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Crunch time series

**Novel and exponential
technologies in Finance**

The NExT frontiers in Finance Transformation

Pop quiz

Check the box if you can define the term.

Generative AI

Augmented reality

Large language models

Quantum computing

Machine learning

How did you do?

(Don't worry: The answers are ahead—what they are, how any CFO can use them to help transform the value Finance brings to the business—and how to change the game.)



It's an evolution, not a revolution

—and opportunity is everywhere.

Generative artificial intelligence (AI), language models, machine learning, augmented reality, quantum computing: These hot topics are everywhere, and they likely aren't going away. In particular, large language model generative AI that can create (sort of, kind of) the way a human can is having a moment. Everywhere you turn, it seems like someone is testing the abilities of consumer-facing generative AI applications like ChatGPT, AlphaCode, DALL·E, and Bard. We're learning their limitations ... and their potential. And everyone—including Finance leaders—could be wondering what these technologies mean for their work and for the future. >

It's an evolution, not a revolution—and opportunity is everywhere.

To be clear, we've known that these powerful, leading-edge solutions will likely play an outsized role in Finance's evolution, from self-service to finance cycles to enterprise resource planning (ERP). But the question remains how—and as these technologies continue to evolve, it will be up to the individual organization, and its leadership, to answer that. As with any new technology, potential opportunity awaits those organizations that find innovative, forward-thinking ways to leverage these novel and exponential technologies (NExT).

Is the hype real?

But skepticism is also in the air.

- **Skepticism about a return on investment**—that generative AI is as good as it's promised to be, and whether the return is worth the investment.
- **Ethical skepticism**—Should we be using this, especially in the face of equity and bias concerns, plagiarism, intellectual property theft, and socioeconomic challenges?

Now try adding those real questions to a Finance leader's already stacked list of concerns: rapidly evolving business models, continued geopolitical instability, economic uncertainty, and more. It's no wonder that in the face of so much change, trying to answer these questions can lead to inertia if you aren't careful.

As with any new technology, potential opportunity awaits those organizations that find innovative, forward-thinking ways to leverage these novel and exponential technologies (NExT).

It's an evolution, not a revolution—and opportunity is everywhere.

Evolution, not revolution

But this is an evolution, not a revolution—and evolution can mean opportunity. None of the ideas behind these technologies is really new. The application of these ideas is evolving, and the resources needed to apply them to business are getting faster, better, and cheaper. This evolution also should rest on a backbone of data, trust, and security investments that Finance leaders should always have in the back of their minds, no matter what's coming in hot. Shiny objects can distract from a strong and dynamic core. Don't let them.

Humans, and business,
have always led the technology,
not the other way around.

New opportunities

These technologies may cause disruption somewhere—but for the Finance leader, they're likely to open new opportunity. These technologies can drive experimentation, which may cost money and time without a clear return on investment. But Finance leaders often have a clear view to the biggest challenges that can be addressed with leading-edge tech. They can work across the organization to determine where these technologies can have the most profound impact on operating expenditures, capital expenditures, market capitalization, and a lot more.

With that in mind, we've designed a pragmatic guide to the technologies that are likely to disrupt your organization over the next few years. We'll show you what you should know, what to watch out for, and where to focus. (It might not be where you think.)

Human-centered design

Another thing to remember: Humans, and business, have always led the technology, not the other way around. Sure, Henry Ford's assembly line revolutionized industry—but it was the way businesses combined those technologies and processes with their people that made the difference and changed the world. (And technologies, so far anyway, can't invent themselves.)

Our perspective on these novel and exponential technologies is the same—they are likely to have enormously meaningful impacts on the way businesses work, but it's up to us humans—and specifically you, the Finance leader—to determine what each technology means for your organization's future. So let's get started.

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What does a Finance leader really need?

(We're talking about *you*.)

To a certain extent, the technologies a Finance leader needs are specific to their organization. But there are common needs among Finance organizations, and they usually top Finance leaders' agendas—or at least that's what a lot of those leaders told us.¹ As you read on to learn about these buzzy technologies, consider using this checklist to help you align them with your organization's true priorities. Some areas could be easier to automate with these technologies than others. It's worth a deep dive into the workings of the day-to-day transactions to understand where leaders, who don't typically get into the weeds, can help apply these technologies to help improve their function from the ground up.

Can this technology help my Finance organization...

