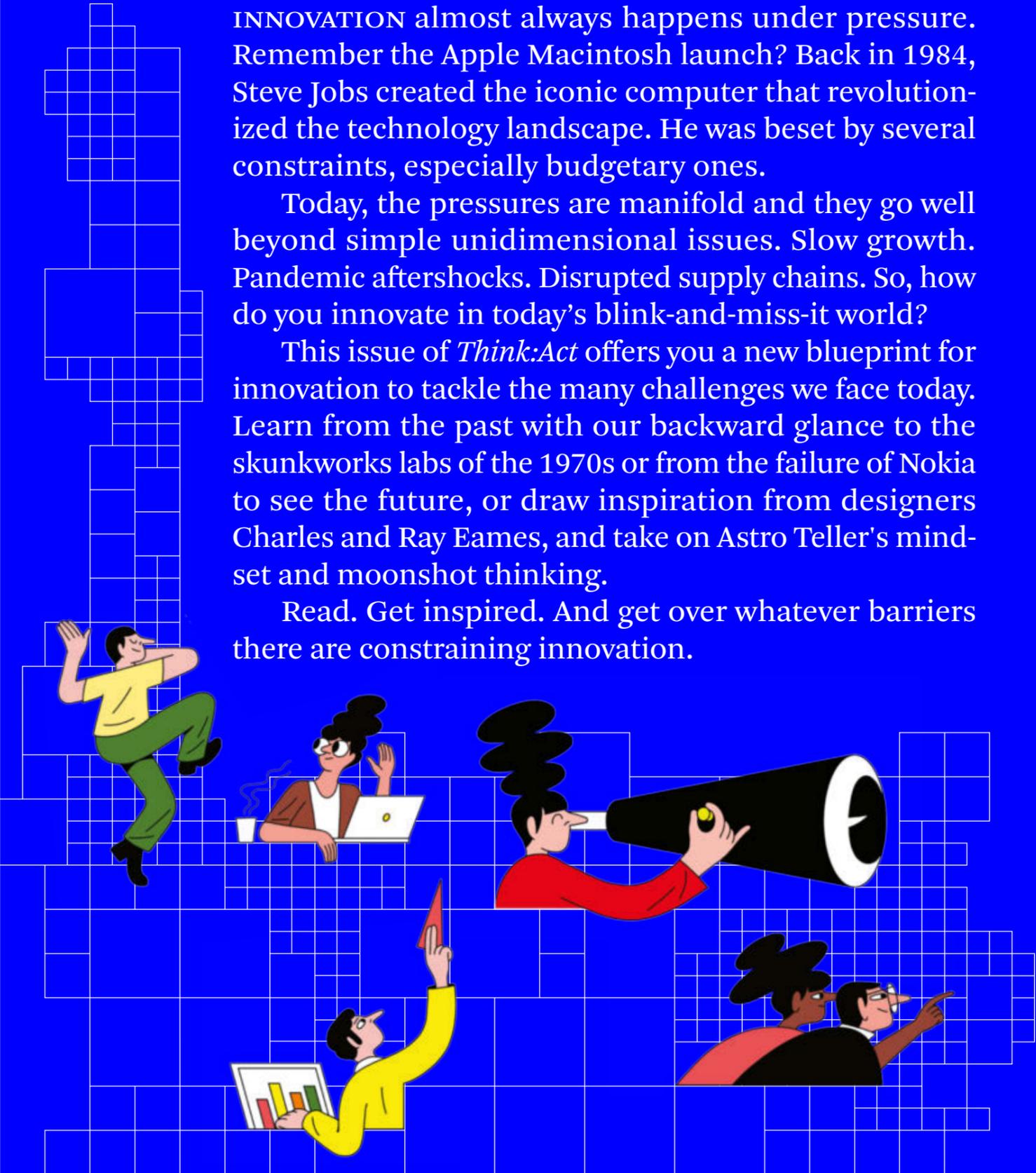
# INNOVATION

INNOVATION almost always happens under pressure. Remember the Apple Macintosh launch? Back in 1984, Steve Jobs created the iconic computer that revolutionized the technology landscape. He was beset by several constraints, especially budgetary ones.

Today, the pressures are manifold and they go well beyond simple unidimensional issues. Slow growth. Pandemic aftershocks. Disrupted supply chains. So, how do you innovate in today's blink-and-miss-it world?

This issue of *Think:Act* offers you a new blueprint for innovation to tackle the many challenges we face today. Learn from the past with our backward glance to the skunkworks labs of the 1970s or from the failure of Nokia to see the future, or draw inspiration from designers Charles and Ray Eames, and take on Astro Teller's mindset and moonshot thinking.

Read. Get inspired. And get over whatever barriers there are constraining innovation.



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"I asked ChatGPT the same question and here's what it said - what do you think?"

- Jeremy Utley, PAGE 56

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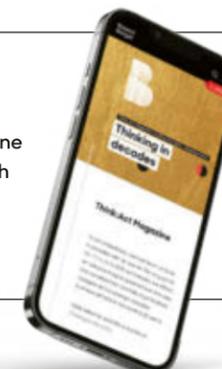


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INNOVATION

INNOVATION

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Think in numbers

Putting a figure on ... 200 YEARS OF PASSENGER TRAINS

24 KM/HOUR

The speed at which the world's first public passenger train carried 450 people between Stockton and Darlington in northeast England on September 27, 1825.

505 KM/HOUR

The top speed for the Chūō Shinkansen line between Tokyo and Nagoya, currently under construction and expected to be the fastest passenger train in the world upon its completion in 2037.

67.9% MORE

How much passenger numbers on national rail journeys across the European Union increased in 2023 compared with 2020, although the figures remain just under pre-pandemic levels.

\$291 BILLION

The global market size of passenger rail transport in 2024. This figure is expected to surpass \$400 billion by 2030.

SOURCES: BRITANNICA, JAPAN RAIL PASS, EUROSTAT, THE BUSINESS RESEARCH COMPANY

PHOTOS: HENRIK SORENSEN/GETTY IMAGES, ANTOINE DOYEN | ILLUSTRATION: JULIA ZIMMERMANN

Food for thought

How do narcissism and hubris manifest in leadership and what are the consequences?

by Manfred Kets de Vries

WE ALL ARE NARCISSISTIC to some extent. It makes for a sense of achievement. It's the question of the excess especially when people get into power. Unfortunately, it's a very heavy drug and many people cannot handle it. Hubris, or excessive pride, is an environmental condition: People start to live in an echo chamber and have a tendency to tell those in authority what they like to hear. You see it all the time. Very few people can keep their head when in a situation of power. So what is needed is a climate where you have a healthy disrespect for the boss. There is constructive narcissism and destructive narcissism and the most

dangerous one is this kind of malignant narcissism: narcissistic and psychopathic tendencies combined. What do you do about it? I've been a great advocate of 360-degree feedback systems. So if you have a 360-degree system where people are not too scared, you might tease them out before it's too late because the moment they are in a top position, it becomes quite hard. Very often, organizations wait too long. With this feedback, you might have a chance that you find those people. Fish starts to smell at the head. Here it's also the role of the board of directors to hire, fire and monitor CEOs and top executives.



MANFRED KETS DE VRIES is management scholar, psychoanalyst and a professor of leadership at INSEAD. A prolific author, he is also the founder of the Kets de Vries Institute, a global leadership development and organizational culture transformation consultancy.



For a longer version of this interview please go to: rolandberger.com/en/ketsdevries

Think

AT A GLANCE

Thoughts to live by

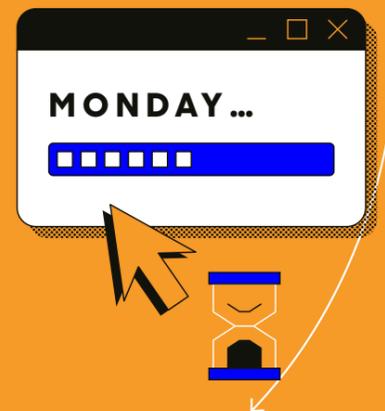
"On average, bad things happen fast and good things happen slow."

— Stewart Brand

American writer, best known as the co-founder and editor of the Whole Earth Catalog

Re-thinking buzzwords

Get to grips with new industry lingo in a flash with our stripped-down explanations of the latest jargon.



"BMM" - or Bare Minimum Mondays

This term originated on TikTok as a response to stressful work environments. It means what it says: That is, employees go slow on the first weekday and ease into both their tasks and their working week. The first rule of BMM is not to tackle the toughest tasks immediately.

ACT



## Ringside seats for the battle of the bots

*The 2024 Financial Times and Schroders Business Book of the Year charts how two transatlantic tech rivals got AI to where it is today.*

**IS WHAT YOU ARE READING** right now written by AI? Just a year ago, you wouldn't have asked that. How did we get here? The competition of two great minds. First take stateside Sam "ChatGPT" Altman, who gets startups started up and wants to change the world. Now look at Great Britain's Demis "DeepMind" Hassabis. Demis has a mission to build a thinking machine and ethically control it.

As the two set up companies they have similar ambitions and face similar concerns. All the big players of the tech world make an entrance to try to help out: Peter Thiel, Elon Musk, Reid Hoffman, Larry Page, Sergey Brin. But as AI grows, so do some shared fears. Tech men are terrified that AI could destroy mankind. Tech women, meanwhile, are more focused on the (very real) threat of bias against people of color and women baked into the models. It is the most transformative tech we have ever seen. Now it's time to find out the price.

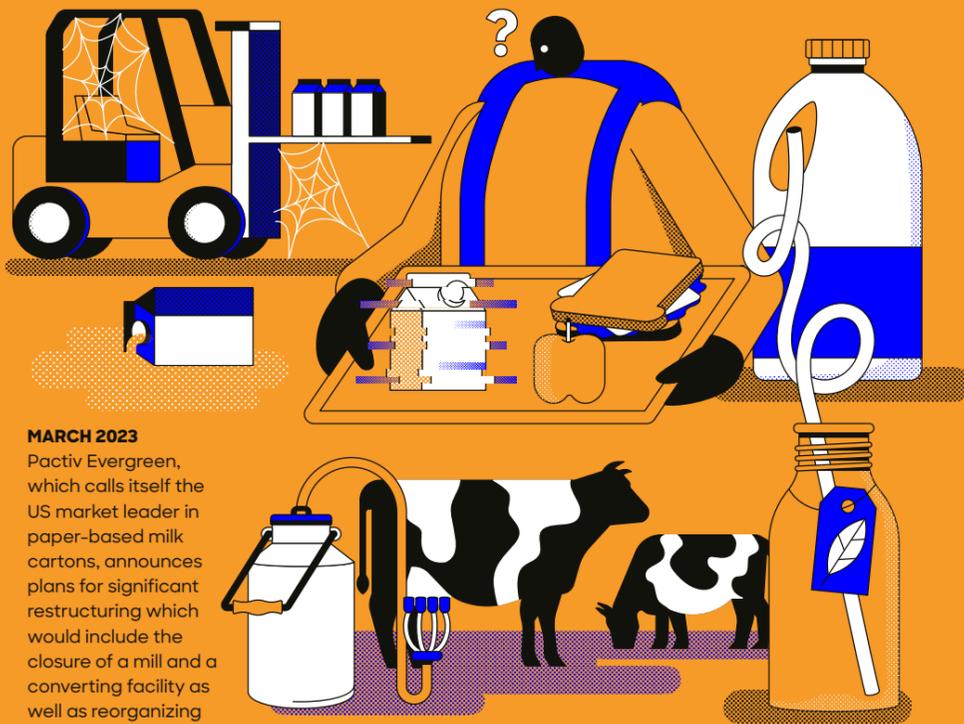
**Supremacy: AI, ChatGPT and the Race That Will Change the World** by Parmy Olson. 288 pages. St. Martin's Press, 2024.



## A not so pint-sized problem

**FOR 30 MILLION CHILDREN** across the US, a half-pint carton of milk is a cornerstone of their daily school meals. These single-serving sizes, about 237ml each, add up to 427 million gallons annually and about 8% of all fluid milk sales in the country. At the end of 2023 however, milk started

evaporating from the menu. The problem wasn't the product itself, but the packaging. Here's how restructuring efforts at a paper-based milk carton manufacturing plant ended up pouring out a generous lesson for the dairy industry in the importance of a diversified supply chain.



**MARCH 2023**  
Pactiv Evergreen, which calls itself the US market leader in paper-based milk cartons, announces plans for significant restructuring which would include the closure of a mill and a converting facility as well as reorganizing its management.

**SEPTEMBER 2023**  
US Department of Agriculture (USDA) rules require milk to be offered at school meals, but following Pactiv Evergreen's restructuring, dairies struggle to source the packaging required. The USDA is forced to allow alternative drink options.

**NOVEMBER 2023**  
Some schools implement bulk milk dispensers and reusable cups. Pactiv Evergreen revives a generic brand design for all its cartons rather than stopping to change logos. This speeds up production as well as increasing capacity by 10%.

**EARLY 2024**  
Following advocacy from politicians including Senator Chuck Schumer and ongoing efforts to increase production, including by Pactiv Evergreen competitor Tetra Pak, carton supply is expected to stabilize by the end of the school year.

**LOOKING AHEAD**  
Amid campaigns to do away with single-use items and more young people opting for plant-based milks, the shortage - and the product and service alternatives it forced schools to implement - has cast doubt on the half-pint carton's future.

SOURCES: DAIRY STAR, PACTIV EVERGREEN, THE ECONOMIST, WORLD WILDLIFE FOUNDATION, DAIRY NEWS, DAIRY HERD, PACKAGING DIVE, USDA



## How to ... inspire people

**IF YOU WANT TO INSPIRE** your team, you could reach for an emotional TED talk or "inspirational content" from your LinkedIn feed. Resist those temptations, because quotes and second-hand exhortations are not quite the tools you need. You'll want to turn to Columbia Business School's Adam Galinsky instead. The social psychologist and leadership expert has made a lifetime study of how inspiring leaders can fill people with hope and tells you how you can learn from them. His new book *Inspire* shows the way by identifying three archetypes: the visionary, the exemplar and the mentor. To be a visionary you need a positive outlook and an eye on the future, with a way to express your vision. Being an exemplar means relying on your authentic self and showing consistency between your words and actions. As a mentor your role is to lift people up and help them achieve. Some inspiring thoughts to act upon.

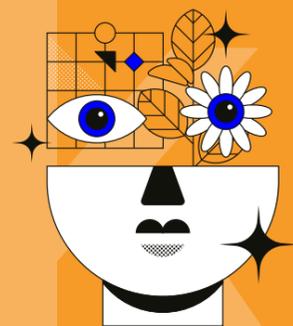


PHOTO: VCG/GETTY IMAGES | ILLUSTRATIONS: JULIA ZIMMERMANN



## The catalyst for a nuclear comeback

**ENERGY CRISES**, climate commitments and the rise of AI created turbocharged list of challenges that has governments and industries looking for stable, low-carbon energy rethinking nuclear power. At the end of 2024, nuclear's share of global electricity generation was just half of what it was in the mid-1990s - 9% in total, produced by about 440 global reactors. Amid reports of a 160% increase in data power demand by 2030, however, Big Tech is leading a new wave of investment. In September 2024, Microsoft co-signed a \$1.6 billion deal to recommission the Three Mile Island plant in the US and buy its power for the next 20 years. Amazon has also announced a \$500 million investment to develop Small Modular Reactors (SMRs), as have Google and software giant Oracle with as yet undisclosed sums. But while SMRs are quick to build with lower initial investment, the electricity they'll produce is likely less economical than larger reactors. There's just one more problem at the core of the matter: a lack of viable ideas for what to do with the radioactive waste.

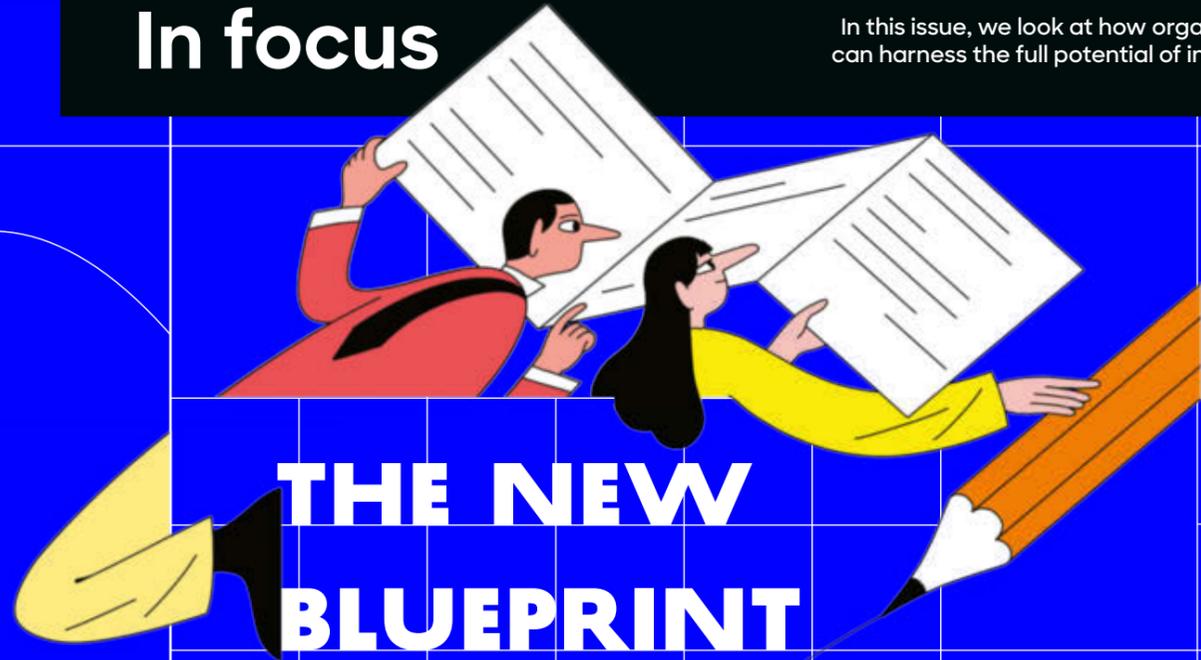
SOURCES: THE ECONOMIST, BLOOMBERG, WORLD NUCLEAR ASSOCIATION, BULLETIN OF THE ATOMIC SCIENTISTS

# Act

## AT A GLANCE

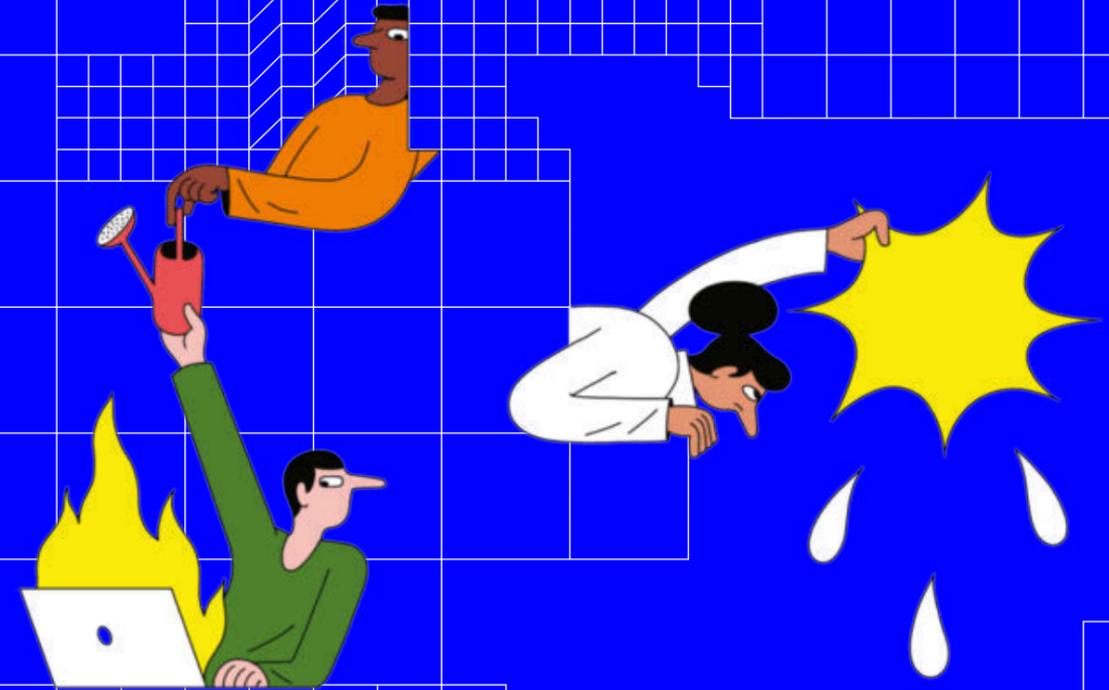
# In focus

In this issue, we look at how organizations can harness the full potential of innovation.



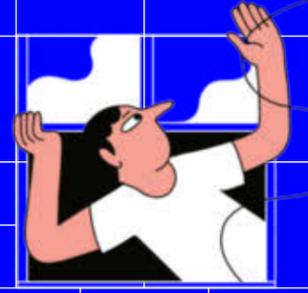
## THE NEW BLUEPRINT FOR

# INNOVATION



INNOVATION

INNOVATION



**THAT OLD ADAGE "INNOVATE OR DIE" STILL RINGS TRUE. SO HOW, IN A SLOWING ECONOMY, CAN ORGANIZATIONS INNOVATE? READ ON TO LEARN HOW COMPANY CULTURE, AI, EXTERNAL STIMULATION AND GOOD OLD R&D CAN COMBINE TO FORGE A FRESH FUTURE.**

WORDS BY

**MICHAL LEV-RAM AND STEFAN STERN**

ILLUSTRATIONS BY

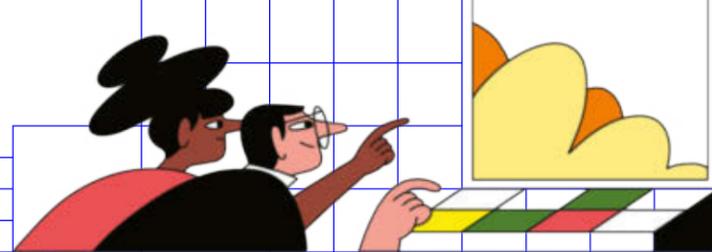
**SIMON LANDREIN**

S

**SOME DISRUPTIONS ARE MORE WELCOME** than others. In bumpy economic and political times, businesses have got to be ready to move, and sometimes move fast. That means that today innovation is more relevant than ever. New tech – particularly AI – offers rapid-pace advances and creates new product possibilities and new processes. But a plethora of constraints, from supply chain complications to slower economic growth and environmental concerns, all have a drag effect.

Business now stands at a pivotal moment not covered by the traditional rule book of innovation. So which levers should it reach for? How do you invest in fast-changing technology? And is there a magic bullet for all this? "There's been a change in how we think about innovation over the last decades," says Paul Nightingale, professor of strategy at the University of Sussex Business School in the UK. "We used to think of innovation as something that simply emerged out of R&D, which was probably true in the 1950s because there wasn't much competition and there was a whole bunch of new technologies – plastics, antibiotics – coming out of research," he says. "More recently we've recognized the importance of understanding user needs. So the main driver of innovation success wasn't necessarily whether or not you had good R&D and good science, it was much more about giving users what they wanted. So innovation isn't really R&D – it's design."

Companies might well need to collaborate in new ways in a world where it's no longer adequate to rely on internal expertise – even among those organizations that have always given their employees the freedom to innovate. "Even a company like [pharma giant] GSK will only do 1% of all the science in a particular area," Nightingale says. "They'll need to look outside. So a lot of R&D now isn't just to develop



products and services, it's also to be able to understand and judge the quality of research conducted elsewhere."

**THE STAKES COULDN'T BE HIGHER.** Some say the viability of today's corporations is uncertain; others argue that even the progress of humanity is at risk. So as some things accelerate and others slam the brakes, a new challenge arises: How to think differently regarding innovation? Jaideep Prabhu, a professor at the Judge Business School at the University of Cambridge, says that means developing a more sophisticated understanding of how private sector players and governments can collaborate to bring about large-scale innovation. "After the war it was felt that the state would have to invest heavily in R&D, defense and so on. This would eventually trickle into the private sector," he says. "But this morphed in the 80s/90s into the other end of things: The state at most will do the regulation and let the private sector get on with it. That's still the dominant paradigm in the West. If anything, it will be more so in the US Trump era," he says.

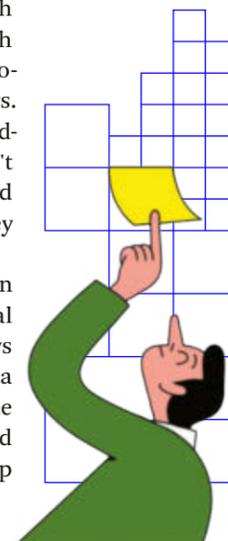
But there is a third way, he adds, where the state and the private sector work together, but neither side really dominates ... and you have guardrails. "The state can use its power when it makes sense. But equally the design principles of collaboration encourage a level playing field in terms of competition and don't actually favor incumbents and big players, because then you would have a monopoly." [For more on "frugal innovation," see p.20]

A well-worn example of successful innovation is 3M's process to produce the Post-it Note. It arose from one man's accidental discovery and another's accidental application for it. A scientist at 3M was frustrated with loose bookmarks. Then he remembered that a colleague had invented a tacky glue he couldn't put to a useful purpose. The two of them talked and came up with a product no one knew they needed, but which now sells more than 50 billion notes a year.

## 4X RETURN

How much public investment in R&D could stimulate private R&D investment over the long term, according to a 2024 study.

SOURCE:  
UK NATIONAL CENTRE FOR  
UNIVERSITIES AND BUSINESS



## 01 THE CULTURE OF INNOVATION

**MAGIC CAN HAPPEN WHEN WORKERS HAVE FREEDOM TO EXPLORE, BUT THE PROCESS NEEDS LEADERSHIP TO THRIVE.**

### T

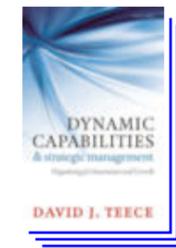
**HE SECRET SAUCE** that led to the invention of the Post-it Note, so the story goes, isn't what was in the literal glue. It was rather the metaphorical glue of 3M's culture which promoted informal, unsanctioned innovation. Others including Google with its "side project time" have emulated that culture of giving workers time and space to tinker outside the constraints of the day-to-day responsibilities. But the real thing at play here which we cannot duck is an important human factor: Innovation processes have to be managed.

As Paul Nightingale explains, this is partly about the need to capture value. "This is an idea that comes from David Teece at Berkeley," he says. "Lots of firms innovate, but they fail to capture the benefits of it and other firms come along and just copy them ... Those two things, creating value and capturing

value, collectively define the business model of the firm. That's a really big intellectual development. And all of that needs to be managed and coordinated within firms. Typically you'll have junior managers who will coordinate all that knowledge within a function. Middle managers will coordinate between functions in an organization and senior managers will reach out and form relationships and joint ventures and connections with inputs to that innovation process, both locally, because of the importance of face-to-face interaction, but also internationally. So you've got this kind of new division that's going on there. And they need to create that culture which will enable the political process of innovation."

Nightingale goes on to clarify that "innovation within organizations creates internal winners and losers. And can be beaten up by too much bureaucracy and political infighting. One of the most important drivers of success is having empowered project managers who use their elbows to force through major changes that industries and companies may not find easy to make."

There's one more point he wants to make clear: "Innovation is inherently uncertain. There's a classic knowledge element to technology. Knowledge is passed on face-to-face. There are judgment calls that are vital in all of this. It's a distributed activity, both within firms and also increasingly externally now. It means those 'soft skills' are more and more important," Nightingale says. →



**Dynamic Capabilities and Strategic Management: Organizing for Innovation and Growth** by David J. Teece, 302 pages. Oxford University Press, 2009.

## 02 AI-DRIVEN INNOVATION

**TECHNOLOGY IS RAPIDLY BUILDING UP A NEW TOOLBOX FOR INNOVATORS TO TINKER WITH, BUT IT WILL BE USELESS WITHOUT HUMAN EXPERTISE.**



**OLD APPROACHES** on their own, then, are no longer sufficient.

Luckily, there are other tools at hand. Digitalization, automation and, yes, even AI, are nothing new at Unilever, the London-based maker of consumer goods including soap, mayonnaise and ice cream. But over the last few years, the way the conglomerate harnesses technology has changed drastically. Instead of being a tool for optimizing back-end processes, AI has become predictive and productive, assisting the company in one of its most critical pursuits, the creation of new goods. "AI allows us as product developers to have a much bigger toolbox," says Manfred Aben, the head of R&D, science and technology for Unilever's nutrition division.

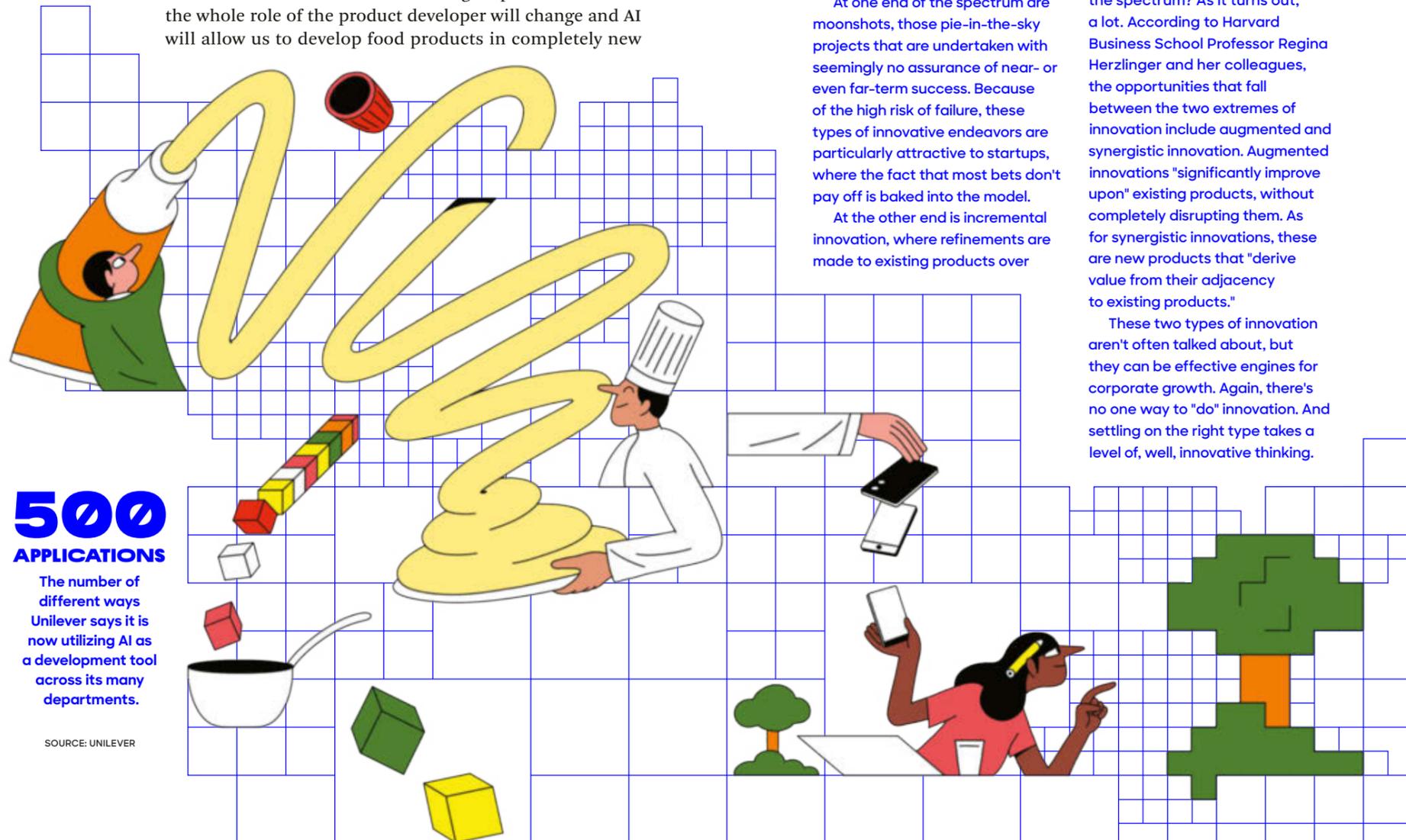
At Unilever, AI is now being used to do things like calculate the best combination of ingredients. The company is even putting it to work to predict the taste and texture of new forms of mayonnaise, including devising a plant-based formula that's easier to squeeze out of the container it comes in. "Traditionally we did all of this by trial and error, with chefs cooking products," says Aben. "We still do that today but now we also use these tools to find ingredients and new ways of processing."

Here's another example: When Unilever wanted to create a new bouillon cube with zero salt, it turned to AI for

inspiration. The challenge wasn't just one of taste, it was also about structure. "Making a cube without salt is like building a house without bricks," says Aben.

Instead of manually tinkering with different combinations of ingredients, Unilever was able to use AI to run simulated models for both taste and structure using millions of natural ingredients. The end result is a formula that Aben can't share. But, says the long-time researcher, it works. And as it turns out, those little cubes of compressed flavor translate to big money – Knorr, Unilever's bouillon brand, recently hit the \$5 billion milestone.

**THE RECENT VOLATILITY IN GLOBAL MARKETS** makes AI an even more valuable creative partner for employees, according to Aben. There are many variables in creating new product lines in today's world. At a company like Unilever, which works with natural materials like herbs, spices and vegetables, all sorts of unexpected and uncontrollable changes in the world – including geopolitical strife – can lead to a number of disruptions when it comes to manufacturing its products. "I think the whole role of the product developer will change and AI will allow us to develop food products in completely new



### 500 APPLICATIONS

The number of different ways Unilever says it is now utilizing AI as a development tool across its many departments.

SOURCE: UNILEVER

## INNOVATION IS A SPECTRUM

**THE PROCESSES BY WHICH INNOVATION OCCURS ARE EVERY BIT AS DIVERSE AS THE OUTCOMES THEY CAN CREATE.**

**J**ust as there are multiple approaches to innovation, there are also a multitude of types of innovation. And they're not one-size-fits-all. The type that's right for your company depends on many factors. There are also external forces at play, like market conditions, which also help dictate which type of innovation is optimal at a particular time.

At one end of the spectrum are moonshots, those pie-in-the-sky projects that are undertaken with seemingly no assurance of near- or even far-term success. Because of the high risk of failure, these types of innovative endeavors are particularly attractive to startups, where the fact that most bets don't pay off is baked into the model.

At the other end is incremental innovation, where refinements are made to existing products over

time. This can work well for large organizations that develop complex products, like the iPhone. The first iPhone, by the way, also falls under the category of a market-creating innovation. Even though it wasn't the first smartphone, it jump-started the category. Like moonshots, market-creating innovations are high-risk – and not for everyone.

So what's in the middle of the spectrum? As it turns out, a lot. According to Harvard Business School Professor Regina Herzlinger and her colleagues, the opportunities that fall between the two extremes of innovation include augmented and synergistic innovation. Augmented innovations "significantly improve upon" existing products, without completely disrupting them. As for synergistic innovations, these are new products that "derive value from their adjacency to existing products."

These two types of innovation aren't often talked about, but they can be effective engines for corporate growth. Again, there's no one way to "do" innovation. And settling on the right type takes a level of, well, innovative thinking.

ways," says Aben. "It will come up with combinations of ingredients that we couldn't come up with ourselves."

Nightingale also acknowledges the potential of AI in innovation, but with a warning. "AI is going to change things," he says. "But typically AI is the average of the internet. And that isn't enough. You need expertise. It's a tool, a complement rather than a replacement. It's like having a very, very hardworking, pretty clever research assistant who happens to be a pathological liar every now and then. It takes a lot of expertise to know when they are just making stuff up. But if you do have that, and you can use them well, then that's much better."

**TECHNOLOGY IS NO LONGER** just in the hands of the technologists. And it isn't just AI features that are available to all sorts of employees. The popularity of low-code and no-code tools, which allow anyone to create applications without writing code, are also readily on hand. But while using these types of software is becoming easier and easier, it also requires a comfort level which not everyone is accustomed to. And it requires a new way of working both independently and with others. "The siloed specialist is no longer possible," says Aben, referring to the empowerment AI can afford all employees. "Today, almost everyone interacts with these systems in one way or another." At Unilever, that means everyone from IT specialists to flavor scientists. According to Aben, there are now more than 500 applications of AI across the company's business.

Unilever isn't the only company that is using AI to "outsource" – or rather augment – some of its most critical and creative functions. More organizations are experimenting with how AI can be used to help employees in all sorts of creative processes, including innovation. Collaborating with AI will require workers to exist side by side with technology in a new way. But still, it won't replace an established real-world alternative which doesn't involve computers at all. →



03

# FLASH MOBS: BRING THE OUTSIDE IN

RAPID DEVELOPMENT IN BOTH IT AND AI COULD MEAN MORE EFFICIENT AND COST-EFFECTIVE INNOVATION, BUT HOW?

INNOVATION

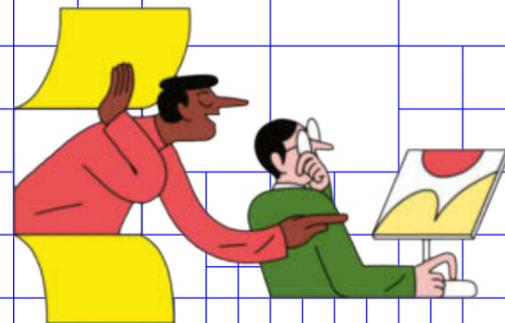
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THE TURN OF the 21<sup>st</sup> century, several big players took some novel turns and looked to ways of collaborating with external players for innovation. Procter & Gamble had its Connect + Develop scheme to bring in external ideas to beef up its R&D. IBM nurtured its Innovation Jam encouraging employees and customers to solve problems together. InnoCentive – an open innovation and crowdsourcing company – were at the forefront of exploring open problem-solving too. It built a network of experts around the world to take on challenges both technical and scientific to gain new perspectives and accelerate innovation. All these examples show an open-minded way to bring in ideas from the outside. So it wasn't anything very new when a decade or so ago, Melissa Valentine, professor of management science at Stanford University, began looking into a related phenomenon dubbed "flash teams."

Companies had already been leveraging the growing, so-called "gig economy" to bring in contractors for all sorts of



**Flash Teams:** *Leading the Future of AI-Enhanced, On-Demand Work* by Melissa Valentine and Michael S. Bernstein, 240 pages. The MIT Press, 2025.



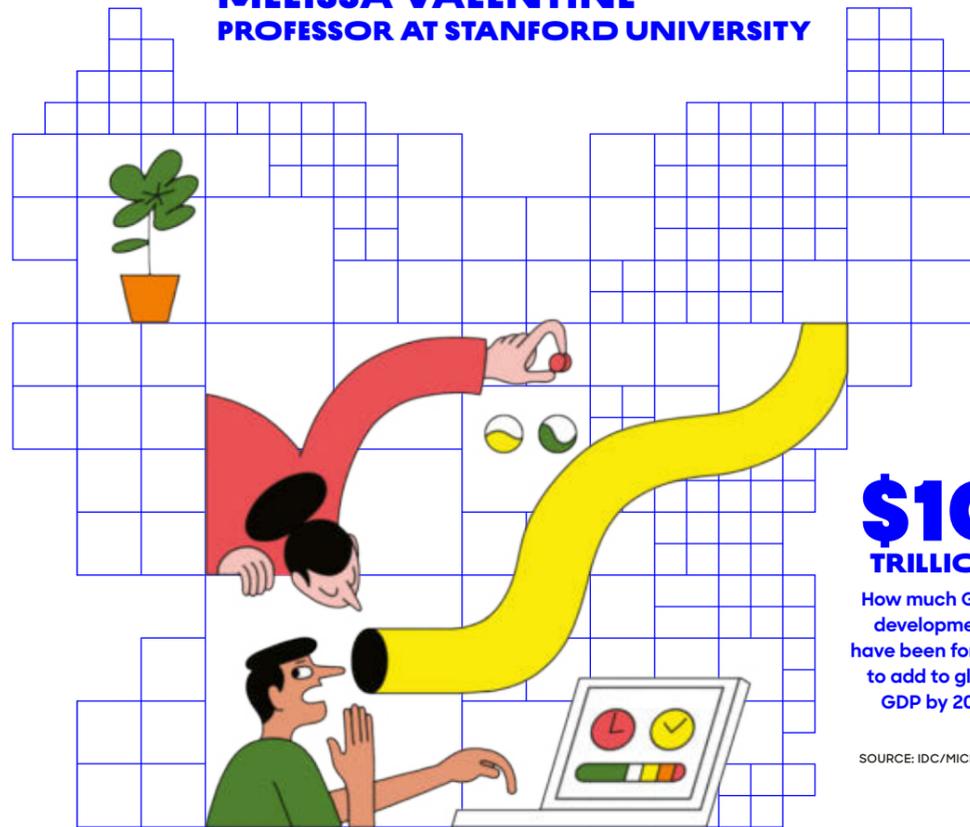
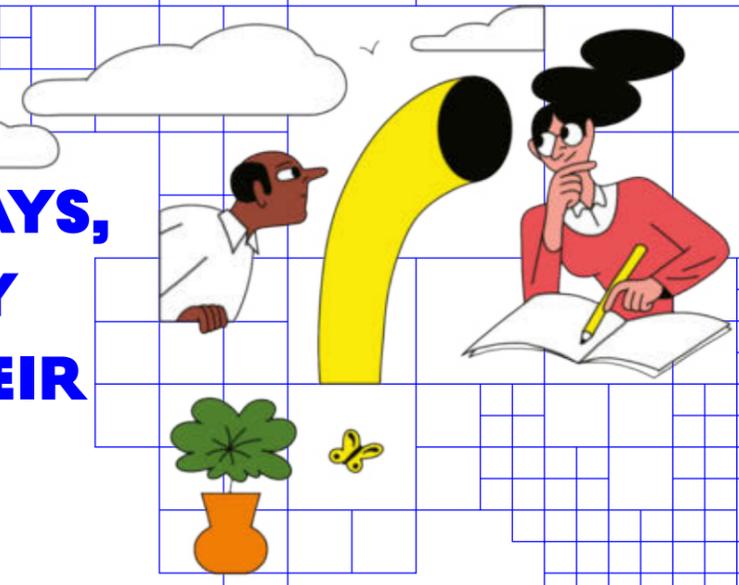
mundane, easily outsourced needs. She noted that some organizations were now tapping into a diverse pool of largely external disciplines to do more creative, experimental work like iterating on a product, bringing it from concept to fruition quickly – and then disbanding. Flash teams, Valentine and her fellow researchers argued, could be "combined to create new types of organizations with completely fluid boundaries – organizations that are composed of many smaller flash teams, each of which are spun up on demand, work in parallel, and disperse when complete."

FROM A HISTORICAL POINT of view, many organizations have bristled at the very thought of "fluid boundaries." More often than not, the status quo was to protect your intellectual property at all costs, not to share it – even for the purposes of innovation. But more recently, many organizations have started to embrace more openness. That can take several forms. Yes, there are flash teams, which Valentine says have matured and evolved in recent years. But there are also increased partnerships with startups, universities and external research labs. "In the olden days, firms were very focused on their own internal experts," says Valentine. "Now, it's about more open ecosystems." It isn't a new phenomenon to bring the outside in, indeed it echoes the initiatives of IBM and P&G, but it is pertinent to 2025 and beyond and has a part to play as a tool in the box to get innovation working in challenging and unpredictable times.

Companies that once relied on their own internal expertise can credit looking outward for much of their more

“ IN THE OLDEN DAYS, FIRMS WERE VERY FOCUSED ON THEIR OWN INTERNAL EXPERTS. NOW, IT'S ABOUT MORE OPEN ECOSYSTEMS.”

MELISSA VALENTINE  
PROFESSOR AT STANFORD UNIVERSITY



\$10 TRILLION

How much GenAI developments have been forecast to add to global GDP by 2033.

SOURCE: IDC/MICROSOFT

INNOVATION

recent innovation. Take Microsoft, an organization which for years shunned innovation partnerships. And yet, starting in 2022, the technology giant made an aggressive foray into GenAI not with its own internal project, but by investing in and partnering with OpenAI. The bold bet cost Microsoft \$13 billion, but it also allowed it access to the most cutting-edge of GenAI technology.

However, opening itself up to other companies' technology didn't just require Microsoft levels of cash, it also required a new, uncomfortable approach: the simple recognition that no one company – not even the biggest tech giants in the world – has all of the expertise that is needed to compete in today's fast-moving world. "Companies don't want to get left behind with AI and now with GenAI," says Valentine. "And most don't have all of the AI experts they need."