- Grow the business and build a better future?
- Improve margins and better understand profitability?
- Create and enable value for shareholders and stakeholders—customers, employees, communities—alike?
- Strengthen Finance's role as a strategic thought partner to the C-suite, business, and board?
- Become more nimble, agile, and efficient?
- Guide my organization's workforce, talent, and leadership strategy amid rapid change and innovation?
- Manage risk to help preserve shareholder value and stay resilient, and manage a constantly evolving US and global regulatory atmosphere?
- Navigate the headwinds of climate change and stay on top of my organization's sustainability priorities and needs?
- Stay agile and resilient by anticipating, adapting to, and succeeding in the face of unexpected events?



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The technologies



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“There are no shortcuts
in evolution.”

—Louis D. Brandeis

The technologies

What's here now? 



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The original AI

(Intelligent automation, conversational AI, visual AI, etc.)

Artificial intelligence, or AI, is a catch-all term for technologies that allow machines to mimic human intelligence, perform tasks autonomously, and learn from experience.

Traditional AI capabilities include things like robotic process automation (RPA), natural language processing (NLP), and computer vision (think: facial recognition). AI has been around for years, and some Finance organizations have broadly used it to automate tasks, uncover patterns and correlations, and help their organizations more accurately determine their futures based on past data.



What it can do

Be trained and learn through the accumulation of data; help businesses automate routine tasks and free up humans for more complex work; increase speed to execution.



What it can't do

Fully replace human workers; answer complex questions that require understanding of multiple topics; handle ambiguity or adapt to dynamic or unforeseen situations.



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How (the original) AI can be used in Finance



Finance process streamlining

Automate repetitive and rule-based tasks in Finance, such as invoice processing and account reconciliations.



Intelligent customer risk assessment and cash forecasting

Analyze patterns and historical data to help better predict when customers will pay and assess the likelihood a customer will not pay or default.



Document processing

Automate the extraction and analysis of information from financial documents such as invoices, purchase orders, and contracts.

But have they delivered?

Some of this probably sounds familiar to Finance leaders, who might have gotten excited about these technologies several years ago. The possibilities of RPA and NLP layered onto rote activities to automate them sounded great, but many organizations generally ended up using the technologies to streamline individual tasks, not to achieve end-to-end outcomes. These technologies likely didn't achieve their true potential because expectations were set too low, and the solutions weren't implemented and scaled strategically enough. These technologies still hold enormous potential opportunity when you look at them through an end-to-end lens. ([Read more.](#))



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Machine learning

A subset of AI, machine learning (ML) has been around for decades. It's a data analysis method that uses algorithms and historical data to identify patterns and make predictions; it learns from examples rather than following explicitly programmed rules. In Finance, ML can be used for high-volume activities in which a judgment-based decision should be made to influence a next step.



What it can do

Predictive maintenance; answer customer questions via a chatbot; perform tasks done by virtual assistants; match transactions such as invoice to PO matching or intercompany balancing; uncover trends based on previous data and user performance.



What it can't do

Reason effectively and understand the reason behind an anomaly; perform well with substandard data.



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How ML can be used in finance



Intelligent supply chain

Help predict (and potentially prevent) supply chain disruptions by making in-the-moment decisions based on historical data and previous patterns.



Predictive forecasting

Use actual financial results and statistically validated drivers to help predict reliably accurate forward-looking financials.



Tax compliance

Identify “holes” in data provided by other functions and potentially reduce the human hours needed to reconcile data that the tax department needs for compliance and assessing risk.

ML is probably in your organization—you just don’t know it.

We have seen machine learning have a significant impact on the commercial side of businesses across many industries. For example, a health care organization has implemented ML² to streamline claims management. Restaurants have been able to transform their pricing and customer service by implementing ML.³ But these powerful technologies do not seem to have been as widely adopted in Finance. For leaders who are curious about generative AI, ML could be a good technology to start with: It can be applied to similar use cases, generally faster and less expensively (for now).



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Generative AI

Chances are you've heard a lot about generative AI, and the buzz seems only to be getting louder. Basically, it's a subset of AI in which machines can create new content such as text, code, voices, images, videos, and more. It can mimic human work by creating new content using the data it was trained on, and it can also add contextual awareness and decision-making skills to workflows. The version we're all seeing right now is based on large language modeling that powers a user-friendly chat interface, pushing generative AI into its breakthrough moment. AI that can generate music, imagery, and videos is also emerging.



What it can do

The potential of generative AI may seem broad, but for Finance right now, think of it as one of the best analysts you've ever worked with. You probably wouldn't present their work to the board. But you would ask them to prepare a budget to actuals variance analysis or write a report on the major drivers of your organization's working capital. Generative AI can do those things and, by proxy, help humans do their jobs better with greater efficiency and effectiveness. Generative AI will dramatically change Finance work over the next several years.



What it can't do

Generative AI shares limitations with traditional AI and ML but may have the potential to transcend those limitations because of its content-generating qualities. Sometimes generative AI produces inaccurate results that seem confidently accurate. (This will likely improve over time.)



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How generative AI can be used in finance



Scenario modeling

Generate forward-looking scenarios with multivariate assumptions and narrative generations per your choice.



Intelligent avatars

Interact and engage in a more dynamic way. Ask it a question: What were sales this week in the Northeast region? The response should include the answer—and also why.



Regulatory monitoring

Monitor new regulations and provide insights on potential implications and impact.

The regulatory atmosphere

Generative AI has the potential to transform the work of Finance across all domains—from financial planning and analysis and tax to internal audit and controllership. Government and regulatory agencies are currently working to better understand how to regulate these technologies and establish standards for generative AI. Risk management frameworks and guidelines are emerging, but governmental bodies will likely work to create legislation that determines accountability. There are also likely to be standards created for public companies that build their own generative AI models and use them for internal and external reporting. All this is in motion—so stay tuned.⁴



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Potential generative AI uses cases

(Illustrative list, not exhaustive)



Strategic Finance

- Assess corporate development deals and run due diligence
- Research vast data (financial, industry, socio-economic, political) and generate insights for strategy development
- Generate scenarios, summarize, and draw initial conclusions for capital optimization



Financial planning and analysis

- Produce management reporting analysis, commentary and presentation
- Produce first version of plan and forecast models of expensive budgets and forecasts
- Generate performance insights, variance, and/or decision analysis



Business unit Finance

- Produce competitor analysis and insights
- Produce demand forecast and sizing
- Produce budgeting, planning, and performance/variation analysis
- Produce ad hoc/scenario analysis
- Produce product costing



Transactional Finance

- Process invoices, management payments, billing, and collections
- Predictive risk modeling
- Virtual collection assistants
- Cognitive spend analysis



Controllership

- Automate data entry and reconciliations
- Prepare internal and external financial reporting, including commentary and insight generation
- Source-to-target COA mapping
- Intelligent contract review



Internal audit

- Identify potential risks and detects fraud
- Generate internal audit reports
- Monitor compliance with regulations and internal audit reports
- Monitor compliance with regulations and internal



Treasury

- Automate cash forecasting, cash management, and better visibility into cash flows
- Report FX and currency positions, perform counterparty risk, and analysis
- Advise on optimal mix of investments for liquidity need



Tax

- Automate tax preparation and reporting
- Provide insights on new tax laws and provisions
- Monitor compliance with tax regulation



Investor relations

- Develop investor report and communication
- Predict analyst questions and prepare responses
- Value company for capital markets financing
- Interpret and advise on disclosure rules and regulations



But can I trust it?

Finance leaders probably know that generative AI outputs aren't necessarily as accurate as they appear, and one of the hardest parts about implementing generative AI is knowing when it's wrong. It may be difficult to imagine a day when regulatory filings are produced systematically and a Finance or fiduciary leader is willing to sign off on them. Whether you can fully trust your generative AI depends on how your organization implements and uses it.

We have determined three key factors of trust and ethics for generative AI:



Managing hallucinations and misinformation

Generative AI can create language that sounds convincing—but its assertions may be wholly false. Mitigate this through data and AI governance.



Matter of attribution

Generative AI outputs align with the real-world data used to train it. But while that real-world data may be subject to attribution and copyright, generative AI outputs are not. This takes finding a balance between trust in attribution and human oversight.



Real transparency and broader user explainability

Some people may not understand how generative AI works, but an organization should still focus on transparency when it comes to the outputs. This will likely take workplace training and a true cultural shift.



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The technologies

What's next? 



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Augmented reality

Augmented reality (AR) is a technology emerging (predominantly in the consumer space) that, at its core, superimposes images over a viewer's real view of the world to build virtual experiences. It started a few years ago with filters on social media but is now being used to build virtual shopping experiences, AR storefronts, and more.