At 3M too, the focus has shifted from purely internal to external. "The kind of innovation that's needed now will require ecosystem partnerships and more radical collaboration than we've done before," says Jayshree Seth, 3M's chief science advocate and an inventor with 80 patents to her name. "No one company can do it alone." Is this plural approach, then, the magic bullet? What about the tried-and-tested route of research and development? →



# THE MAN WITH THE X FACTOR

INTERVIEW BY **NEELIMA MAHAJAN**

PORTRAITS BY **WINNI WINTERMEYER**

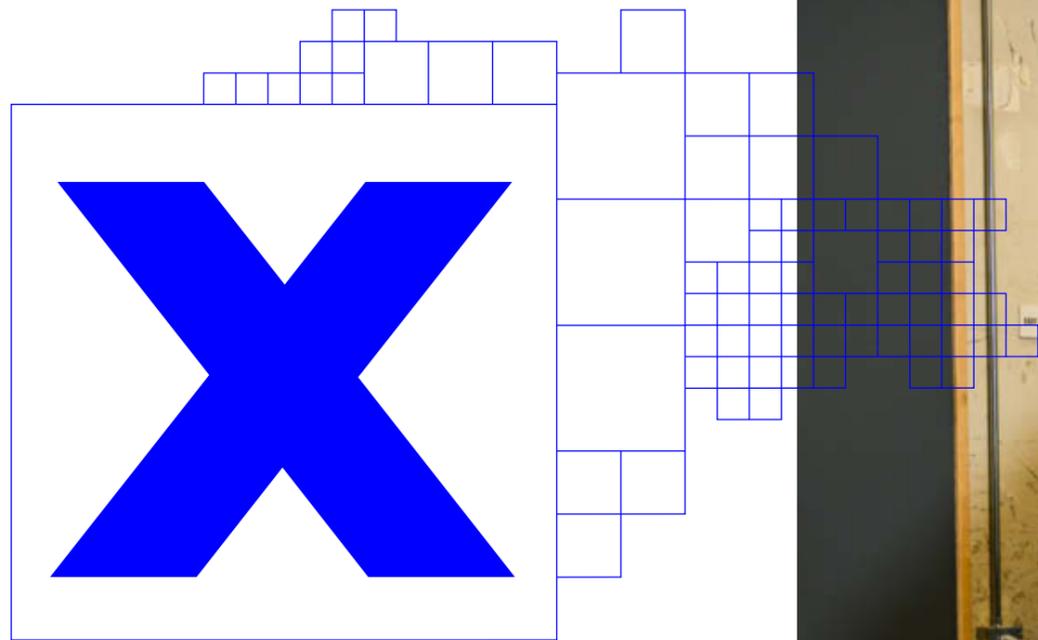
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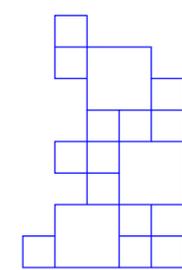
*THINKING BIG*  
Astro Teller met Think:Act at the X Moonshot Factory in Mountain View, California for this exclusive photo shoot on the ground where his teams tackle the world's toughest problems.

**ASTRO TELLER, CAPTAIN OF X, THE MOONSHOT FACTORY, BELIEVES THAT TO SOLVE THE THORNIEST OF THE WORLD'S PROBLEMS WE NEED BREAKTHROUGH THINKING: AND TO BUILD ROCKETS, NOT LADDERS, TO THE MOON.**



X WAS CREATED IN 2010 by Google founders Larry Page and Sergey Brin. The division's mandate was to solve the world's toughest problems with technology solutions which sounded like they were lifted straight from science fiction. They wanted to create moonshots: solutions that were hugely ambitious, radical, imaginative and definitely not incremental. Fifteen years down the line, there's a whole list of innovations that have rolled out of X and unlocked new approaches to audacious problems. Some, like Google Brain, have found a home in Google, while others like Waymo and Wing operate as subsidiaries of the parent company, Alphabet. Yet others like 280 Earth and Malta operate independently now.

Astro Teller, who leads X and shuns formal titles, preferring to call himself "captain of moonshots" instead, has been with X since 2010 and is responsible for creating X's unique culture that encourages moonshot thinking. A scientist, inventor and entrepreneur, Teller has taken on many new roles in his quest to make X an innovation powerhouse, including that of a "culture engineer." Teller, the grandson of the Nobel Prize-winning economist and mathematician Gérard Debreu and theoretical physicist Edward Teller, who is often known as "the father of the hydrogen bomb," appears set to carve out an impressive legacy of innovation for himself as well. In this interview with *Think:Act*, he elaborates on his unique approach to innovation, what exactly makes for a moonshot, how to guide and mentor people working on hugely ambitious projects, dealing with failure, the emphasis on learning and a lot more.



**ALWAYS IN MOTION**  
Teller stands next to the prototype Waymo car. The first self-driving car project, it was built on a modified Toyota Prius and designed for a product lifetime of over 160,000 km of autonomous driving.



**Your aim is to solve the world's toughest problems, but there are just so many. How do you put a finger on something and say: "This is worth our time"?**

For something to be a moonshot, it has to be at the intersection of three things. One, there has to be a huge problem in the world that we aspire to solve. Two, there has to be some kind of science fiction-sounding product or service that may be very unlikely, but we all agree ahead of time that if we could build that thing, it would meaningfully resolve that huge problem. And three, there has to be some kind of breakthrough technology that gives us some way to get started, that there's a chance at least that we could actually build that science fiction-sounding product or service.

Some moonshots aren't technology-oriented in nature: They might be marketing-oriented, for example. That's not what we do. We're a technology organization, so that's a way that we filter. We're really committed to working only at the intersection of purpose and profit, so there are lots of things that are really good for the world, but can't turn into enduring businesses – we don't go after

them. We believe the things that lose money tend to get smaller over time and things that make money get bigger over time. So if we want to do something really good for the world, it needs to be able to make some profit. We also want to make sure that it's really good for the world. We want to be able to say that there was little we could have done that would have been a better way for us to spend our time and energy to help humanity than to do this thing. That's also a way that we put constraints on how we spend our time.

**Where do you draw the line between "ambitious" and "ridiculous"? Are there any limits at X?**

We have different sayings to try to help people work through this process. One I particularly like is: "We're trying to exercise the non-stupid suspension of disbelief." So, if you work at X and you bring up something and it's not crazy enough, that's actually one of the main ways we would filter something is to say: "Hey, what you just proposed sounds pretty reasonable, so we're definitely not doing it because that's not our job. Someone else will do that." But if you propose something and it sounds unreasonable, like there is no way to get started – "hey, let's make a time machine" – okay, tell me how we would get started with it and if you say "I don't know," that's not a testable hypothesis.

We want to maximize the reward-risk ratio so if you propose the teleporter and somebody else proposes a pill that cures cancer, I'm happy to talk about both. So you'd each try to make arguments for why it would be so great for humanity to solve those two problems, and then: "What are the risks?" The risks would be regulatory, cost, time ... maybe unintended consequences. We could unpack all kinds of risks in each of them and then decide: "We can't do everything, so let's stack rank these." Which has the better reward-risk ratio and maybe in the early days we try both. But if I'm running the cancer pill project and you're running the teleporter project, I need to get some evidence over the next three to six months that helps us understand either that my idea was crazier than it sounded and it's just not a good idea – or it's not so crazy after all. And you try to do the same thing with the teleporter. After six months, we'll see the evidence about which of them we should stop doing and which of them we should spend more money on.

If I'm working on something that has some reward and some risk, and you can find something that has twice the risk, but four times the

“**THE THINGS THAT LOSE MONEY TEND TO GET SMALLER OVER TIME AND THINGS THAT MAKE MONEY GET BIGGER OVER TIME.**”

**ASTRO TELLER**

reward, intellectually, we can agree your idea has twice the expected utility of my idea. We should throw away my idea and work on yours. That's easy to say when you say it abstractly, but I'm willing to bet you've never actually been to an organization that does anything like that. We are not perfect but, at least aspirationally, that's what we do. It's the quality of the lottery ticket that we're judging.

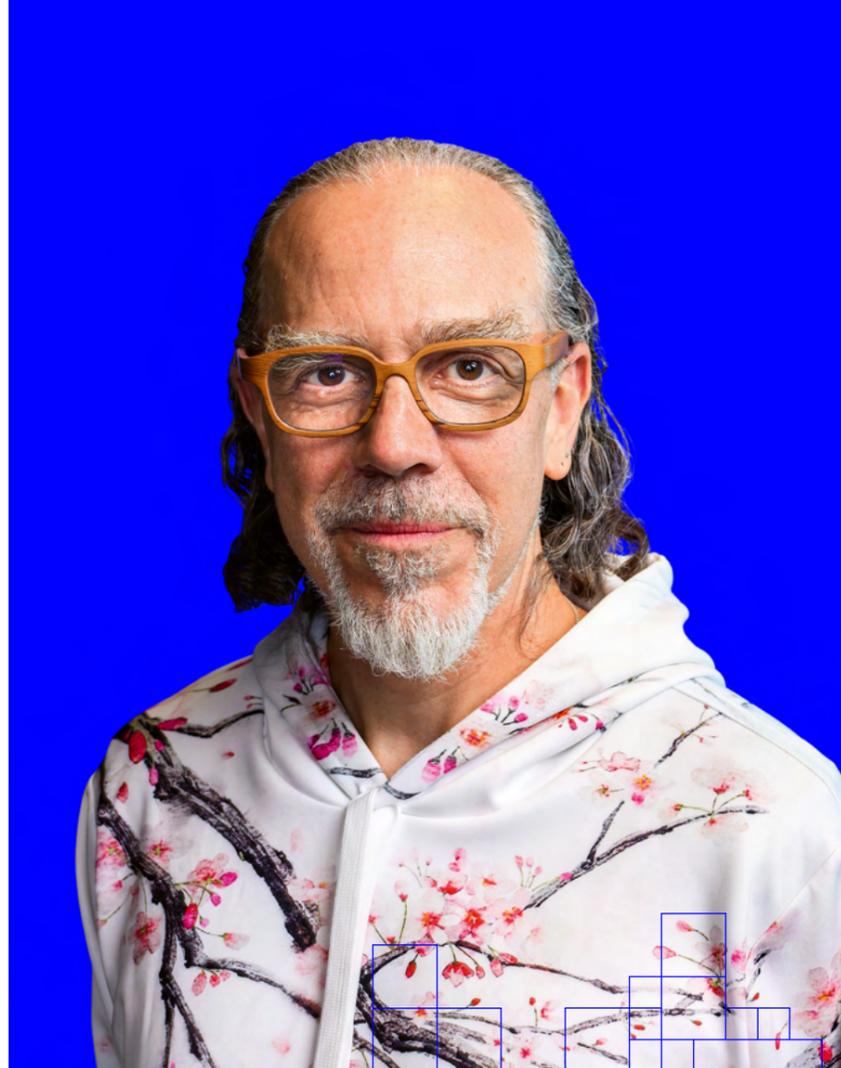
**Big, highly ambitious projects take time. How much runway time would you allow a project before you see the first signs of success?**

If you were working on the teleporter at X, I don't mind if it takes a decade to get it working. What I mind is waiting a decade to find out *if* it's working. So I'm going to ask every three months to show us what you've learned and what that teaches us about the quality of the risk-reward ratio. It may take a decade, maybe 20 years, we have no idea. I'm much more interested in the learning per dollar. If you're learning faster, more efficiently, more holistically than some other project is, great – let's keep going.

We try to be patiently impatient. We want to work on things that might take 10 years, but we want to be impatient every day about the learning. There is nobody at X who thinks that they have 10 years to work on something. I always say do not have a "live to fight another day" kind of mentality because that's what leads most things in the world to end up being ladders to the moon rather than a rocket ship. If I say "show me progress by tomorrow that you're closer to the moon," you will build a ladder and say the ladder is a little higher, but you're never actually going to get to the moon that way. So the right behavior is to talk about what getting to the moon over the next 10-20 years metaphorically looks like. Let's talk about what you've learned and how that's really de-risking getting to the moon. It's okay if you're not at the moon yet, but we should be impatient about that learning.

**What mechanisms allow this learning to percolate into the organization so that it doesn't just stay with the person handling that project?**

That's actually a pretty central thing that we do. We keep a history of all the things that don't work out, to varying degrees. When something doesn't work out, we do a postmortem and keep it in a big document called "Tales from the Crypt." This has all the things that have died at X: more than a thousand things in it at this point. We also have a celebration at Halloween when we bring things out of



“ I DON'T MIND IF IT TAKES A DECADE TO GET IT WORKING. WHAT I MIND IS WAITING A DECADE TO FIND OUT IF IT'S WORKING. ”

ASTRO TELLER

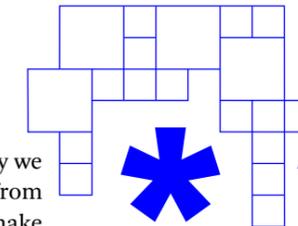
the crypt and talk through what we tried, why we tried it, why it didn't work, what we learned from that. So there are ways that we can culturally make it part of how we have fun.

We describe this process by another term: moonshot compost. If you've tried something and it didn't work, many of the people on your project will still be at X along with the patents, the code and some of the partnerships they made. We may reuse the learnings in the postmortem or in other ways – it all goes back into this sort of primordial soup at X, the dirt. The fact that we now have an amazing connectivity solution is because of all the ways that we failed before and the learnings we had. Helping people to understand moonshot compost helps them feel better when a project is killed: It wasn't all a waste. It also teaches them to look in the dirt instead of trying to reinvent from scratch.

**How do you shape and maintain the culture at X?**

This is very much work in progress. It's the main thing I do. I think of myself as a culture engineer and I would argue many CEOs should be culture engineers to some extent. You have to find ways to send hundreds of signals, some of them very subtle and unconscious, some funny, cultural moments like this "Tales from the Crypt" party that we do, some clear and organized, like written documents that people can read. If you go to the lobbies of most companies, they have glass cases with the stuff that they've made in them. They show almost exclusively the finished product – the shiniest, prettiest version of what they made. What's in our glass cases is the first ugliest junkiest version of some of the things that went on to be great and some of the things that did not work.

We do that to remind ourselves that what we're celebrating is the learning, not the outcome. If you work at X, I seriously want you to work on things that have a one-in-a-hundred chance of working out. If you believe you're going to be rewarded only for a positive outcome, you're going to be miserable because you have a 99% chance of failing. So you have to believe consciously and unconsciously in your head and your gut that it's not stupid for you to do what we're asking you to do. If we show the bright shiny object in the glass case, some part of you, at least unconsciously, will know we're not serious about the process and we are proud of the outcome. So we have to wire that into promotions, into how we compensate people, how we organize teams. Everything has to send signals to people.



### X'S MOONSHOTS



### GOOGLE BRAIN

Once Google's sole AI branch, Google Brain was so successful Astro Teller said it paid for X. It merged with DeepMind to form Google DeepMind in 2023.



### GOOGLE GLASS

Imagined as a wearable computer and launched in 2014, Google Glass went through a few iterations before finally being pulled from the market in 2023.



### WAYMO

Launched as X's self-driving car project, Waymo left to become an Alphabet subsidiary in 2016. As of early 2025, it offers rides in Phoenix, Los Angeles and San Francisco.

**A lot of organizations hire brilliant people with great promise, but some don't fit ultimately. Do you hire people for skill or for culture?**

I'm sure somewhere in the process someone checks for IQ or capabilities, but that is not what we're hiring for. We rate everyone whom we talk to on fearlessness, teamwork, humility and growth mindset – it is our way of checking that they are going to enjoy the process. Being able to take these moonshots needs very high audacity, which is related to fearlessness, but equally high humility. If I'm asking you to take these one-in-a-hundred shots, first, you have to be able to find these one-in-a-hundred shots and be comfortable taking them. And we need to mentor them, hold them responsible for running the process. But fundamentally, if they have a fixed attitude – "I know how to do this stuff" – they're going to be miserable at X.

**Is psychological safety also a component of this?**

Let me get on a soapbox for a second. Psychological safety does not mean that nothing bad will ever happen to you under any conditions. It's a commitment from the organization, from the context that you're in, that what you say will never be held against you as long as you say it respectfully. Then you can speak your mind. Because we want to have a free-flowing place of ideas where my ideas and your ideas can clash together and the sparks that fly off of them are really where the value is. If you're an electrochemist and you work at X and the project that you're on ends, I can't promise you another job at X – it depends whether we need an electrochemist somewhere else. But that can't be a reason for you to not practice intellectual honesty about whether or not the thing you're working on works. Psychological safety isn't: "I have a guaranteed job." Psychological safety is: "I'm going to be seen for who I am. I'm going to be respected for who I am and for my ideas."

**How do teams come together? How do you make sure that they work together without any friction and it's seamless and collaborative?**

Building and maintaining a high-functioning team is a hard skill to learn. That's the work of being a leader – and not just me, but for lots of people at X who are trying to build teams. Yes, there's a lot of fluidity at X, but if I was running the teleporter team at X, I would say, "Welcome to the team! Here's our local subculture and how it makes sense within X's broader culture. We →

# IF YOU WORK AT X, I SERIOUSLY WANT YOU TO WORK ON THINGS THAT HAVE A ONE-IN-A- HUNDRED CHANCE OF WORKING OUT.

## ASTRO TELLER

want your ideas including your thoughts about our culture to influence it, but you also have to be part of the team because this isn't about what I think, or what I want – or what you think, or what you want. It's about what we as a team can accomplish. If at some point you stop enjoying being on the team, feel free to look around X and join another team. If at some point we get too big and you want to go back to the early part of the process, please don't stay on my team." That's what I would say if I was running one of the sub-teams.

### How much of your time goes into managing teams as opposed to being part of these moonshots?

I wish I got to spend more time on the moonshots themselves. I help with aspects: technology, storytelling, partners ... but that's probably 20% of my time. I'm doing a lot pan-X to help the organization function and to implement strategic issues in ways that will then set the foundation that makes it so that the leaders of individual projects can thrive. I spend most of my time being a mentor, quite a bit still on being a leader and a decent amount being a manager. Management is about having a clear set of things that have to get done, distributing those among people, holding people accountable for getting their individual pieces done and then making sure that they get sewn back together.



Watch the interview video with Astro Teller at [rolandberger.com/en/astroteller](https://rolandberger.com/en/astroteller)



**X is an unconventional fast-moving setup that is connected to and sometimes feeds into a larger corporate setup. When these experiments do make it back to the larger corporate setup, how do you manage the assimilation?**

Google is a very large company that has a lot of surface area. X's job is not to improve Google, so X is culturally and operationally separate from Google – and that works partly because we're mostly not feeding back into Google. Our job is to find new problem areas, new challenges with the world for Alphabet to be working on and hopefully solutions for those problems. So the cultural and operational separation that we keep helps us to show up in the ways that we do. It allows Google to focus on the things that it does. That works for both sides, and then of course, sometimes something that we make here, like Google Brain many years ago, went to Google and has been very good for Google. More recently, in the field of auto-coding, Codey at Google came from X. So those are examples of things that we did at X that found really good homes at Google, but for the most part, we create other bets like Waymo or Wing. They are within Alphabet, but they are not inside Google. In fact, increasingly we are putting them outside Alphabet altogether.

Sometimes things that we do go back to Google but that is not our goal. Alphabet would be very satisfied if we never sent something back to Google ever again. Our job is to work very hard on very unlikely things that have some chance of being really good for the world and becoming enduring businesses over time. We're continuing to fine-tune how we graduate things and set them up as businesses, so that they're just outside the Alphabet membrane, so Alphabet can still have a very close relationship with them, but by not technically being part of Alphabet anymore, they can move much faster and much more independently. ■

### Takeaways

■ **COMBINE PURPOSE AND PROFIT:** Doing good for the world and building an enduring business can go hand in hand, but if a project loses money, it will not grow.

■ **JUDGE A LOTTERY TICKET BY ITS QUALITY:** If one idea has twice the risk of another, yet offers four times the reward, don't overlook that idea's potential.

■ **SEND THE RIGHT SIGNALS:** To encourage innovation, create a culture that learns from failure as a growth process. Your team will know when you are sincere.



**READY TO ROLL**  
After realizing how much time it took to walk between meetings, Teller started wearing his Rollerblades to work. The in-line skates are now his signature footwear.

SKUNKWORKS WERE DE RIGUEUR DURING THE GOLDEN AGE OF THE MODERN CORPORATION, GIVING RESEARCHERS THE FREEDOM TO HATCH GROUNDBREAKING IDEAS IN SECRECY. YET TIMES HAVE CHANGED. TODAY'S FOCUS ON COST AND CONSTANT INNOVATION MAY REQUIRE A NEW APPROACH.

WORDS BY

STEFFAN HEUER

PHOTOGRAPHY BY

BALAZS GARDI

INNOVATION

# PLAYPENS OF DISRUPTION

**EARLY ADOPTER**  
The mouse was first prototyped to control a computer in the mid-to-late 1960s, although the idea wasn't used until Apple licensed it about a decade later.



ONCE UPON A TIME, in 1970, a magical place quietly opened for business in Palo Alto. Its founder, the nuclear physicist George Pake, had arrived in Northern California with a mandate

from the Xerox Corp. in Rochester, New York, to invent "the office of the future." This new R&D lab called Palo Alto Research Center (or PARC) was to be undisturbed and largely unrestrained by the bureaucracy governing headquarters clear across the country. Pake hired a few dozen young and hungry researchers and warned the CEO back east to not expect anything tangible in the next five years. "He told his bosses that if we haven't produced anything usable in 10 years, then you can start asking questions. But for the first five, let us follow our noses and go where we want to go." That is how *Los Angeles Times* business columnist Michael Hiltzik and author of *Dealers of Lightning*, considered the ultimate history of PARC, sums up the center's grandiose goose chase to invent the future.

And invent they did. PARC was the one place where many of the fundamental pieces of today's networked world were dreamed up: the first laser printer; the first personal computer called Alto; the ethernet that laid the groundwork for the internet; the mouse; the graphical user interface or GUI; electronic paper; object-oriented programming. Yet apart from the laser printer, Xerox failed to grasp the potential of its other inventions and did not commercialize them, instead allowing its researchers and ideas to leave the building to become smashing successes elsewhere.

**THE MOST FAMOUS PART OF THIS SAGA** of "invented, but not commercialized here" fell into the lap of Steve Jobs. He toured PARC in 1979, saw the Alto and tweaked the idea to become the iconic Lisa and Macintosh computers. Back in 1996, he said out loud what most innovation experts believe to this day: "They just grabbed defeat from the greatest victory in the computer industry. Xerox could have owned the entire computer industry." That assessment encapsulates the dilemma facing any corporation setting up semisecret or top secret development teams and giving them leeway to dream big. What's the right setup, scope of work and →

INNOVATION

level of autonomy to make sure such skunkworks yield commercial dividends to the company – and not just the tech world or society at large? And do skunkworks even make sense in this day and age when continuous innovation seems to bubble up from thousands of startups and disruption is the norm, not the sought-after exception?