What it can do

There is some potential for Finance, such as experiential learning. AR could become increasingly prevalent over the next few years for business and the enterprise but more likely for customer-facing experiences—not as much for Finance and the back office in the shorter term.



When you should think about it

AR combined with digital twin technology. Consider the possibilities of lowering the risk of capital expenditure decisions by enabling stakeholders to assess design and layout decisions, understand risk and advantage, and test and compare options before they make large-scale (and capital-intensive) investments. Or using AR to overlay financial information—production costs, operational expenses—on real-world views of factory lines, which could allow Finance to make informed decisions to help improve resource allocation or adjust production processes to drive financial performance. The opportunities for Finance could be wide-ranging. But as yet, they're relatively untapped.



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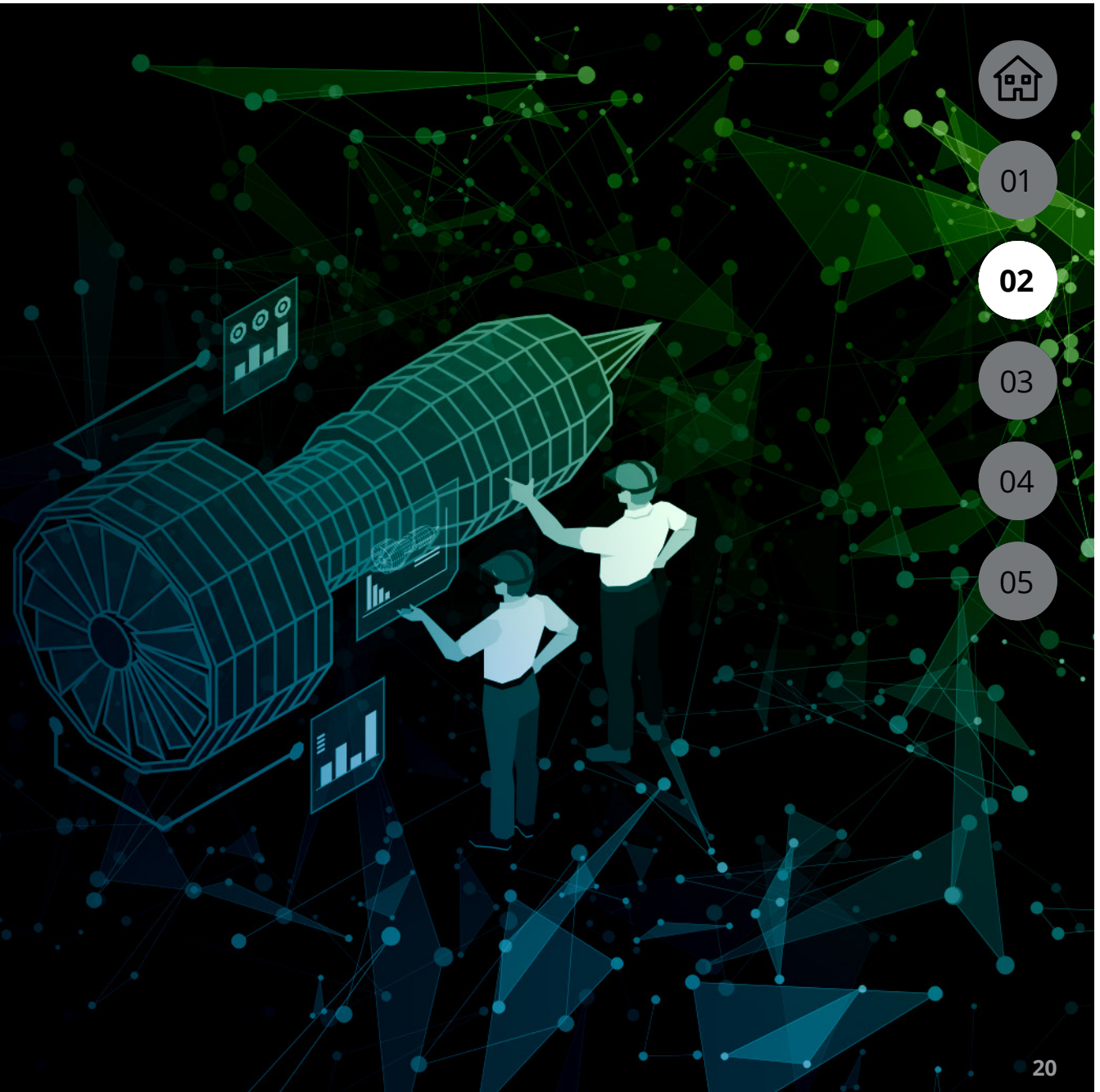
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What is a digital twin?