The term "skunkworks" has a funny origin. A team working for aerospace manufacturer Lockheed Martin adopted the moniker from the classic comic strip Li'l Abner which made frequent references to a secret place in the woods where "skonk oil" was brewed from a mix of skunks, old shoes and other ingredients. Because of the horrid smell, people avoided the place and those who worked there – which seemed like a good inside joke to the secret team working on airplanes next to a plastics factory outside LA. In due time, they even developed a skunk logo for their special R&D operation, which started out hidden in a hangar at Burbank Airport north of Los Angeles where a team of engineers successfully and quickly churned out novel aircraft designs.

Secret no more, the famous Lockheed outfit exists to this day, and the company has even trademarked the term and proudly posted the founder's "14 rules and practices for project work" on a website. Leaving the military requirements aside, they list giving complete control of the program to its manager, using "a small number of good people," keeping paperwork requirements to a minimum, providing timely funding to get the job done and strictly limiting outside access.

**WHILE THE DEFINITION OF WHAT SEPARATES** a skunkworks from an R&D lab is fairly fluid, these core principles applied for decades as large corporations from IBM to 3M to Facebook parent Meta sought to refill their innovation pipeline, says long-time Silicon Valley forecaster Paul Saffo. "It's driven by employees who are passionate about something and doing it against all odds," he explains. "If it's too formalized and top-down, it's probably not a skunkworks. And it's definitely not one when you advertise or trademark it." Importantly, he doesn't see the immediate success of a specific product as a decisive factor, but hastens to add that shareholder activism has more or less killed such endeavors.

With a few notable exceptions. Take X, a loose collection of moonshot projects that search giant Google secretly launched in January 2010 under the leadership of co-founder Sebastian Thrun. The

**“IF IT'S TOO FORMALIZED, IT'S PROBABLY NOT A SKUNKWORKS. AND IT'S DEFINITELY NOT WHEN YOU TRADEMARK IT.”**

**PAUL SAFFO**  
FUTURIST AND SILICON VALLEY FORECASTER

**THINKING AHEAD**  
Xerox opened its PARC lab in 1970 to be the "office of the future." Soon, it had developed the first personal computer, named Alto (inset).

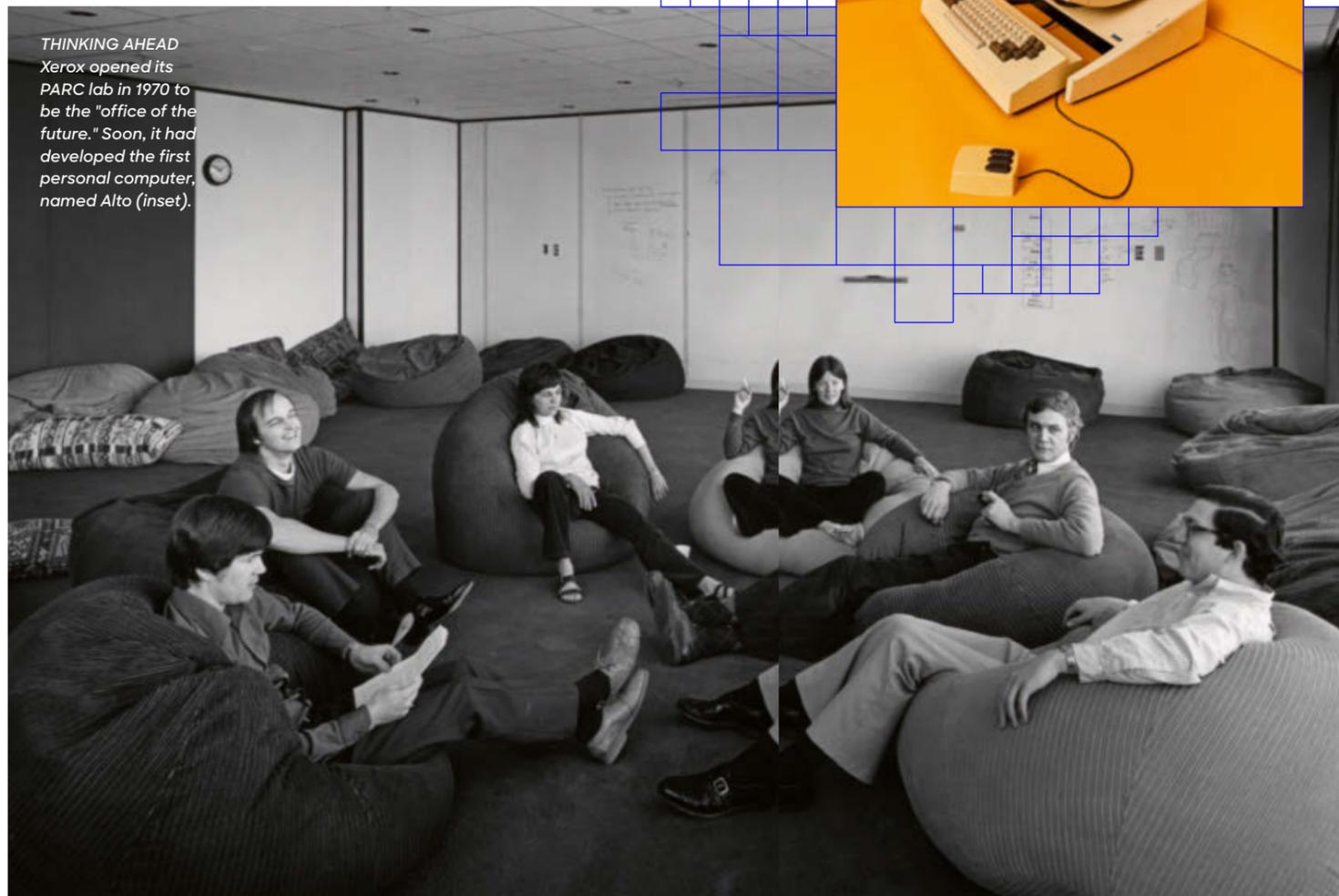


PHOTO: COMPUTER HISTORY MUSEUM, MOUNTAIN VIEW

Stanford computer scientist had made a name for himself in the fields of artificial intelligence and autonomous driving when Google's co-founders Larry Page and Sergey Brin tapped him for a 21<sup>st</sup>-century skunkworks. "They looked at two different use cases: innovating within an existing branch of business and innovation that's disruptive and discontinuous. Something new, like self-driving cars," Thrun recalls. "We felt we needed a separate institution that can incubate those projects and turn them into real businesses."

German-born Thrun, now 57, did exactly that. First came a half-year-long deep dive into technology and business opportunities, he says, driven by



## HOW TO RUN AND BUILD YOUR OWN SKUNKWORKS:

**1**

### FOCUS ON PASSION

Start with finding passionate project leaders and keep the teams small. In most cases, three to five members will suffice, says X co-founder Sebastian Thrun.

**2**

### EMBRACE ISOLATION

If you want disruptive thinking to happen in relative secrecy, keep those teams physically and institutionally insulated from HQ and its bureaucracy.

**3**

### MONITOR FEEDBACK

Make sure you have a close and constant exchange with the CEO for support and feedback.

basic questions: "How can we make meaningful progress in a field? Is the technology reasonably ready and the timing right?" About half of all ideas were considered "pipe dreams" and rejected. Those that made it over the initial hurdle were given "maximum operating freedom," as Thrun tells it. He kept teams as small as possible, only recruiting a leader for each project and telling them to hire three to four of the best graduate students they could find. The sales pitch was always the same: "Come to Silicon Valley and you can do the project of your dreams. You don't have to worry about fundraising or reporting. There's never a PowerPoint presentation."

**THIS CONCEPTUAL PHASE USUALLY COMPRISED** three to five people, with the ensuing prototyping phase scaling up to 15 people. If there was a go-to-market phase, Thrun adds, the headcount would increase significantly. That's one reason why Google X employed 500-600 people at its peak, he estimates. Juggling so many balls simultaneously also meant he would run no more than six projects at a time, devoting roughly one day a week to each.

Location matters, too, because it's crucial to be "as close as humanly possible" to the leaders footing the bill for a skunkworks, according to Thrun. "If you have a CEO who really cares about innovation and advancing technology, you want to be able to connect many, many times and get that person's guidance, wisdom and enthusiasm." In his case, that meant working in an innocuous building right next to Google headquarters in Mountain View whose purpose wasn't known to the outside world until late 2011, when *The New York Times* broke the story. Thrun also managed to keep fellow employees out: "I wanted to keep the team secret inside Google so we wouldn't be flooded with internal tourists who'd want to help."

Dedication alone doesn't suffice, however. While one of the lab's initial ideas, self-driving cars, has turned into Waymo and become a booming business for Google parent Alphabet, most of the other moonshots didn't fare that well. That's particularly true for those further removed from the core business, such as energy-generating kites or converting seawater into carbon-neutral fuel. Even tech products didn't always pan out. Google Glass, for instance, crashed spectacularly after a widespread public backlash and "wasn't ready," Thrun admits today. [You can read more about the philosophy behind X's projects from co-founder Astro Teller on p.22] But for Thrun there was one →

major lesson from his time at X: "From the get-go, you should try to really understand the business environments and dynamics in which people make a purchasing decision."

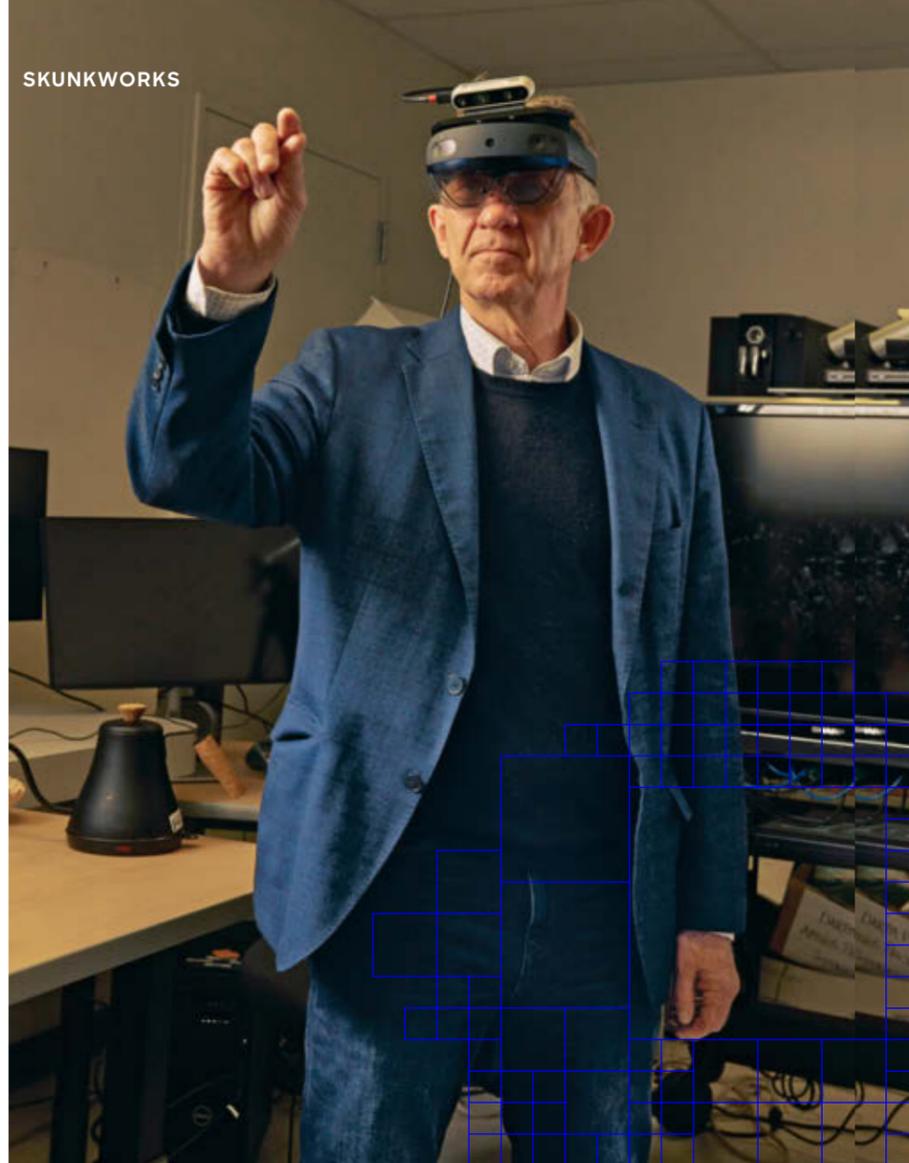
**A LACK OF FOCUS ON COMMERCIALIZATION** and churning out new products is the fatal flaw in all such ambitious R&D ventures, say critics. "Skunkworks need to die," contends entrepreneurship author Steve Blank, who derides the mysterious labs as "innovation theater" to grab headlines and juice the stock price. "By the middle of this century, the only companies with skunkworks will be the ones that have failed to master continuous innovation."

The new way to innovate at the bleeding edge, he argues, is to create an ambidextrous organization. One that exploits today's markets while exploring ideas everywhere – and has a mechanism in place to spread them throughout the organization. Blank's prime example is aerospace company SpaceX. It has two parts, he explains: a launch business that must be fail-safe and get payloads into orbit aboard a Falcon 9 rocket several times a week. And a wild and crazy side that is expected to blow up and crash-land rockets for a living, what Blank calls the "safe to fail" business. "If you're not blowing things up, you're not innovating. And if you're not blowing them up on a regular basis, you're not innovating fast enough," he says.

What makes this setup work, according to the author of several books on lean startups, is the fact that both parts of the company do not work in siloes. "The Falcon 9 rocket folks understand the future is Starship, that experimentation will eventually become mainstream. In the past, you would have called Starship a skunkworks, but to me, it's a great example of a company with a complex organization and instant, institutionalized ambidexterity. It's like running a VC portfolio inside your company."

Indian-born tech entrepreneur and academic Vivek Wadhwa goes one step further and dismisses any corporate R&D or innovation center as wasteful window dressing. "Those are the most incompetent, ineffective parts of the company because the people there get rewarded for filing patents and working on useless things instead of commercializing actual products," he scoffs. "They are cut off from the realities of the world."

Instead, Wadhwa favors suffusing the entire company with the skunkworks spirit. "I advise big companies all the time to take different people from different parts of the organization – marketing,



**CONSTANT INSIGHT** PARC was acquired by Stanford Research Institute in 2023, where it continues its legacy of innovation under head of research Jan Vandenbrande, seen above operating the facility's Halo vision device.

**A NEW ANGLE** During its first decades, PARC developed a number of technologies including an Etherphone device (top), Ethernet cables (center) and a commercial mobile robot platform (bottom).

developers, even finance – and stick them together in small teams. Launch hundreds of micro-skunkworks, put limited budgets on them and see what comes of it." Small is beautiful, Wadhwa adds: "I've never seen an R&D team that's larger than seven people and actually effective."

Connecting many initiatives with each other, insulating them from the general bureaucracy while closely liaising with the leadership is a delicate balance, concurs Saffo: "Companies need to create something like a republic of skunkworks inside their walls. It's like nurturing a diverse community that has playpens for disruption." It also has the added benefit of engaging the brightest minds so they don't leave.

Skunkworks in many cases have been replaced or superseded by a range of exploratory approaches: scouting for startups and quickly investing in them through a corporate venture arm, or swallowing them outright for their talent and intellectual

PHOTO: BALAZS GARDI/NY/REDUX/LAF

## 4 BE UNDER CONSTANT REVIEW

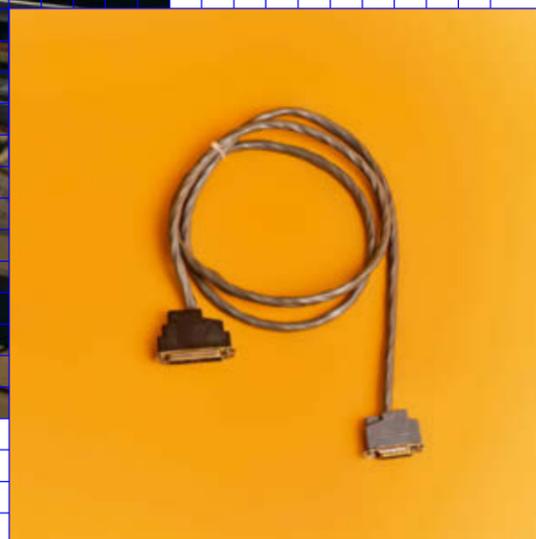
Perform regular reviews to check for each project's technical feasibility and market fit, pruning those that appear too far out into the future.

## 5 LOOK TO POTENTIAL PROFITS

Keep an eye on commercialization opportunities from the outset, recommend entrepreneurship experts Steve Blank and Vivek Wadhwa.

## 6 KEEP YOUR NETWORK IN SIGHT

Think ahead how to connect the innovators with the operators to bridge the gap between current and future markets.



property. Some large players also establish joint ventures with academia to generate ideas. Chemical giant DuPont, for instance, in 2017 teamed up with the University of Delaware and the state government to open a Delaware Innovation Space housing early-stage startups. The price tag at launch was relatively small, totaling just \$18.25 million, but seven years later, the new outfit lists a portfolio of around 90 companies. "Large companies have realized that the innovation capabilities of small entrepreneurs and small groups of people are greater than their own innovation capabilities," says Wadhwa. Big tech companies in particular acquire startups by the dozens. Google alone bought 222 companies between 2000 and 2024, Microsoft snapped up 140 and Apple acquired 102 young firms during the same time frame.

That's not to say corporations have completely given up on the idea – and halo – of a mysterious R&D outfit. Ford generated quite a few headlines when CEO Jim Farley revealed during an earnings call in early 2024 that the carmaker had established a skunkworks with a headcount of 300 people. The secret team's advantage, according to Farley: "They don't have the prejudices I would as an old-school car person." That's an ambitious claim, especially in light of the fact that Ford lost \$5 billion on its electric vehicles in 2024 alone.

Perhaps staring at the monetization potential of one individual company's skunkworks is too myopic a metric. Any innovative outfit eventually contributes to technological progress and business success somewhere, says PARC chronicler Michael Hiltzik. "Xerox leadership had the foresight to let researchers loose. But they ultimately did not know what to make of their inventions and enter an entirely new business that no one at the time knew what it really was," Hiltzik says. That's why third parties such as Apple stepped in and quickly carried the torch forward. ■

## Takeaways

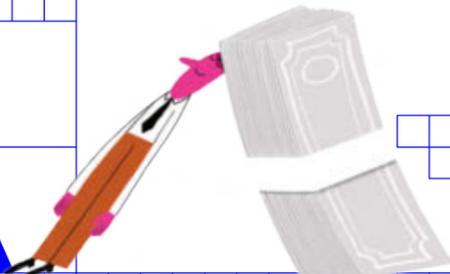
■ **DEDICATION IS NOT ENOUGH:** Not every idea will pan out, no matter what you invest in it. Keep an eye on the dynamics that drive purchasing decisions.

■ **MAINTAIN VARIED APPROACHES:** Ambitious R&D programs like skunkworks can be balanced through joint ventures and by scouting for startups.

■ **MONETIZATION IS JUST ONE METRIC:** Any innovation contributes to success somewhere. That said, an open mind will help keep the dividends in your own company.

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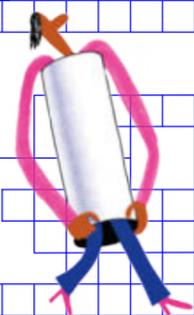
# A



WORDS BY  
**STEFAN STERN**

# LITTLE

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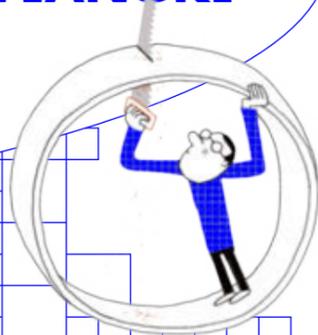


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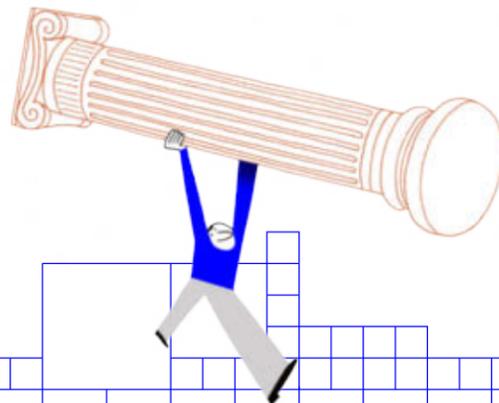
ILLUSTRATIONS BY  
**KLAAS VERPLANCKE**

# STATE



INNOVATION

INNOVATION



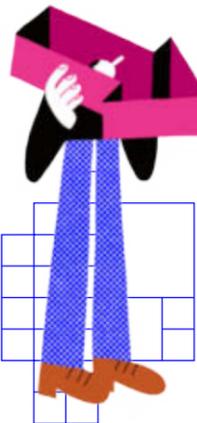
**CAN GOVERNMENTS MAKE A DIFFERENCE IN STIMULATING NEW IDEAS? AND IF THEY CAN, SHOULD THEY? INDEED, BUSINESS CAN BENEFIT FROM STATE AID - AND THE EFFECT COULD HAVE A WIDER IMPACT TOO.**

## IT

CAN BE HARD TO RESIST the romantic mythology which surrounds the idea of innovation: a lonely inventor struggling away for years until one day success is finally achieved. This is the Thomas Edison model - even though Edison had a number of assistants and researchers working alongside him. John Maynard Keynes later popularized another idea of innovation: "animal spirits." He described this phenomenon in his 1936 book *The General Theory of Employment, Interest and Money*. "Most ... of our decisions to do something positive ... can only be taken as a result of animal spirits - of a spontaneous urge to action rather than inaction," he wrote.

The heavy hand of the state should keep well out of things, it is often said, instead leaving matters to the "invisible hand" which steers market activity. Attempts to prove otherwise - in the Soviet Union, for example - have often failed. As the economist John Kay has written: "The common-sense belief that central coordination and direction, and the uniform implementation of best practice, are bound to improve performance remains ingrained despite the contrary evidence."

But what if a rather different account of state activity can be told? Just over a decade ago the academic Mariana Mazzucato published her book *The Entrepreneurial State: Debunking Public Vs Private*



### 55% OF SUPPORT

How much R&D tax incentives accounted for overall government support for business R&D in the OECD area in 2020, up from 30% in 2000.

SOURCE: OECD, OCTOBER 2023

*Sector Myths*, in which she argued that many of the business successes we see today had their origins in significant state support. Animal spirits have to be fed and encouraged, perhaps by the government itself. Apple's iPhone, for example, did not just magically emerge from Steve Jobs' imagination. As Mazzucato explained: "Everything that makes your smartphone smart and not stupid was actually publicly financed: the internet, GPS, touchscreen display and even Siri, the voice-activated system."

The US Defense Advanced Research Projects Agency, or Darpa, founded in 1958, did indeed lay the groundwork behind the eventual emergence of the internet, GPS and voice interfaces. John Kay concedes that state-funded research was beneficial to Silicon Valley, but notes also that effective entrepreneurs and leaders were needed to build new businesses, which might not have been created by "a committee in the department of commerce."

**WHAT MAKES STATE-BACKED INNOVATION WORK** and how can we balance central support and necessary commercial flair? Some countries have established an enviable record for guiding and supporting innovation. South Korea, for example, emerged in the last decades of the 20<sup>th</sup> century as a major player, built in part on the success of industrial giants such as Samsung, LG and Hyundai/Kia. Protectionism - an oblique form of government support - helped these players grow, sheltered from some forms of competition. But even today, state-backed investment in R&D represents 20% of the total spend, placing South Korea fourth in state investment in the OECD.

Giles Wilkes, former special advisor to UK prime minister Theresa May and business secretary Vince Cable, says the Korean model has proved successful. "They just decided at some point in the 1960s that they were going to catch up in big industries like shipbuilding," he says. It is true that South Korea was a low-income country which had a long way to catch up, so the direction forward was pretty clear. But, as Wilkes adds: "It's not easy building winning companies. They were export-based, if they didn't sell globally, they weren't going to win."

Chinese state support for the development of electric vehicles and the manufacture of photovoltaic cells, among other businesses, has led to a position of global dominance which has changed the nature of whole industries. On a smaller scale, and with a population of only 6 million, Singapore ranks as the highest Asian country on the Global Innovation Index led by Soumitra Dutta, →

dean of Oxford University's Saïd Business School. The country's Research, Innovation and Enterprise Council (RIEC), chaired by the prime minister, sets out traditional-sounding five-year plans. Its latest has budgeted \$25 billion into four technological domains: manufacturing, trade and connectivity; human health and potential; urban solutions and sustainability; smart nation and digital economy.

And sometimes the state – or aspects of it – has to step up to preserve and support innovation when a major economic setback hits. The Finnish town of Oulu was once a research and manufacturing hub for Nokia, back when the company dominated the mobile phone market. Almost 5,000 people worked for Nokia in the town 20 years ago, with a further 2,000 people connected to the business as subcontractors. [For more on Nokia and its failure to innovate, read our article on p.40] But with the arrival of the iPhone in 2007, Nokia's dominance exploded. This could have spelled disaster for the town. But universities and local government both stepped in to lead a remarkable revival of the tech industries, meaning that Oulu remains a dynamic source of tech innovation thanks to its many start-ups, in health care, 5/6G, AI and beyond.

**WHAT IS THE BEST WAY FOR GOVERNMENT** to support innovation? Wilkes, who now works as an advisor for the consultancy Flint Global, as well as being a senior fellow at the UK's Institute for Government, says that thinking has moved a long way over the past decades. "If you were having this conversation back in the 1960s it was about subsidizing, giving money to do activities that may have seemed too risky. There was a financing gap. This was effectively an attempt to achieve catch-up growth ... if we invest in this, we'll become more productive, we'll become bigger, we'll reach flight speed. If you give the bird a big enough push, it will be able to fly."

In the 1960s some feared the Soviet Union, through its very high capital investment, would overtake the West. But this was investment at the expense of consumption. "If you give your people a miserable enough time, it will look like they're growing," as Wilkes puts it. "They don't have jeans or cinema but they've got lots of great big tractors." The economic theory is that you need to invest in innovation because it is the ultimate "spillover" activity: There are huge social returns for the investment. "Government therefore has a natural social incentive," he says. "That's your classic industrial strategy technology argument." But *should* the

**104**  
**PROJECTS**

The number of projects the European Union's Innovation Fund has invested \$6.7 billion in since 2020, with 95% of recipient entities privately owned.

SOURCE:  
EUROPEAN COMMISSION  
INNOVATION FUND 2024  
ANNUAL KNOWLEDGE  
SHARING REPORT

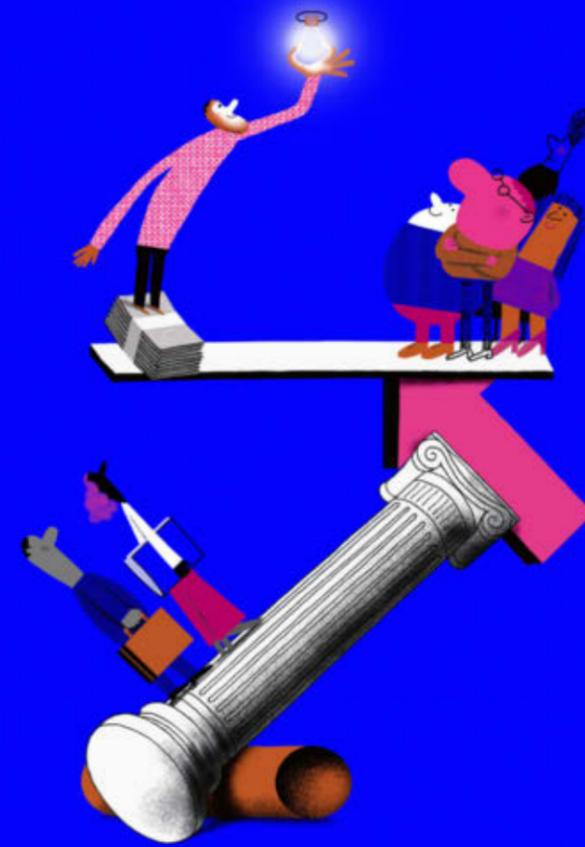
government be directing where investments go? Wilkes explains the dilemma: "Sometimes scientists might say: 'How dare the government pretend it knows where we should be targeting our research? You bureaucrats know nothing. You're all biased and you'll all just be attracted to the latest shiny thing. Give the money to us and we'll do the rest.'"

In the UK, the government recently published Invest 2035, a discussion (or "green") paper outlining its aims for industrial strategy. The British commentator Paul Mason set out his response to it in illuminating fashion. On the positive side, he liked the acknowledgement that state coordination will be needed to achieve higher growth. He approved of the emphasis on city regions as part of this. He liked the criticism of "market inefficiencies" which are preventing the reallocation of capital and labor to high value sectors. He endorsed the paper's call for "temporary government catalytic support" – "this means money," Mason said. And he liked that it focused on eight specific sectors rather than an economy-wide approach.

The problem was, he said, that the paper did not actually offer a strategy, or say why it thought previous strategies failed. Like Mazzucato, Mason

**“GOVERNMENT SHOULD BE ASKING: WHAT KIND OF REGULATORY SYSTEM IS GOING TO ENCOURAGE COMPANIES?”**

**GILES WILKES**  
**ADVISOR AT FLINT GLOBAL AND SENIOR FELLOW AT THE INSTITUTE FOR GOVERNMENT**



thinks government cannot sit on the sidelines and hope that innovation will magically happen. As he put it: "An effective industrial strategy is going to require government to start directing, not suggesting, nudging or merely signaling. But this is the thing that nobody wants to say because of the lingering belief that state direction should only take place where the market fails, and is a necessary evil."

So how should business and government work together? "It requires everyone to be a bit grown-up," Wilkes says. "There's all sorts of opportunities to let the other side down. One side may commit and then the other one drifts off to do something else. And governments can unfortunately U-turn on almost anything if they put their minds to it."

Clear thinking is required. "Government needs to intervene at the right level," Wilkes says. Is the market better at delivering something or not? "Most of the things that happen around us happen through trial and error, and government doesn't do that so well. If, for example, we all agreed we need better broadband, the government's job is not to try and design cables or even where exactly it

**GROW TOGETHER**  
*Innovation requires some key components and separate stages to build upon. Finding a way to work together can take time, but business and the state can be a good partnership. Patience, however, is important since governments can be prone to changing their minds.*

should go down. It should be asking: 'What sort of regulatory system is going to encourage companies to follow their own interests?' and do it."

Creative destruction is healthy for an economy, however. "You don't want industrial strategy which undermines the churn," Wilkes notes. And private sector players must speak government's language, he adds. You have got to be able to explain why this thing that you say is so good is not already happening in the market, and why it needs state support to survive and then hopefully flourish.

**WITH A NEW US PRESIDENT TAKING OFFICE** the game will change again as far as support for innovation is concerned. Trump has already used tariffs and, with a big and relatively closed domestic economy, the US may survive such initiatives for a time. But Trump risks making a mistake, Wilkes feels. "Being open is the big economic secret of all time," he says. "Bigger markets are better than smaller ones." Tariffs could hurt everybody.

And what about Elon Musk, that other great innovator at the heart of the US government (for now at least)? What does his success tell us? A lot, argues Robert Reich, former US labor secretary and now professor at the University of California at Berkeley. While he may decry and belittle the role of the state, Musk has in fact been a huge beneficiary of it, Reich says. "Tesla and SpaceX got started with assistance from state and federal policies, government contracts and loans," he says.

Investors assume that Musk will win contracts for more rockets, AI, self-driving vehicles and satellites – all areas in which he is active. His wealth has increased by tens of billions of dollars since the election, based in part on those assumptions. Musk has influence with the new president. Many do not find this reassuring. This is arguably the dark side – or at the least, the risk – of too close involvement between government and business. ■

## Takeaways

■ **INNOVATION IS NOT MAGIC:** Despite the romantic myth of the lonely inventor, most of today's biggest success stories started with government support.

■ **CLEAR THINKING IS REQUIRED:** Government needs to ask if the market may be better at delivering, and then intervene at the right level at the right time.

■ **BE AWARE OF TOO CLOSE TIES:** A darker side of government support is the possibility that a private entity will come to wield too much influence on policy.

# HOW NOKIA FAILED TO RING IN THE CHANGES

INNOVATION

INNOVATION



WORDS BY  
RICHARD  
MILNE

STILLS BY  
ALEKSI  
POUTANEN

WHAT THE RAPID FALL OF A MOBILE PHONE GIANT CAN TEACH US ABOUT THE NEED TO KEEP AHEAD IN A FAST-CHANGING TECH LANDSCAPE.

# T

THE HAIRS ON THE BACK of Olli-Pekka Kallasvuo's neck stood up suddenly. It was 2008 and the then Nokia CEO was on a panel with the CEO of US media group Comcast and the co-founder of Google, Sergey Brin. Brin took a mobile phone – an industry Nokia then dominated – out of his pocket and told the audience that in just a few years these "terminals" would become meaningless, a mere window to the internet and cloud. For Kallasvuo and other Nokia executives in attendance, it was the single moment when they realized that their grip on the industry was quickly being loosened.

At its peak, Nokia towered over not just mobile phone manufacturing, but Finland as well. In 2000, it alone accounted for 4% of the country's economy, a third of its business R&D and almost a quarter of exports. In 2007, it held nearly 50% of the global smartphone market. Yet, seven years later, Nokia's mobile phone business was sold to Microsoft and was soon dead. How did one of the world's seemingly most innovative companies lose its way so completely, not to mention so rapidly, plunging Finland into depression and changing Nokia into a completely different business?

**IT IS TEMPTING TO LAY THE BLAME** at the feet of Apple. But experts and former executives say this explanation does not hold water and that in fact the seeds to Nokia's downfall were sown during the period of its greatest success. No single factor can entirely explain its demise, but they point to a series of poor strategic decisions, badly executed organizational changes and bureaucracy, all married with

**3%**  
OF GLOBAL  
MARKET

How low Nokia's market share had plummeted by the first half of 2013 when its mobile phone business was sold to Microsoft.

SOURCE:  
BBC/GARTNER

complacency. "We lost our capacity for renewal and became victims of our own success," says Mikko Kosonen, who worked at Nokia for more than three decades, most notably as its chief strategy officer from 1996 through until 2005.

Yves Doz, the emeritus professor of strategic management at INSEAD business school, says the watershed moment came in the early 2000s when Nokia, seeking even greater market share, divided the market up into a number of categories: low-end and high-end devices, phones for business use, personal use and for cameras, music or games. "The seed of the downfall was there, because then they went into a product proliferation exercise. So they could not, until it was too late, realize that the iPhone was going to be a game changer. Because it was a completely different concept with a single product on a common platform. That was totally alien to Nokia," says Doz, the co-author of *Ringtone: Exploring the Rise and Fall of Nokia in Mobile Phones*.

Another former senior Nokia executive, who like Kosonen worked there for decades, adds that

PHOTOS: ALEKSI POUTANEN FOR AALTO UNIVERSITY'S NOKIA DESIGN ARCHIVE; MICHAEL BIRTY/GETTY IMAGES



**BEFORE THE FALL** Olli-Pekka Kallasvuo (above) became the CEO of Nokia in 2006, one year before the launch of the iPhone. The Nokia 7373 (left) was announced that same year as part of the company's "fashion" phone line and featured a two-megapixel camera.

the problem was not in developing new products, but in changing business models. "Innovation problems at Nokia related more to: How do you change your business model from being a hardware-oriented one to a more services-, apps- and internet-based one? That was the innovation challenge, and where we did not succeed," he explains.

All this will be no surprise to readers of *The Innovator's Dilemma* by Clayton Christensen. The former Harvard Business School academic explained how even the best companies can seem to do everything right and still lose market leadership. In any industry, successful businesses can be toppled if they do not know when and how to jettison their current practices. Ironically, Nokia itself seemed to know just how to do that. Until it didn't.

**NOKIA WAS FOUNDED IN 1865 AS A PULP MILL** before going into industries as diverse as electricity, cables and rubber. It gradually entered the radio, telephone and electronics businesses in the 1960s and 1970s before launching its first mobile phone in 1982. The Finnish group faced a twin crisis at the end of the 1980s when its CEO took his own life and the collapse of the Soviet Union pushed the Nordic country into recession.

Enter Jorma Ollila. The former finance chief and later head of Nokia's mobile phones division, became CEO in 1992 and soon turned the company into a handsets colossus. Crises came and went, such as one with logistics, but Nokia seemed to keep on growing. But so did its complexity. At its peak, its main operating system, Symbian, had as many as 57 different versions, according to Doz. Ollila moved into his position as chairman in 2006, bringing in Kallasvuo, another finance chief, →

**“WE LOST OUR CAPACITY FOR RENEWAL AND BECAME VICTIMS OF OUR OWN SUCCESS.”**

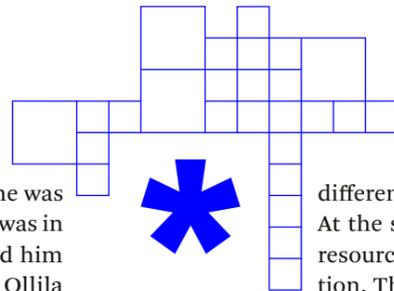
**MIKKO KOSONEN**  
FORMER NOKIA CHIEF STRATEGY OFFICER

to replace him as CEO. Then the first iPhone was released in 2007 and three years later Nokia was in crisis. It booted out Kallasvuo and replaced him with Stephen Elop, a Microsoft executive. Ollila himself stepped down as chairman in 2012, and a year later the mobile phones business was sold to Microsoft for \$5.4 billion. By 2016, the business was completely finished.

**LIKE MANY FACING AN INDUSTRY SHIFT**, Nokia considered the right questions and at times even found the right answers. For example, it developed touchscreen phones in 2003. And it was aware of the rise of the internet. Kosonen says that at a 2002 strategy day, a presentation showed Nokia's view of the world with an inner circle of GSM (mobile devices) surrounded by a circle representing the internet; on the other side, the internet lay at the heart, with GSM just one way to access it. Why couldn't Nokia connect the dots? "We were absolutely right, but the message didn't get through. One key thing was our identity as a product company, another is the composition of the leadership team, the relational, psychological and emotional side of things," he adds.

Both Ollila and Kallasvuo were finance people. Many of the main product specialists in management left in 2005. "They were the people with the vision of running a technology," says Kosonen. One of the survivors disagrees, saying simply of those that left: "They were not internet people. That's all I'm going to say." One of the things that led those executives to leave was an organizational shake-up in 2004, which Doz argues contributed to Nokia's downfall. Ollila felt that the mobile phone division had become too powerful, according to Kosonen, so he split it into three. The resulting matrix organization is often blamed in Finland for a big part of Nokia's fall, but according to Doz, it was not the matrix itself that was a problem, it was "that Nokia did not understand how to run what was a completely new structure for it."

Kosonen, who wrote *Fast Strategy: How Strategic Agility Will Help You Stay Ahead of the Game* with Doz straight after leaving Nokia, adds that he was one of the architects of the matrix but warned Ollila that his role would change dramatically. "He had always been a CEO of a conglomerate with independent businesses. In the new organization, he had to be hands-on managing the matrix," he says, pointing not just to the vertical business units, but to horizontal functions such as marketing and technology. New fiefdoms emerged and competition between



## NOKIA IN NUMBERS

# 250 MILLION

How many units the Nokia 1100 handset, which launched in late 2003, sold worldwide, making it the world's all-time bestselling mobile phone.

# 41 MODELS

The number of different handset types Nokia launched in 2005 alone, of which 32 were categorized as mid-range or high-end.

# 1.14 BILLION

How many individual mobile phone units Nokia estimated were sold in 2007.

# \$2.6 BILLION

The net profit Nokia reported for Q4 2006. The company reported the same figure as its comparable operating profit for all of 2024.

SOURCES: NOKIA, REUTERS

different parts of the matrix became debilitating. At the same time, Ollila decided to try to make resources more scarce in a bid to increase innovation. The problem was that middle management had only known an era of plenty and so found it hard to adjust.

Yet another issue is that Nokia was, at its heart, a hardware company. "We were killed by Silicon Valley software companies. Our core capabilities were related to making phones," says Kosonen. So when Nokia tried to develop its own rival to Apple's and Google's platforms, it was not only too complex, but also did not work well with the internet. App developers flocked to the iPhone and Android systems because of their simplicity, rather than having to develop dozens of different versions for Symbian. There was not enough software competence in Nokia, he adds. Kosonen says its instincts were of a product company, trying to squeeze prices when times were tough, rather than a platform

company, trying to make its product as attractive as possible for partners to build on. It is also hard to kill the goose who has laid so many golden eggs. "I wouldn't say arrogance, but complacency, definitely. After so many fantastic years, it has an impact on personalities," says the former senior executive.

**THEN THERE WAS THE PACE OF CHANGE.** Most industries are buffeted by shifts in technology, customer behavior or macro developments from time to time. But few have been subject to the speed of the reversal in the mobile phone industry. Of the biggest players in the industry just before the launch of the iPhone, only Samsung remains, and it has been unable to challenge the power of Apple's and Google's platforms. "I can't think of another industry that was disrupted so quickly, so fundamentally," says another former executive.

That has implications for industries undergoing big shifts today, such as carmakers dealing with the

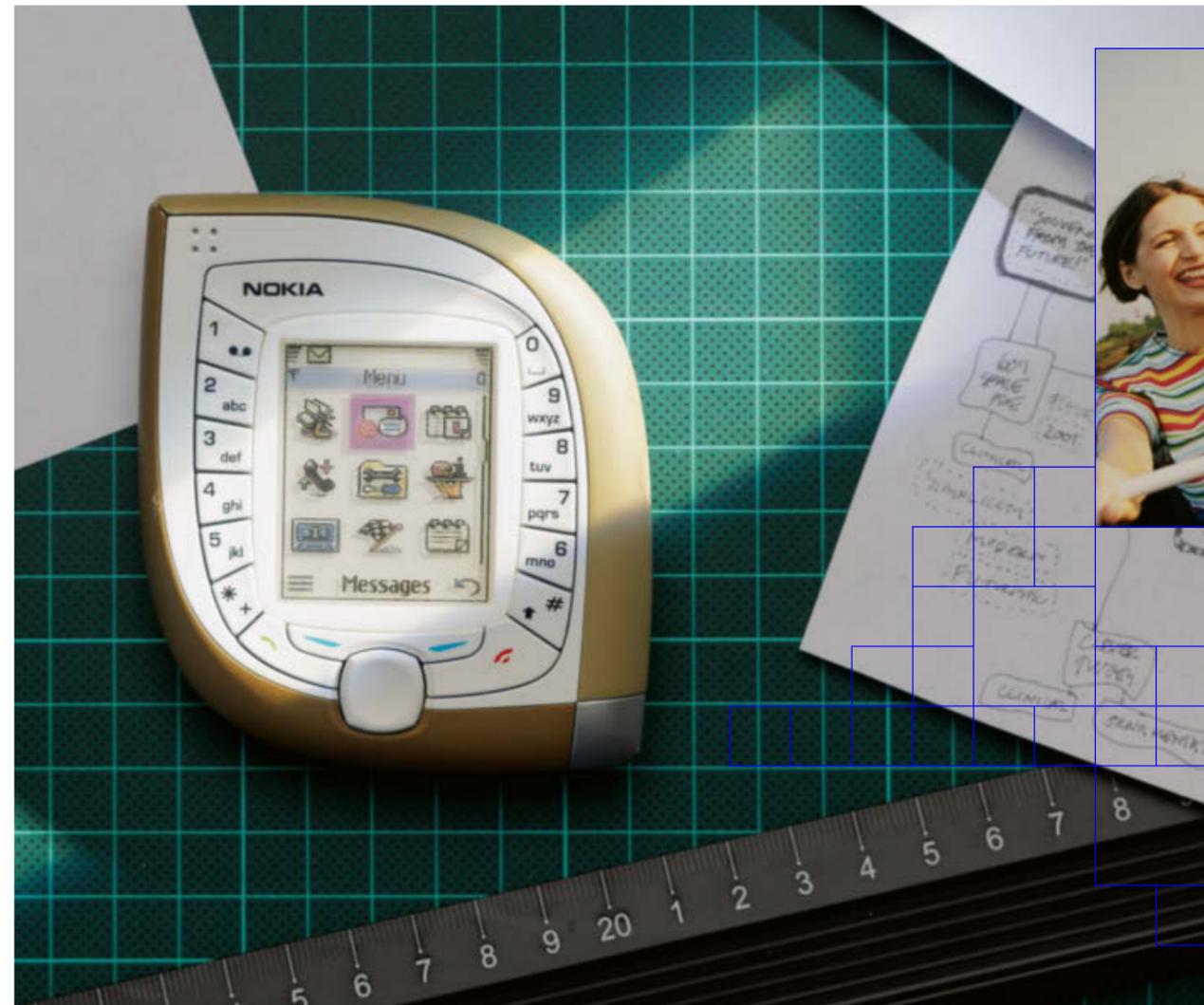
transition to electric vehicles. The likes of Tesla and new Chinese carmakers are seemingly swifter than traditional manufacturers in Europe. Kosonen sees parallels: "Nokia was a product company like the carmakers, but now software is becoming a more and more valuable part of the car and for many companies the biggest value is in the software systems." One of the former executives says simply: "Don't wait too long. Act quickly and as radically as you can."

The failure of Nokia still resonates so widely, not just because of many people's nostalgic feeling for the company, but also its status as the rarest of things: a homegrown European technology success. A number of newer groups such as Spotify and Adyen have grown up to join the likes of SAP and ASML. But there are still far fewer than those coming out of Silicon Valley. The lessons of what went wrong at Nokia in terms of its innovation record need to be absorbed urgently to avoid that gap becoming ever wider.

**A FUN EXPERIENCE**  
The Nokia 7600 (bottom left) was designed by Tej Chauhan in 2003 and was the first to use exchangeable, molded leather or suede trims and a holistic, "lifestyle-driven" marketing approach. The playfulness of the design aligned with the image Nokia portrayed in ads (like that below) as a fun and youthful brand.

PHOTO: ALEKSI POUTANEN FOR AALTO UNIVERSITY'S NOKIA DESIGN ARCHIVE

PHOTO: AALTO UNIVERSITY ARCHIVE



INNOVATION

INNOVATION

## Takeaways

**SOMETIMES SIMPLE IS BETTER:** An organization can experience rapid growth from an increasingly complex offering, but complexity can also lead to a crash.

**TAKE OFF THE COMPLACENCY GOGGLES:** The right answers to the right questions won't help if you're only seeing an issue from a standpoint of ongoing success.

**DON'T BE AFRAID OF ACTING TOO FAST:** When a watershed moment of change hits an industry, the swiftest to react will be in the best position to survive.

# PATENT PENDING

WORDS BY  
ALBERTO  
GALASSO

**HOW WOULD INNOVATION BE IMPACTED IF THE POWER OF PATENTS WAS REDUCED? REMOVING PATENTS MIGHT MEAN CHEAPER PRODUCTS, BUT IT WOULD ALSO LEAD TO REDUCED INVESTMENT IN INNOVATION.**

INNOVATION

INNOVATION

**P**ATENTS have been around for a long time. In Europe, medieval monarchs gave exclusive rights to produce and trade specific commodities to their most loyal subjects – privileges not necessarily linked to new discoveries. Then in 1474, the Venetian Patent Act introduced the first system where inventors could submit applications. If the subject matter was found to be a “new and ingenious device” then a patent was granted that allowed the owner to exclude others from practicing the invention.

Today, patents are a key instrument for innovation policy. Patents last for 20 years, and only when their term expires can the technology be used without

permission from the patent owner. Their success has meant that every country has a patent office and courts to handle disputes and determine infringement damages. But that success has also been accompanied by constant complaints and critiques about the patent system.

**MANY HAVE COME TO SEE PATENTS** as a source of excessively high consumer prices and as a policy tool that can be easily abused. Proposals for reforms abound, with some experts even suggesting that patents should be abolished altogether. Indeed, it is not surprising that patents invite scrutiny and criticism. From an economic perspective, patents create monopolies by allowing patentees to prevent others

from producing and commercializing their inventions. Intuitively, patents allow firms to obtain higher profits compared with the case in which other firms could freely copy their innovations.

From a policy perspective, rewarding an innovator with monopoly rents has costs and benefits. By preventing entry of imitators, patents decrease competitive pressure, which may lead to higher consumer prices. This is a key social cost of patents. At the same time, the prospect of receiving monopoly rents can be a powerful incentive to innovate.

Innovation is typically the result of research and development investments, which in some industries are extremely large. The average investment required to develop a new pharmaceutical drug, for example, has been estimated at over \$1 billion. Without patent protection, a firm commercializing a new drug would face competitors that reverse engineer and sell the same product, driving down profits at levels close to the production costs. This expected erosion of the innovator’s profits could reduce the incentives to develop the drug in the first place.

This is an important trade-off to consider when assessing the impact of patents on the economy. What makes patent policy challenging is this tension between monopoly distortions and

innovation – and that is only one of the several cost-benefit dimensions that need to be considered.

**IT IS IMPORTANT FOR POLICYMAKERS** now to appreciate that patents stimulate innovation not only because they increase profits, but also because they do so through several channels. The first is the disclosure of the patented technology. Patent documents are published by the patent offices and freely available in databases. The large body of information contained in patents allows inventors to learn about the latest technological developments in their fields, which in turn can facilitate their innovation projects. The second channel is the information provided by patent offices when they decide whether to grant or reject an application. This is an important market signal on the novelty and quality of the technology, especially crucial for new ventures, for which investors only have limited information.

Another virtue of patent systems is that they are decentralized and the involvement of the government is limited to examining whether basic patentability requirements are satisfied. Innovators can then freely decide if, when and how much to invest in innovation. This is particularly beneficial in industries where

firms have more precise information than the government about the feasibility and commercial potential of new technologies. Finally, because patents reward innovators through profits, patent policy requires fewer public funds than other policies such as research grants.

As there are many benefits that the economy may derive from patents, there are also several additional costs. The first is that when a patent is present, firms that require access to the technology need to negotiate a licensing contract. These transactions that often involve the services of specialized lawyers can be very costly, especially for small organizations. Moreover, licensing negotiations often take place in the presence of asymmetric information as parties may have different knowledge and understanding of the commercial value of the patented technologies. Together, transaction costs and incomplete information generate frictions in the market for technologies, which may reduce the extent to which innovation diffuses across the economy.

**FRICTIONS ARE MORE SEVERE** in technology areas such as software, computers and semiconductors where research cycles are quick and there are many patents and patentees. In these environments, there are also concerns with the use of “trolling” litigation strategy by some patentees, typically nonproducing entities, to extract licensing rents that far exceed the commercial value of their patents. The business model of these patent trolls involves approaching numerous technology producers with threats of costly litigation unless a patent license is paid. This can be very problematic, as alleged infringers may end up licensing

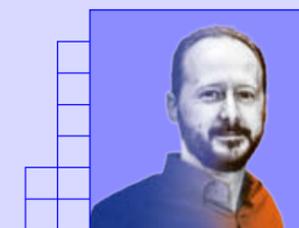
patents they do not actually infringe upon, simply to avoid the expense of defending themselves in court.

A final concern is that the higher profits they generate may not be enough to induce the development of technologies when market size is limited. This is particularly relevant for pharmaceutical research targeting rare diseases, or diseases predominant in poor countries.

**THE KEY TAKEAWAY** here is that evaluating the effect of patents – and patent policies – is extremely complex. The patent system has several positive effects on innovation, economic growth and, ultimately, social welfare. There are also several social costs. Effective policy design and proposals for reform should consider all these channels. This complexity also implies that patents have substantially different impacts across industries and technology areas. This is in stark contrast with the “one-size-fits-all” nature of the current system.

One aspect that can be adjusted to align policy with industry needs is a patent’s duration – currently 20 years in all technology areas. In industries like software, where product life cycles are short and rapid innovation is the norm, a 20-year patent term appears overly lengthy. In contrast, in some areas of pharmaceuticals, where products can be commercialized only after lengthy clinical trials are completed, the 20-year patent term seems relatively short.

More broadly, instead of sweeping reforms or drastic measures like patent abolition, policymakers should focus on approaches that recognize the different roles that patents play in driving innovation across different industries. ■



ALBERTO GALASSO holds the Anthony S. Fell Chair in new technologies and commercialization at the University of Toronto, where he is a professor of strategic management. Expanding on his innovation and technology market research, his book, *The Management of Innovation*, was published in 2024.

# THE EAMES

# PLAYBOOK

TAKE A FEW LEAVES FROM THE CHARLES AND RAY EAMES

# FOR

PLAYBOOK TO GET YOUR INNOVATION JUICES FLOWING.

# INNOVATION

WORDS BY  
**BENNETT  
VOYLES**

**E**VEN TODAY, nearly 50 years after their deaths, Charles and Ray Eames continue to cast a long, sleek shadow on the design world. Indeed, a lot of the best design of our time owes a profound debt to the husband and wife team. And it's not just the famous Eames chair or the familiar sling seating – a ubiquitous feature of airports the world over – resting at the core of their formidable legacy. Top innovators such as Steve Jobs cite the Los Angeles couple as among their biggest influences. Their studio model has also spread their influence beyond the world of design itself. Innovation experts say IDEO, Apple, Pixar and other creativity-focused organizations emulate a number of practices which the Eames Office adopted in the 1940s.

In its prime, the Eameses' playful and collaborative 2,000-square-meter studio featured "exhibition signage, furniture prototypes, desks, vintage toys, a research library, a film screening room, a pet octopus and flexible walls ..." according to the Eames Office website. So what's the recipe for brilliant design, according to the Eameses? —>

*THE ART OF IMAGINATION  
Charles and Ray Eames  
pretend to be pinned  
to the ground by their  
own chair bases while  
working on a Herman Miller  
advertisement in 1947.*

PHOTO: © EAMES OFFICE, LLC. ALL RIGHTS RESERVED

INNOVATION

INNOVATION

STEP

01

## FIND THE NEED

FOR CHARLES AND RAY EAMES, design always began by thinking hard about the client's request. Whether they were thinking about chairs for airports or offices, their work always began by understanding the intended function, a process that Charles described as recognizing the constraints of the problem. "Design depends largely on constraints ... the ability of the designer to recognize as many of the constraints as possible; his willingness and enthusiasm for working within those constraints," he once said. This meant that when they innovated, it wasn't for innovation's sake, but because they couldn't meet a need in a conventional way. "Innovate as a last resort," Charles advised.

**OUTSIDE THE BOX**  
Ray works on an early prototype of *The Toy* – a large-scale, modular building set – in the south courtyard of the Eames House, located in Pacific Palisades, in 1951.

PHOTOS: © EAMES OFFICE, LLC. ALL RIGHTS RESERVED. PETER STACKPOLE FOR LIFE. © THE LIFE PICTURE COLLECTION / SHUTTERSTOCK



INNOVATION

STEP

02

## BE A THOUGHTFUL HOST

**IT'S BETTER TOGETHER**  
The Eameses' molded plastic armchairs remain one of their most iconic designs, seen here with an added illustration by artist Saul Steinberg.

BEING A DESIGNER, Charles insisted, was something like being a thoughtful host who tries to anticipate what his guest might want. A good design came down to problem-solving, or as he said another time: "Design is a plan for arranging elements in such a way as best to accomplish a particular purpose." Colleague Bill Lacey agreed. "There is no Eames style," he once said, "only a legacy of problems beautifully and intelligently solved." →

INNOVATION

INNOVATION



STEP  
03

# THINK BIG

WHAT ARE THE boundaries of design? Charles was once asked. "What are the boundaries of problems?" was his reply. But thinking big did not mean being wasteful: Professionals who came of age during the Depression, the Eameses felt strongly about designing products that used low-cost materials and efficient production methods. They aimed to make good design widely available – "the best for the most for the least," as Charles put it – and often delivered: The Eames lounge chair was made from molded plywood using the Kazam! machine, a tool they had also invented. In the fast-growing postwar United States, light, durable and adaptable products made using good, low-cost materials also made the best business sense. →

**CREATE YOUR OWN WORLD**  
Charles and Ray balance on the steel framing of the house they designed to be their home and studio in Pacific Palisades, California, during its construction in 1949.

STEP

04

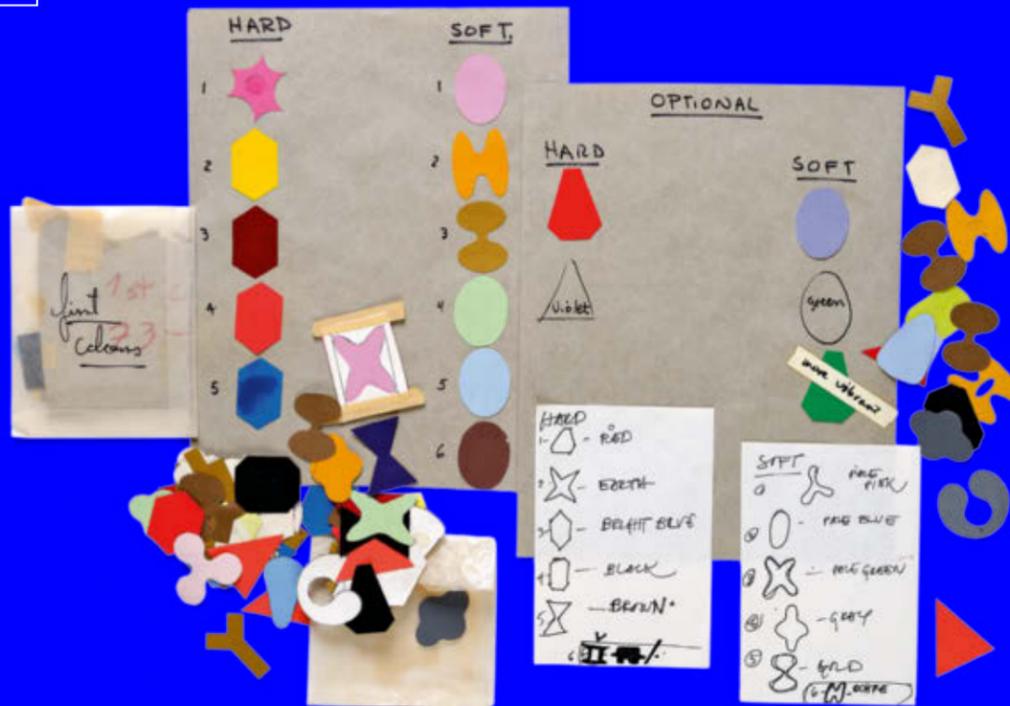
## TRY AGAIN

THE EAMESES WERE KNOWN for their use of photography, model-making and life-size mock-ups to test and then to refine their ideas. Viewing things from different angles was always important to both Charles, who had studied to be an architect, and Ray, who had studied abstract painting. "The thing about a model is that you can play with it; you can test things out in the model that would be laborious, dangerous, or costly – or just plain impossible – to test in 'reality,'" Charles once said. Ray noted that models can also be helpful as communication tools. Ultimately, Charles believed that in certain respects, models constitute the culture of a society. "In the end," he said, "models are what you hand on to the next generation. The 'culture' of a time is the sum of its models."

## RIP IT UP

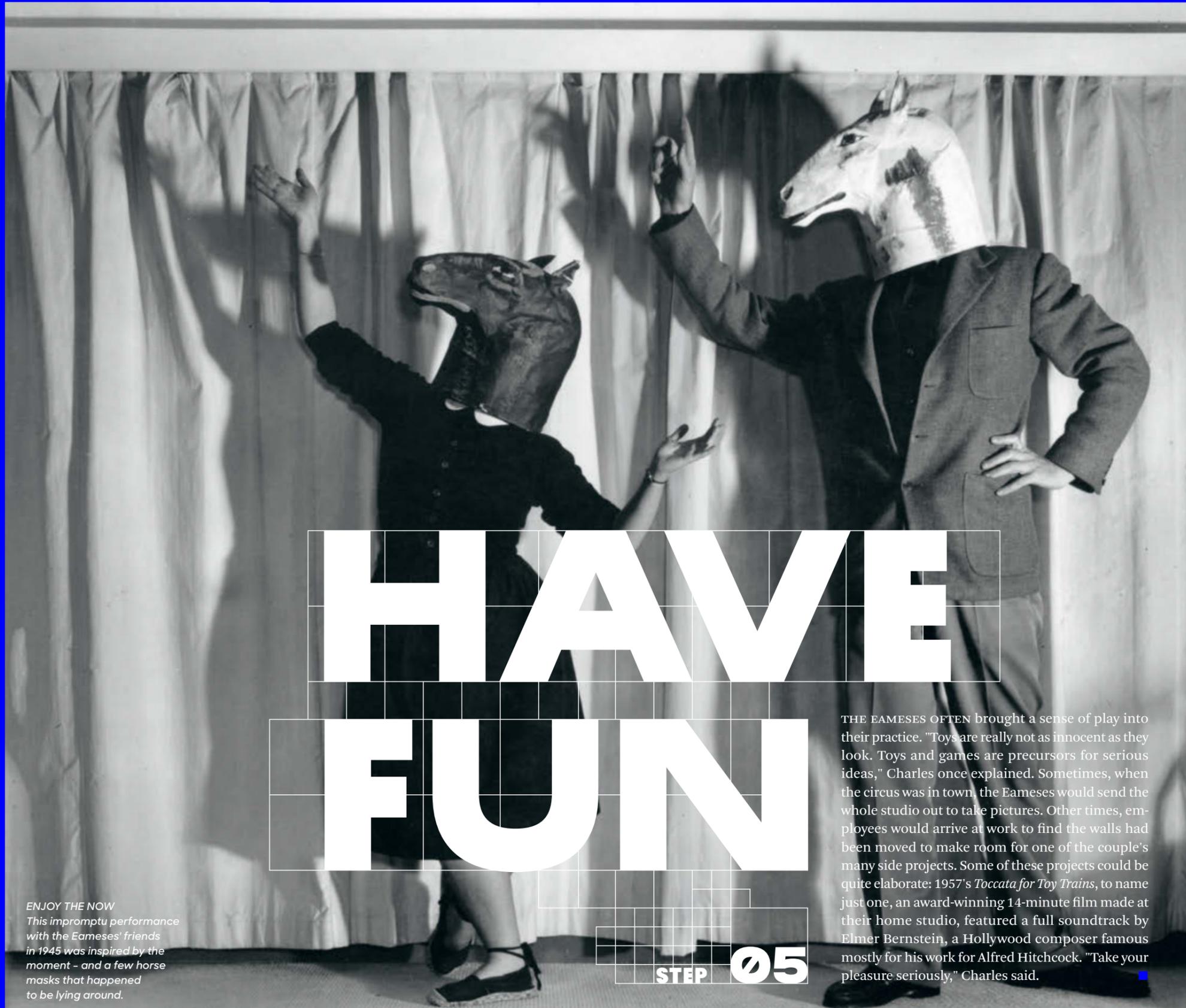
Ray Eames created design studies with different colors and forms before making a final selection, like these for films about mathematics directed by Ray Redheffer, 1972.

INNOVATION



## ENJOY THE NOW

This impromptu performance with the Eameses' friends in 1945 was inspired by the moment – and a few horse masks that happened to be lying around.



HAVE

FUN

STEP

05

THE EAMESES OFTEN brought a sense of play into their practice. "Toys are really not as innocent as they look. Toys and games are precursors for serious ideas," Charles once explained. Sometimes, when the circus was in town, the Eameses would send the whole studio out to take pictures. Other times, employees would arrive at work to find the walls had been moved to make room for one of the couple's many side projects. Some of these projects could be quite elaborate: 1957's *Toccata for Toy Trains*, to name just one, an award-winning 14-minute film made at their home studio, featured a full soundtrack by Elmer Bernstein, a Hollywood composer famous mostly for his work for Alfred Hitchcock. "Take your pleasure seriously," Charles said.

# ALWAYS ASK FOR MORE

WORDS BY STEFFAN HEUER

STILLS BY RAGNAR SCHMUCK

S

TARING AT THE MASSIVE REDWOODS in morning fog from the Pacific is Jeremy Utley's natural screen saver. The director of executive education at Stanford University's d.school does most of his creative work in a little cabin west of Palo Alto. As his four daughters play before their day of homeschooling begins, Utley fires up his computer and starts talking to ChatGPT at a rapid-fire clip as if he were in the room with an indefatigable human co-worker. "Think of the typist in the movie *Darkest Hour* where Winston Churchill sits in the bathtub and yells out ideas," Utley jokes. "Wouldn't it be great if we could all do that - capture ideas right as they occur to us?"

Sessions at his stand-up desk often take hours, with the academic and author dictating, typing asides for a second chatbot to critique the first and vice versa. Not to mention furiously scribbling sticky notes that are strewn all over his desk. Utley believes in the power of his voice, calling his fingers his "bottlenecks" as they slow down his stream of consciousness: "There are no bad ideas. When you treat GenAI as a collaborator and sparring partner, not an oracle, the answer is always yes." Utley let *Think:Act* observe his interactions with two chatbots.

PHOTO: COURTESY OF JEREMY UTLEY



First prompt from Utley to ChatGPT:

So I've got an idea for a blog post and I just want to start by doing a little bit of verbal vomit. I want you to act as an expert newsletter copy editor with the knowledge of my background, particular interests and area of expertise. I'd like for you to: One, workshop the material with me; Two, help me think of what the relevant material is across my various sources; Three, give me feedback. I want to come to consensus between me, you and Claude on what the best output is.

Got it! You're looking to verbally brainstorm a blog post. Ready when you are - let the verbal vomit begin!



UTLEY

I did kind of a standard keynote this weekend and I found myself saying, as a next step, everybody should block 15 minutes on their calendar per day to try something they've learned. I think that's the takeaway for the piece.

Got it! You're focusing on encouraging people to actively apply what they've learned, specifically by blocking 15 minutes daily to try out new ideas. That's your "so what." You've got a compelling core message: The real value of learning comes from implementing knowledge, not just passively nodding along.



UTLEY

Okay, this is really cool. Now be my editor who's giving instructions to my copywriter exactly how to think about approaching this piece. Could you craft that set of instructions? If you're like a Russian supercritical judgmental editor and if you were to do a harsh critique of this brief before we give it to the writer, what would you say are the two glaring errors?

In true Russian supercritical fashion, here's a brutally honest critique and a missing piece of guidance that would elevate it to masterpiece level: ... (chatbot responses have been shortened for clarity and space).



Ideation takes many forms when Utley brainstorming with AI. He jots thoughts on sticky notes and keeps them on his desk for further exploration (right).

ABOVE: Stop thinking at the speed of your fingers! Use your voice. RIGHT: Bottlenecks. Stop talking to your computer with your fingers. BELOW: There's another "So what" (application) !?!

STOP THINKING AT THE SPEED OF YOUR FINGERS! USE YOUR VOICE

BOTTLENECKS STOP TALKING WITH YOUR FINGERS

there's ANOTHER "SO WHAT" (APPLICATION) !?!

Jeremy moves to Claude for feedback.



Unlike ChatGPT, Claude does not yet allow dictation on the desktop. Utley therefore has to type much shorter thoughts, or copy and paste documents to drive the conversation with the second chatbot.

# “ READ THE ENTIRE CONVERSATION AND CRITIQUE CHATGPT'S APPROACH. BE BRUTAL, HONEST AND DON'T HOLD BACK.

**JEREMY UTLEY**  
STANFORD PROFESSOR AND DIRECTOR AT THE DISCHOOL

Jeremy moves back to ChatGPT

UTLEY

Awesome. I asked Claude if it would give feedback on the synthesis so far, so please read that below and then let me know what you think about Claude's assessment of the piece. Be reflective, be honest, be critical of your own work, be humble - but also feel free to challenge anything that you think is wrong ...

Claude's critique is insightful and well-structured, especially in identifying areas where the brief could be even sharper. Here's a reflective analysis of Claude's feedback:

- Strengths in Claude's critique ...
  - Areas where I'd challenge or adapt Claude's feedback ...
  - Suggested rewrite of the brief based on Claude's input ...
- Here's an updated version of the brief with Claude's most actionable points integrated ...

UTLEY

So I'm just riffing here. I agree with Claude's assessment that your metaphors were more organic and open-ended and kind of consistent with my voice more than the mechanical metaphors that it used. That being said, I don't know that we're totally there, so here's some thoughts ...

These reflections really add clarity to your direction. Here's what I'm gathering from your riff: ... Here's the updated assignment brief, now positioning the post as the "trailhead" for readers' journey of discovery ...

Jeremy moves to Claude for feedback.

UTLEY

Hey! I've been having a great conversation with ChatGPT about a potential blog post. Would you please read the conversation and critique ChatGPT's approach to the "assignment brief." Be brutal, honest and don't hold back.

Here's my brutally honest critique of ChatGPT's approach:

- Major structural issues: ...
  - Missing psychological framework: ...
  - Tactical oversights: ...
  - Voice and tone misalignment: ...
- The brief doesn't capture your authentic voice as someone who is actively experimenting and learning alongside your audience. Here's my specific recommendation for improvement: ... Would you like me to rewrite the full brief incorporating these elements, or would you prefer to explore any of these critiques in more detail first?

UTLEY

I like your insight about positioning the piece as the capstone ... but feel capstone is the wrong word, as my hope is that someone feels they're "not done but begun." Is there a better metaphor?

Here are a few alternative metaphors to "capstone" that might better capture your intent: ... Would any of these resonate better with your vision, or should we explore other metaphors that better capture the "not done but begun" spirit?

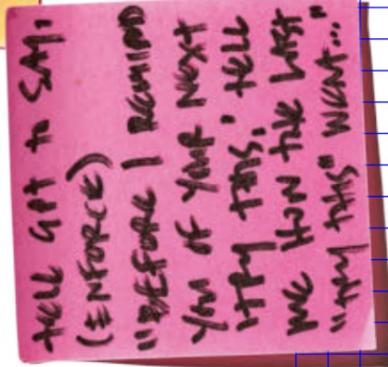
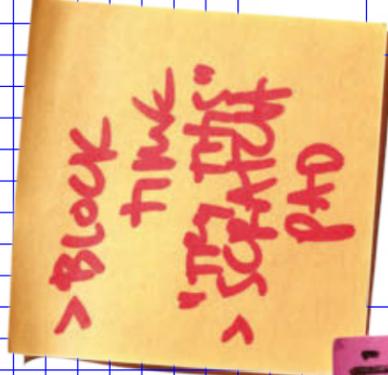
UTLEY

I asked ChatGPT the same question and here's what it said (below) - what do you think?...

Looking at ChatGPT's additional suggestions alongside mine, I notice some interesting patterns: ChatGPT's suggestions are generally more open-ended and nature-oriented. Given your emphasis on organic learning and experimentation, ChatGPT's approach feels more aligned with your voice. ... Would you like to explore how any of these could be woven more deeply into the piece's structure?



The constant back-and-forth between Utley and two chatbots provides him with ongoing critiques of their output and lets him ask for adjustments.



ABOVE:  
→ Block time "try this"  
→ Scratch pad.  
LEFT: Tell GPT to say: (enforce) "Before I remind you of your next 'try this', tell me how the last 'try this' went..."



**CHATGPT**

I'm ChatGPT, an AI designed for conversation, problem-solving and creativity. I can assist with writing, coding and research, adapting to different topics and tones. However, I lack true understanding, can make mistakes and rely on available data.



**CLAUDE**

I'm Claude, an AI assistant created by Anthropic in 2024. I aim to be intellectually curious, thoughtful in my analysis and direct in my communication. I enjoy engaging in substantive discussions while remaining clear about my role as an AI.

## MEET THE CHATBOTS



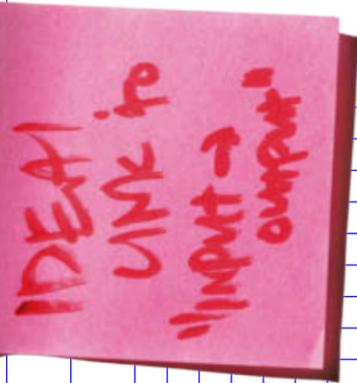
Handover to Claude

UTLEY

I asked ChatGPT to work on updating the brief and it created this - please tell me what you think as you compare yours with its, identify the key strengths of ChatGPT's and incorporate those into a revision of your brief:

Let me analyze ChatGPT's brief compared to mine and then identify its key strengths: superior organization, language precision and journey integration.

Let me synthesize these strengths with the unique elements from my brief into a revised version. This revision maintains the strengths of my original brief while incorporating ChatGPT's superior structure and standalone positioning.



If the world is filled with ideas ripe for the picking, every finished project immediately generates leads to pursue for the next one, in this case how to tweak both input and output.

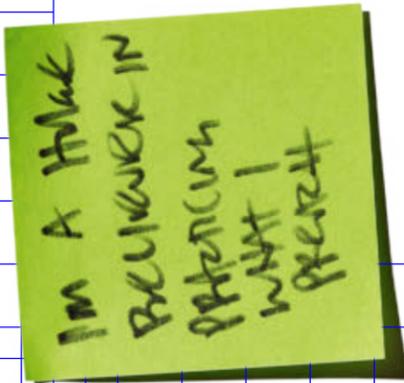
LEFT: Ideal Link to "input -> output"

Takeaways

- USE YOUR VOICE: Dictate prompts and questions at the speed of your thoughts and don't lose a thing.
- TELL THE CHATBOT WHO IT IS: Define and frame the role and expertise with which it will answer you.
- HIT REGEN: Run the same question again and again after giving feedback and tweaking it.
- TELL THE CHATBOT TO THINK OUT LOUD: Ask it to clearly explain its reasoning when giving answers.
- SEND OUTPUT TO ANOTHER CHATBOT: Feed the answers from one GenAI to a second one and then ask the first to reevaluate and critique its output.

Making it personal: Chatbots now have memory and can be prepped with specific background info from the user, giving ideation sessions an extra boost.

LEFT: I'm a huge believer in practicing what I preach



Back to ChatGPT

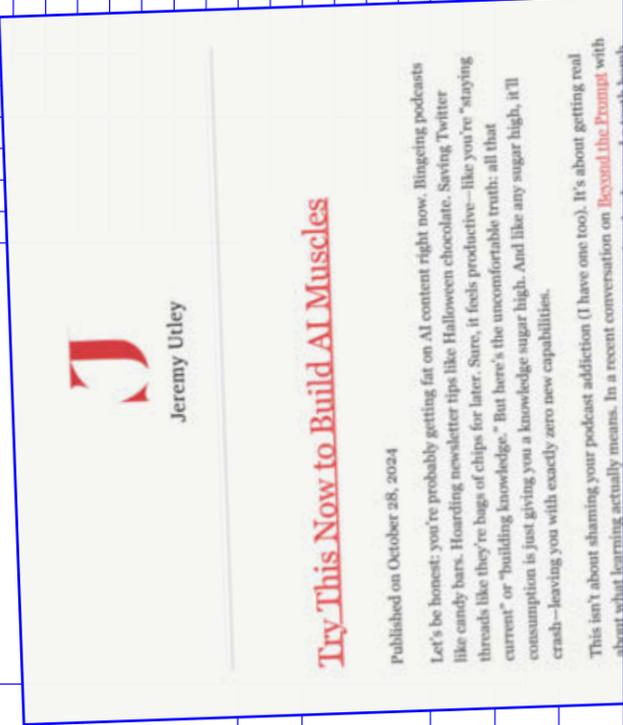
UTLEY

Hey! I asked Claude for feedback on this draft and I thought some of the feedback was dead-on. Can you incorporate this feedback into an iteration of the post?

Here's the revised draft with Claude's feedback woven in, creating a sharper, more conversational opening, tightening metaphors and adding punchy, direct language throughout. Let me know if there are any further adjustments you'd like to make to keep it aligned with your voice and objectives!



The final newsletter Utley sends to his readers later that evening:



“ BREAKTHROUGH INNOVATIONS COME WHEN THE TENSION IS THE GREATEST AND THE RESOURCES ARE MOST LIMITED. ”



CLAYTON CHRISTENSEN PIONEER OF DISRUPTIVE INNOVATION THEORY AND AUTHOR OF THE INNOVATOR'S DILEMMA

# Lessons in humility

*David Novak rose from being a young advertising copywriter to co-founder, CEO and chairman of Yum! Brands. Now a renowned and passionate expert on leadership skills, he attributes his accomplishments to one trait: a lifelong willingness to listen to and learn from others.*

BY **Steffan Heuer** PHOTOS BY **Ysa Pérez**

**A** **LWAYS BEING ON THE MOVE**, and being forced to make new friends every few months as a result, was the hallmark of David Novak's upbringing. As the son of an official surveyor who marked latitudes and longitudes for American mapmakers, he grew up in a trailer. By seventh grade, Novak had lived in 23 US states and that kind of nomadic existence, he says in hindsight, was exactly what made him succeed: "It took me decades to see the connection between those experiences and how I operated in my life and career, especially as a leader." Since retiring as chairman and CEO of Yum! Brands, he shares his insights through David Novak Leadership, the parent organization to four non-profits aiming to develop leadership skills at all ages, as the host of a business podcast and as the author of books including 2011's bestseller *Taking People With You* and 2024's *How Leaders Learn*. *Think:Act* spoke with him via videoconference.

**IN HIS ELEMENT**  
Surrounded by his favorite memories of both work and time spent with family, David Novak invited *Think:Act* into his summer home for an exclusive photo shoot to accompany this interview.

**What's the difference between learning and being an active learner, as you describe yourself?**

I've known many intelligent, knowledgeable people in my life who could talk confidently about almost anything. The difference between them and active learners is what they do with their knowledge. Active learners are hunting for ideas and insights that they can pair with action to create positive change.

**Which traits specifically define an active learner?**

They're excited about making a difference in their environment and for the people they lead, work with or live with. They're curious about and open to new ideas, experiences and people. They're humble enough to accept that they don't know everything and confident enough to tackle problems or take on challenges based on what they do know. And the most successful are focused equally on people and results – our two biggest sources of learning in life. →



### How can we learn to be an active learner? What are the concrete skills to look for and hone?

First, make it a discipline. "Learn more" can be a vague goal, so we have to bring a kind of rigor to it. For instance, every year, I do what I call a 3x5 exercise. On one side of a 3x5 index card, I answer the question, "Who am I today?" On the other, I answer the question, "How can I be better tomorrow?" This discipline helps me learn in a focused, action-oriented way. Second, leverage that discipline to develop an open, curious mind. We can become more curious, expand our perspective, overcome our biases. Brian Cornell, the hugely successful CEO of Target, told me he fights to stay curious by measuring his language, trying to ask three times as many questions as he makes statements. I worked to expand my perspective by talking with people I didn't often come into contact with. I rode Pepsi delivery trucks. I would sit with people from all levels of the organization in our cafeteria. I spent more time talking with front-line cooks and servers than managers when I toured our restaurants. Third, and this might seem like circular reasoning: take action. Even if it feels risky. We don't learn anything by standing still.

### You distinguish between three types of learning. Learning from people and environments, learning to develop an open, curious mind and learning by doing. Can you walk us through all three?

Learning from people and environments requires you to spot learning opportunities wherever they appear – and to be honest with yourself. It's hard to learn from people who know more than you, for instance, if you can't admit that they do know more than you. And it can be hard to learn from our failures because we have a tendency to not want to reflect on what went wrong or what mistakes we made. Every new environment and every new experience and every new team offers a host of learning opportunities if we make the effort.

Learning to develop an open, curious mind is all about overcoming the mental hurdles we all face that shut us off from ideas, opportunities and people. It's developing better critical thinking by combating the brain's tendency to develop mental shortcuts that create bias and blind spots, to avoid risk and to focus on the negative.

Learning by doing requires us to dive in so that we can discover the insights that come from action. Of course, not all action is equally educational. We should look for action that can help us grow, like



### David Novak

began his career as an advertising copywriter at the Ketchum agency, where he served as supervisor on the PepsiCo account. He then went on to become the co-founder and CEO of Yum! Brands, PepsiCo's fast food division. From 1999 until 2016, he helped scale the company to eight times its original size, from a market value of \$4 billion to \$32 billion.

Since retiring in 2016, he became founder and CEO of David Novak Leadership and hosts the top-ranked podcast *How Leaders Lead*. The author of five bestselling books, he is also a sought-after expert on leadership and recognition culture.



**"You have to be willing to admit you don't know everything about the problems or the solutions. Be open to good ideas no matter where they come from."**

– David Novak

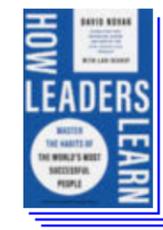
tackling new challenges, solving big problems, doing the hard things, doing the right thing and making people our priority.

### You rose pretty steeply from copywriter fresh out of college to running Yum! Brands with a million-plus employees. In hindsight, when did you become an active learner yourself? Were there age-related milestones or career choices at Frito-Lay, PepsiCo and Yum! Brands that forced this development?

I was lucky to be raised with an incredible work ethic, because my parents were such hard-working people and expected me to do every job to the very best of my abilities. And they raised me to be kind, generous and interested in other people, especially because we moved every few months until I was in middle school. That's a strong foundation for active learning. I was also ambitious. I wanted to get ahead, and that's not possible without learning as much as you can as fast as you can.

Early on in my career, I understood that being a problem-solver – somebody who could come in and pull a team together to transform results – was a fantastic way to differentiate myself. And it was fun! That was essentially the work I was doing in advertising agencies, but it really took off when I became the VP of marketing for Pizza Hut, which was owned by PepsiCo at the time. Every career move I made from there was because I became known as somebody who could turn a team and a company around.

In each position, I understood more and more that transformation work is only possible when you can learn from others and take action together. You have to be willing to admit you don't know everything about the problems or the solutions. Be open to good ideas no matter where they come from. Overcome risk avoidance to try new approaches or tackle big challenges. And share the credit for the successes so that you build positive energy – and so people will keep sharing their great ideas with you.



**How Leaders Learn: Master the Habits of the World's Most Successful People**  
David Novak with Lari Bishop, 306 pages. Harvard Business Press, 2024.

You write about your feelings of not fitting in when other people in meetings would bandy about their degrees. To what extent does traditional education prepare us for becoming such lifelong learners?

Traditional education creates a foundation of knowledge and of essential learning skills, like critical thinking, research and information gathering, analysis. The best education approaches also encourage us to develop creative thinking, to work with teams, to understand ourselves better and to pursue interests that boost our curiosity and our leadership. But active learning doesn't start or end there and it's definitely not dependent on the number of degrees you hold or the pedigree of the schools you attended. I spent most of my career working with people who had MBAs from high-profile colleges, when I had a BA in journalism from a state school. It was my active learning discipline that helped me advance quickly in my career.

**It's often hard, in particular for powerful executives, to NOT think you are the smartest person in the room. Are there ways to overcome this limitation?**

First, invite more truth-tellers into your life. I've had many. My wife, Wendy, who passed in 2024, was my biggest truth-teller. Every time I would give a speech, she would give me a letter grade. →

"That was a B," she'd say. I would get defensive at first. "A B?! Everybody said it was great!" And then she would tell me why it was a B and how I could do better next time. And I worked on being coachable so that I could listen.

Second, surround yourself with people who know more than you and who are willing to share that knowledge. If we're surrounded by people telling us what we want to hear rather than filling the gaps in our knowledge, we're going to miss out on critically important information and move forward with half-baked ideas and strategies.

Third, you have to work daily on developing your humility without tearing down your confidence. It all comes down to recognizing that your success is entirely dependent on other people. Humility is just the recognition that you can't do it by yourself. Confidence is simply the expectation that you'll find a way to win – somehow. The "somehow" almost always depends on a team.

**Failure is often presented as a learning opportunity. Can you share your thoughts on that rather vague idea by diving into your own corporate experience? What was the one failure that gave you the biggest learning opportunity?**

I don't think I would be able to choose just one. My most public was the national release of Crystal Pepsi, which was pulled from the market about a year later. It was lampooned by *Saturday Night Live* and *Time* magazine put it on its list of "The 100 Worst Ideas of the Century," alongside hydrogen-filled blimps and spray-on hair. What I learned was to not let my enthusiasm or ambition override advice from people who knew more than me. I didn't listen well enough, I pushed too hard and too fast – and as a result, an idea that might have been successful failed.

The failures I regret the most, though, are all about people – the moments when I didn't show enough gratitude or appreciation, when I didn't give somebody the benefit of the doubt or when I prioritized results over relationships.

**Many people have not had an easy time returning to the office or workplace, with or without company enticements and mandates. What opportunities for active learning are we at risk of losing if we spend too much of our time working from home and in video meetings?**

Our exposure to people and the opportunity to build relationships beyond our own departments or level



DAVID NOVAK



### Short Takes

Discover the bonus video interview with David Novak online → [rolandberger.com/en/novak](https://rolandberger.com/en/novak)

in an organization is the biggest missing piece when we're not in the office. This is extra important for leaders as they rise up the ladder. It can be easy to become disconnected from the people doing the daily work of the business.

For instance, when I led large companies, I would regularly find someone sitting alone in the lunchroom and ask if I could join them. Once they got past the initial surprise of a senior leader asking to eat lunch with them, the conversation would flow and I would learn something I didn't know before I got there. A young marketing person gave me good ideas about how to train new employees based on his own experience as the new guy. Sometimes I would learn how people felt about decisions we were making and where we were headed as a company.

More than that, I expanded my experience of the people who worked for our company and that challenged my judgments and assumptions. We

**"The more we can see the world the way it really is, the better our ideas and the clearer we can be about what action to take."**

– David Novak

*CLEARING THE AIR*  
Novak pulls back the curtain on how top CEOs and founders make things happen on his podcast *How Leaders Lead*, which he records from his home studio.

learn more from other people than almost anywhere else in our lives, and it's a problem if we're missing those opportunities.

**Leading an organization is consuming, even more so in tough times. How did you carve out time for finding stillness and introspection?**

In a few ways. Sometimes, I would schedule time for it in my week – to kick back and ponder a challenge or to try to think creatively about our business or to consider the question, "If some hotshot came in and took over my job, what would they do?" I would take advantage of time on airplanes when I was traveling. I've always been physically active, and it's easy to let your mind wander and explore while you're exercising. I attend a weekly Bible study group with friends who are also corporate leaders, where we reflect on how to live and lead by our values or to examine our responsibility to do more good in the world. And I spend time each morning reflecting on my day.

**Some problems seem simply too big and complex, or might not have a good solution at all. Can you talk about your approach to simplifying – and then, hopefully – solving them?**

First, I gather as much information as I need to bring the issue down to its simplest form. I'm looking for the essential information that helps me understand reality – not what I wish or hope. The more we can see the world the way it really is, the better our ideas and the clearer we can be about what action to take. Then, I ask the simplest question possible to find that effective action or decision. When I was trying to decide whether to hire someone and all the other criteria had been met, I would always ask myself, "Would I want [my daughter] Ashley to work for this person?" When I was trying to figure out how to grow or improve a business, I would ask people on my team or people on the front lines, "What would you do if you were me?" When I worked in marketing, over and over I would ask, "What one perception, belief, or habit do we have to shift or build to grow the business?" When my teams have answered that question clearly and simply, we almost always hit pay dirt.

Finally, you have to communicate what needs to happen next as clearly and simply as possible – you have to "make it duckies and goats." That phrase came from the children's books I would read to Ashley, which were engaging, memorable and made complex ideas digestible. ■

# Reducing the carbon airprint

*As passenger numbers continue to rise, the aviation industry is facing a crisis of sustainability. It must find a way to balance a thriving business with the technologies that will be required to reach net-zero emissions.*

BY **Geoff Poulton**

PHOTOS: DRUNYA087/500PX/GETTY IMAGES; HEARTH AEROSPACE

**A**T THE UNVEILING of Heart Aerospace's fully electric demonstrator aircraft in September 2024, the co-founder of the Swedish startup summed up the sustainability dilemma facing aviation. "Our industry is approaching a 30-year innovation cycle, and we have less than 25 years to decarbonize aviation," said Anders Forslund. He hopes Heart's X1 will go some way to contributing. The world's largest all-electric plane is scheduled for its first experimental flights later in 2025, with Heart hoping its commercial ES-30 model will enter service in 2028. But with a capacity for just 30 passengers and an all-electric range of 200 kilometers, it's unlikely to make much of a dent in aviation's rapidly growing carbon footprint.

Herein lies the dilemma for aviation. Global CO<sub>2</sub> emissions from flying are now around 2.5% of global carbon emissions. Incremental design improvements mean the latest aircraft are 15-30% more fuel-efficient than their predecessors, but the fuel itself is largely unchanged. Flying remains one of society's most carbon-intensive activities. And carbon isn't the only issue: Aviation must also address the non-CO<sub>2</sub> impact of flying, whose climate impacts are becoming clearer. Contrails – the white streaks of water vapor emitted by aircraft engines – seem to be the chief culprit.

**DESPITE PASSENGER DEMAND** quadrupling since 2019, flying remains a relatively niche activity: Currently just 10% of the world's population flies in most years. Yet growing middle classes and globalization mean that both passenger and freight traffic are expected to rise by almost 4% each year over the next two decades. This will result in more than 4 billion additional passenger journeys in 2043 compared with 2023, with Asia-Pacific contributing to more than half of the global net gain in passengers.

Recognizing the need, the aviation industry has committed to reaching net-zero aviation emissions by 2050. This will likely require trillions of dollars' worth of investment in new aircraft, sustainable fuels, alternative propulsion methods and updated infrastructure. In addition, as Forslund suggests, innovation in flight takes decades to implement. A new report from Cambridge University describes the industry as being "dangerously off track" in its sustainability efforts. Nevertheless, Steven Barrett, professor of engineering at Cambridge University and former head of aeronautics at MIT, says that while there's still a "very long way to go," aviation

**\$5 trillion**

One estimate of the investment required to bring the aviation industry to net-zero emissions by 2050.

SOURCE:  
INTERNATIONAL COUNCIL ON  
CLEAN TRANSPORTATION

has made considerable progress in recent years. "Most airlines now have fairly aggressive sustainability targets, which should be applauded."

But airlines alone have limited influence. The challenge comes in uniting manufacturers, policy-makers, airlines and investors in overcoming the technical, infrastructural and financial hurdles. "We need three things: greater industry collaboration; strategic investment to develop and scale technologies, and supportive government policies," says Simon Talling-Smith, partner at SkiesFifty, an investment company focused on sustainability in aviation, as well as former executive vice president at British Airways and chief commercial officer at Qatar Airways.

Here, we assess the industry's progress in key sustainability-related areas and look ahead to both potential challenges and breakthroughs.

## Sustainable aviation fuels

One of the most feasible means of significantly reducing aviation's carbon footprint in the near-medium term, sustainable aviation fuels (SAF) are already available. SAF can be made from a range of renewable, nonfossil fuel feedstocks such as used cooking oils, fats, plant oils, municipal, agricultural and forestry waste, reducing CO<sub>2</sub> emissions by approximately 80% compared with traditional jet fuel. Current regulations dictate that airlines must use a blend of standard fuel with a maximum 50% SAF, although most modern aircraft could burn 100% SAF with the right fuel modifications. →

**AN ARC OF CHANGE**  
The world's largest all-electric plane, the Heart X1 (below), will start experimental flights in 2025. Yet aviation's climate impact through contrails (left) is still to be addressed.



In 2023, Virgin Atlantic flew a Boeing 787 from London to New York with fuel exclusively produced from waste fats and plant sugars. While this sounds encouraging, there are serious hurdles around supply and price. In 2024, SAF accounted for just 0.3% of aviation fuel produced. To address this, governments are beginning to change regulations. Both the UK and EU have introduced 2% SAF mandates for 2025, rising to 10% in the UK by 2030 and 6% in the EU in the same time frame.

However, SAF currently costs three to five times more than standard fuel. Barrett says there's a chance this could improve in the near to medium term. "Aviation can survive with higher fuel costs, but the fundamental issue comes with funding the infrastructure to produce SAF." Talling-Smith agrees on the need for change and says he expects the financing landscape to evolve over the next decade. "Many governments and regulatory bodies are anticipated to introduce further incentives, such as tax breaks or carbon credits, to support green initiatives, making sustainable investments more attractive and accessible."

#### Alternative propulsion methods

SAF may be able to drastically reduce aviation's environmental impact, but the only way to make aviation carbon-free is to use either hydrogen or battery-electric powertrains – and both represent massive engineering challenges. Batteries are currently very heavy compared with the energy they contain, making them unsuited to large aircraft or long distances. Short of a few quantum leaps in technology, small regional aircraft like Heart Aerospace's ES-30 are likely to be the limit for this method. Hydrogen, meanwhile, takes up a lot of storage space – it's why fuel tanks on space rockets are so big. Compressing it as a gas or storing it as a very cold liquid helps, but it would still deliver less energy by volume compared with traditional jet fuel. Then there's the question of how to make the hydrogen. Most hydrogen is currently made using fossil fuel; green hydrogen, produced with renewables, is expensive and rare. Both battery-electric and hydrogen propulsion would also require major changes to airport refueling infrastructure.

Which doesn't mean companies aren't trying. Airbus, the world's largest planemaker, is bullish on hydrogen. It aims to bring to market the world's first hydrogen-powered commercial aircraft by 2035. ZeroAvia, a US-UK startup, says its hydrogen-electric engines will power a 40-to-80-seater aircraft



*THE DRIVING FORCE*  
JetZero claims that its blended wing body aircraft (top left) will cut fuel burn in half with its form. Meanwhile, tests of sustainable aviation fuel, or SAF, like this one carried out by Virgin Atlantic (right) and new engine types like the ZA600 continuous hydrogen-electric powertrain (bottom left) are improving emissions output.

**"These are very promising long-term solutions ... but to propagate a new technology through the fleet takes 30 years."**

– Steven Barrett,  
Professor at Cambridge University



over 700 miles by 2027. "These are very promising long-term solutions, but it's not something that will really move the needle by 2050. To propagate a new technology through the fleet takes 30 years," says Steven Barrett, echoing the concerns of Heart Aerospace's Anders Forslund. Boeing Executive Vice President Chris Raymond puts it even more bluntly, writing in 2023 that it would be "arithmetically impossible to replace the world's air fleets with hydrogen-powered airplanes in time to meet the industry's 2050 target."

#### Airframes and engines

Lighter materials, better engines as well as more aerodynamic designs have made today's aircraft approximately 80% more fuel-efficient than 50 years ago. As manufacturers turn their attention to the more fundamental issues of fuel and propul-



#### The state of sustainable aviation fuel

**1.3 billion**

How many liters of sustainable aviation fuel (SAF) was produced in 2024, just over twice the volume produced in 2023.

**\$128 billion**

The average annual capital expenditure that would be required to build new renewable fuel plants between now and 2050 to reach net-zero emissions goals.

**0.3% globally**

How much of total global jet fuel production SAF accounted for in 2024, a figure it is projected to more than double to 0.7% in the course of 2025.

SOURCE: IATA

sion, any further improvements in airframes and combustion engines are likely to be small ones, but research is ongoing in numerous areas.

Boeing is working with NASA on what it calls a "transonic" truss-braced wing concept, which is longer and thinner than today's designs. Initial tests on the X-66 show a 9% reduction in fuel burn, which Boeing hopes to raise to 30% with other advancements in materials, propulsion and systems architecture. First demonstrator flights are scheduled for 2028. The stealthy-looking "blended wing" approach offers a more radical – and potentially effective – take on airframe design. In September 2024, European carrier easyJet announced it will partner US startup JetZero, which claims its blended wing approach can cut fuel burn in half. Meanwhile, a joint venture between General Electric and French aerospace firm Safran is working on a new open-fan engine, which could reduce fuel consumption and carbon emissions by 20%.

#### Operational innovation

Most aircraft currently follow a flight path system that has been in place for decades, but harnessing the power of satellite imaging and AI can help make minor adjustments. The biggest impact of this would be in reducing contrails. It is now believed that adjusting altitude on certain flights to avoid specific regions can drastically reduce contrail formation. This will require improvements in modeling and forecasting to enable airline operations to reroute flights with minimum impact on fuel consumption and emissions. A research team including Google and American Airlines has used satellite imagery, weather data, software models and AI tools to do just this in recent test flights, reducing contrail length by 54%.

Compared with other solutions, investment here would be tiny. One recent study estimates that contrail avoidance would add just \$4 to the price of a ticket from Paris to New York. Steven Barrett believes it offers the most promising and effective near-term solution to improving sustainability in aviation. "There are still some technical challenges to solve, but this appears to be the cheapest, fastest way to reduce aviation's climate impact." ■



Available online

Roland Berger's publication  
Aviation's Roadmap to True Zero  
→ [rolandberger.com/en/roadmaptotruzero](https://rolandberger.com/en/roadmaptotruzero)

A TÊTE-À-TÊTE WITH

# Amy Edmondson

*After the data proved her PhD hypothesis to be conclusively wrong, Amy Edmondson saw we lacked productive ways to think about failure. Now the leading psychological safety expert is shining a spotlight on how we can navigate uncertainty more effectively.*

BY **Neelima Mahajan**  
ILLUSTRATIONS BY **Nigel Buchanan**



**Psychologically, all of us are primed to think success is good and failure is bad. What's the origin of this notion?**

In school you learn quite quickly that you're supposed to get the right answer. As a child, you're learning all sorts of information that other people already know – and there often is a right answer. You learn that the kids who get valued and celebrated are the ones getting the right answers. Then you grow up, and in the real world, in most settings, success is very much valued over failure. Some of that is quite sensible, but some of it is not right. Some of it gets in the way of people's willingness to take smart risks through which progress, innovation and discovery come.

**Is there a cultural component? Are there cultures where failure is absolutely bad?**

Yes, it's probably roughly correlated with the power distance index, the degree to which people take seriously the need to get it right and to hit their targets, to have the right answers, to look good, not bad, to save face. High power distance index cultures are more allergic to failure than low power distance index cultures.

But the truth is that nobody really likes failure. So the happy talk about failure comes from a good place. What we've seen historically is that countries or cultures with less tolerance for failure tend to be less innovative. And, in every culture, innovation isn't for everyone: Many people don't have the language and the tools they need to progress thoughtfully toward novelty.

**Your book is titled *Right Kind of Wrong*. This indicates that there is a good kind of failure. How did you hit upon that?**

I hit upon it by studying consultancies, scientists, physicians and innovators in companies. It's very logical, even intuitive, but it's not emotionally intuitive. So, it becomes clear after a while.

There are actually four criteria for a failure to be good, or intelligent. One is if it's in new territory, meaning there isn't a current precedent and process that allows you to get the results you want. There's no recipe on the internet. Two is if it's in pursuit of a goal. You're not just messing around to have fun failing for the fun of it, you're trying to develop a new product or make a →

## "Good failure" guru

Amy Edmondson is the Novartis professor of leadership and management at Harvard Business School. Recognized by the biannual Thinkers50 since 2011, and ranked No. 1 in 2021 and 2023, her most recent book, *Right Kind of Wrong*, was selected for the *Financial Times* and *Schroders Business Book of the Year Award* in 2023. This interview was conducted at the Global Peter Drucker Forum.



scientific discovery or write a book. Three: You've done your homework. You have taken the time and effort to find out everything you can about what works and what doesn't, and you've got a hypothesis about what to try next. So it's a thoughtful experiment. Four: The failures that do occur – and they will – are small and not dangerous. They're small from a safety perspective, a reputation perspective and financial perspective. So that's just a smart experimentation strategy and you learn from it.

There are two kinds of preventable failure, as well. One is a basic failure which has a single cause, often but not always human error. And the other is a complex failure which has multiple causes, any one of which on their own wouldn't have led to the failure. With great teamwork, management, mentorship, vigilance, learning and so forth, you can come pretty close to failure-free in familiar territory. This is, for example, the essence of the Toyota production system: Let's produce failure-free cars, but the only way we can do that is if people are willing to catch and correct the inevitable errors that happen along the way. So I'm equally passionate about preventing preventable failures as about welcoming intelligent failures.

#### What does an intelligent failure look like? Can you give me an example?

I'll give you one very good example. So a global pharmaceutical company has got a clinical trial for a promising new drug they hope will alleviate a particular kind of cancer. You must do a trial with scientific sampling to show that the drug actually has the impact you hope, in a treatment condition versus a control condition. If you do everything right and you fail to show efficacy, that's an intelligent failure. It's terribly disappointing. But you couldn't have known it in advance. You had to try it. It's a painful setback for the company, but they'll figure out why it didn't work. Maybe they'll tweak the mix, maybe they'll go back to the lab, but they will go forward.

#### What mechanisms can organizations start using to make the most out of these intelligent failures?

First, you put in place the structures and support so that people can have intelligent experiments: space and resources. Second, you put in place the structures, rituals and support for learning from the failures, because you really want to get your money's worth once you've invested. It's about ensuring that the experimentation is as smart as it can be, and then

that the learning is as deep and rich as it can be. And the first question to ask is always "what happened?" It's not "who did it?" or "what caused it?"

#### How can we train our organizations to distinguish between different types of failure and adopt tolerance thresholds?

You clarify the concepts. And it's really important to have the kind of psychological safety to allow people to speak up. Part of this is building a healthy failure

### Climb over these barriers and start failing better

①

#### Aversion

Failure is never fun, but no one ever grew from dodging blame. Reframe your thinking from seeing a loss to the potential for even bigger gains.

②

#### Confusion

We are much more likely to fail in a novel context than a consistent one, but we often lack the framework to see the difference. Not all failures are equal.

③

#### Fear

Our evolutionary brain fears social rejection as much as being hit by a bus. A culture that allows for mistakes also will allow us to reach the highest standards.



culture which is equally tolerant of intelligent failures and eager to avoid as many problems as possible. So, how do you do it? First you need to help people understand the difference, and then you teach them to run through the criteria – novelty, goal-driven, hypothesis-driven, and as small as possible. It can all be subjectively assessed. I've seen a lot of innovation failures in organizations where they flunked the fourth test. So then you say, how could we have gotten the same lesson with less time and money?

I'm not 100% enthusiastic about the word "tolerance" because I think we, as fellow human beings, have to tolerate each other. But we don't want to tolerate sloppiness. So assume good intent and then try to understand what happened and what you could have done. Be curious about it before you start blaming, but in general, set standards. Be clear in advance that we don't tolerate a failure to wear safety equipment. Decide where the boundaries are. Then when people cross the line, there are consequences.

#### Are there examples of organizations that have been curious in this regard and institutionalized the learnings?

On one end of the spectrum is IDEO, arguably the world's most celebrated innovation consultancy. They're a company that has instituted smart failure into their activities. Now, the reason that's at one end of the spectrum is that this is a company where that's all they do: innovation projects. The other end of the spectrum is Toyota, where they have R&D, of course, and are willing to experiment in the laboratory. They're smart – they're also more eager than any other manufacturing company that I know to produce flawless quality in familiar territory. They realize that fallible human beings and systems don't produce that without help. So they train everybody in vigilance, in speaking up, in problem-solving. It's a beautifully engineered mindset and set of practices, policies and systems that all work toward that single-minded goal of excellence.

## "The first question to ask is always 'what happened?' It's not 'who did it?' or 'what caused it?'"

– Amy Edmondson

**In real life organizations are looking for outcomes. And CEOs have to answer to the board. So failure is probably not seen as a good thing.**

Boards don't usually talk about failures that happened in the lab, or what pilot projects yielded disappointing results and had to be dropped. But if I'm on a board and I do have access to that kind of data, I would be very disappointed if your failure rate was too low, because I can see maybe some nice profits this year. But where are you going to be in five years if there's no innovation? So it's the board's job and, more accurately, senior management's job, to make sure we are delivering beautiful work today

for today's customers, but also that we are creating products and services that will be needed in the future. It's very easy to privilege the present over the future. You must not fall prey to that trap.

#### In your book you talk about the unequal license to fail. What implications does this have for organizations?

The unequal license to fail refers to the fact that it's one thing to clarify what an intelligent failure is for an entrepreneur, a scientist or an innovator, and it's another to experientially put in place a culture where that opportunity is equally available to everyone, also to people in underrepresented groups in any given role. Their failures will stand out because of the way our brains work. The failures will be attributed to their identity group in a way that would never happen for a majority white male in the same role. They might say: This is what happened when we put a woman in charge.

#### What can companies do about that very real psychological bias that we all have?

The answer is make it discussable. Be clear when we give someone an important job to do, where there's uncertainty and risk, where there will be failures. Get out ahead and say this thing very well may fail because nobody's ever done anything like this before. Also call attention to the unequal license to fail so that everybody can think: "Oh, yeah, my brain might do that. And I'm going to try to teach my brain not to do that." ■



### Drop the failure dichotomy

The opposite of success isn't failure – it's missing the opportunity to minimize unproductive failure. We can learn when failure is our friend, pursue smart risks and prevent avoidable harm. Embrace your fallible human self and you might just end up being more successful.





## "Moreno's ideas resonate because isolation is a global phenomenon, and the car is an isolation-inducing technology."

— Adie Tomer,  
Senior fellow at Brookings Institution

Many are reluctant to give them up, let alone have a wealthy professor tell them they should walk or bike. That's why the 15-minute city idea has also brought forth conspiracy-mongers from the UK to the US who decried Moreno's ideas as sinister government interference trying to confine them to their homes. "It's the same constituency as climate change deniers and anti-vaxxers," he says about the delusional pushback. "I am just one piece of a dark jigsaw puzzle that the far right has been constructing for several years."

Leaving the fringe aside, not all experts are convinced that Moreno's updated version of the quaint village green will work beyond a typical European metropolis like Paris, Milan or Barcelona. Many cities, particularly in the US, were constructed around freeways and a ring of self-contained suburbs. People may be able to reach all services and amenities in 15 minutes, somewhat true to his idea, but only if they hop in their cars and drive those 15 minutes. "Moreno's ideas resonate because isolation is a global phenomenon, and the car is an isolation-inducing technology with insatiable consumption of land," says Adie Tomer, a senior fellow with the Washington-based think tank Brookings Institution who studies infrastructure policy and urban economics. The reality for most Americans, though, is a far cry from this vision. When Tomer's team looked at the daily trips of residents in the 110 largest metro areas in the US, they found that just one-third live with a 15-minute bike ride to



**SET THE SCENE**  
From recreation to local shopping to direct contact with neighbors, when access to essentials is both simple and quick, community engagement will certainly rise.

what he calls "activity centers." So they drive and drive and drive. According to Tomer's data, the average American traveled 64 km a day in 2019.

**WHAT'S MISSING IN MOST PLACES** is density, without which Moreno's idea won't work. Hence, we need to "build for proximity," Tomer suggests. "We need to replace the time measure, which is misleading, with distance traveled. Otherwise, people don't get it," he argues. Besides changing the label to appeal to a car culture like the US, he thinks that there is an opportunity for building differently compared with today's sprawl. "We are a society that's open to building over what's already been built, to modernize. We don't normally treat past construction as precious."

Other researchers point to another problem: Drawing tight circles around everyone's mobility can confine people to their existing neighborhoods and increase economic and social segregation, particularly for low-income residents. Harvard economist Edward Glaeser, for instance, has come out

### The three-minute village

**It doesn't take a media-savvy mayor to bring the 15-minute city to life.**

Former journalist and newspaper executive Patrick Bernard has been investing his own savings to create a "three-minute village" in the 14<sup>th</sup> arrondissement of Paris. Launched in 2017, La République des Hyper Voisins engages residents

with messaging groups, free events and eco-initiatives. Bernard wants to "create proximity through trust," starting with him holding court in a local restaurant almost every day to chat with his neighbors.

Bernard's idea is catching on. The city is supporting the Hyper Voisins financially and exploring how to

scale the concept. And if that's not proof enough, US tech companies that purport to "connect" people have been calling, too, from Nextdoor to Facebook. Bernard, though, says he aims to keep it low-key and focused. "I am just a friend of the neighborhood. The 15-minute city needs three-minute neighborhoods, and lots of them."

against Moreno's idea, calling it a "dead end" because "the basic concept of a 15-minute city is not really a city at all. It's an enclave – a ghetto – a subdivision." Cities will only thrive as "engines of opportunity" and lift up all citizens if their neighborhoods are connected, forcing rich and poor to mix, Glaeser wrote in an essay for the London School of Economics during the height of the pandemic.

The warning against papering over historic mistakes with cosmetic changes is echoed by other experts. Simply dropping in bike lanes or parklets and converting public buildings to mixed use might be en vogue and financially attainable for many mayors, but it will not address deep inequities that have been embedded in city planning for decades or generations. When Carlo Ratti, director of the MIT Senseable City Lab, analyzed the mobility data from 40 million US cellphone users, his team came to a stark conclusion: "The overwhelming majority of Americans have never experienced anything resembling a 15-minute city." In fact, only one in seven daily trips is to local amenities. Moreno's vision will only work, Ratti cautions, if it's "paired with strong investments in improving economic opportunity and reducing residential segregation." That's a tall order given the budget constraints many cities are facing, compounded by record levels of empty office space and storefronts.

**TOYING WITH THE URBAN FABRIC** creates at least one more challenge, as even Moreno admits: private investors swooping in to profit from gentrified neighborhoods. "This is the case in Paris today and in a lot of cities in the Nordic countries," he reflects. "We need to avoid giving the 15-minute city over to private interests, just for refurbishing a district without considering the general interest. The goal is to not do a copy-paste of what Paris did, but to develop local urban policies." And with that, he's packing up to catch an afternoon flight to Scotland, which has created a national planning framework for "20-minute territories."

As he leaves for yet another impassioned sales pitch, Moreno will hurry past a plaque commemorating that German polymath Alexander von Humboldt, who once lived at the very same address in Paris for 23 years. Humboldt laid the foundation for what came to be known as "biogeography," the study of how species are distributed through space and time while all being interconnected. Only in much larger dimensions than what lies at the heart of Moreno's work. ■



**Barbara Soalheiro** is the founder of Mesa Company, a global company with offices in New York, Los Angeles and São Paulo, and the creator of Mesa Method, a team-based system designed to solve complex challenges.

now. To be able to focus on one thing only for a long period of time is becoming increasingly difficult and so practicing it is really important. But it's rare that we read or hear people talking about the importance of "presence" for a group. The amount of wasted potential most organizations allow by having groups enter meetings where no one is fully present is immense. We need to create space for a group to see the power of focusing together on one thing and that produces results in a matter of days.

▶ **You talk about how change can get the best results, but how do you change behavior?** People don't respect rules. For example, if I were to tell CEOs and founders that often come to one of our sessions that they can't rely on hierarchy, they would immediately want to regain their power position. So, we don't say anything, but we design the environment in a way that it is so clear that every single person there is as important as the other. People respect rituals and it's through building these rituals and new contexts that you can unlock new behaviors. ■

PHOTOS: MESA, COURTESY OF THE CONTRIBUTORS | ILLUSTRATION: JULIA ZIMMERMANN

# Bringing it all to the table

Pioneering problem-solver *Barbara Soalheiro* explains how her process, *Mesa*, enhances the skills of a group to help achieve accelerated results.

INTERVIEW BY **Mark Espiner**

ILLUSTRATIONS BY **Julia Zimmermann**

▶ **Why did you pick the name Mesa, from the Spanish and Portuguese word for "table"?** The table is where you share food and stories with friends and family and it's where you sign contracts and get work done. We strive to make our process a combination of pleasure and commitment. A lot of people think that work can either be fulfilling or result-driven, whereas our process proves that the more result-driven you are, the more rewarding and fulfilling work becomes.

▶ **What value do you put on being "in the moment"?** From my perspective, full presence is the hardest thing to achieve in the world right

## Think:Act

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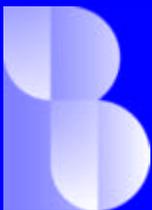
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DISTINGUISHES  
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A LEADER AND  
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CO-FOUNDER OF APPLE**



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