A digital twin is a virtual replica of a physical object, system, or process—for example, a factory production line, smart grid, or even a human heart. With real-time data from its physical counterpart, its value is in performing scenario analysis and simulation to enable more data-driven decisions. For Finance leaders, digital twin technologies can help to optimize costs, enable more effective capital planning, and unlock insights that can improve operational and financial performance today and in the future.

AR can hold potential opportunity for finance when combined with digital twin technology. Together these technologies can create interactive and immersive experiences with digitally generated simulations of production lines, or new facilities. They can bring together operational and financial reporting and allow finance operations to interact with data in completely novel and engaging ways.



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The technologies

What's for
your successor?



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Quantum computing

Supercomputers that rely on the principles of quantum physics and quantum mechanics to perform complex tasks at extremely high speed. Think about it like blowing a bubble: **The way our computers work right now (they use math), it would take literally billions of calculations to determine that we're, in fact, making a sphere. A quantum computer would instantly know it's making a sphere because it understands the physical properties of soap. A question that can't be answered with math may potentially be solved with physics—and that's quantum computing.**



What it can do

Quantum computers will likely offer endless possibilities—but because scaled versions don't exist today, researchers are still learning their capabilities. For example, experts believe quantum computing may provide better machine learning more accurately, with less data, than current computing technologies. Quantum may offer significant benefits across financial services, life sciences, chemicals, and logistics industries, offering more sophisticated optimization models, simulations to support super complex valuations, and faster drug development, to name a few.



When you should think about it

It's a fascinating technology to think about in your spare time. Quantum computing is likely to evolve into the mainstream over the next several years as it scales exponentially. You may not even know it is powering your machines, but you can look forward to another breakthrough leap in calculation speeds. It could become a disruptive force in the future, making scenario modeling even more effective and in less time. But for right now, just consider it a reason to brush up on the basics of physics.



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A DNA of people, technology, data, and controls

An evolution is based on DNA—and no matter what technologies you incorporate into your Finance function, your tech evolution should rest on a no-regrets foundation of a clean core, data, and security. Key investments in your people, processes, and core technology (which includes the way you deal with your data) mean you could be better off when you decide to implement leading-edge tech. If Finance can't trust and scale new tech because the building blocks aren't there, then the investment likely isn't worth it.



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People



Your talent and your organization should be ready for the work now and for the future. A clear definition of the outcomes you are trying to drive, and the way humans **with** machines will realize those outcomes, is critical. What skills do they need, and what skills does your organization lack? Where will you build these competencies—in Finance, in IT, maybe both? Is your organizational structure dynamic, and can it evolve and adapt to take

advantage of emerging technologies? Can your workers understand what to ask generative AI to produce the correct result and how to refine that practice to get better responses? Do they have the ability to identify and recognize bias by confirming the quality, validity, and performance of generative AI models? Are your Finance workers able to tell the organization's story now, and later, by leveraging technology's strength—and their own?

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Technology



If you haven't moved from your legacy ERP solution to a next-generation ERP, now's likely the time to do it, especially if you're planning to implement predictive or generative AI. That's a core foundation that should be in place before you layer on leading-edge tech. Being smart about where you focus your time and money is becoming increasingly critical, and Finance leaders can play a role in driving

those investment decisions. Implementing a cloud-based planning solution can give you streamlined and real-time business insights and reporting, which are key to your function's agility and preparedness. Your tax and controllership teams can benefit from optical character recognition-based solutions, which can help automate data capturing and subsequent data entry from forms and documents to systems.

Being smart about where you focus your time and money is becoming increasingly critical, and Finance leaders can play a role in driving those investment decisions.



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Data



The data you'll use to feed AI will include external sources: crowdsourced like weather, and purchased like industry-specific data and competitive intelligence. It will also come from internal and proprietary sources. Either way, you should get serious about your data and solidify its availability, completeness, detail, standardization, accuracy, credibility, and security.

That generally means building a formalized Finance data organization, automating your data, and getting your team out of spreadsheets. Many organizations may also look to build private models trained in secure environments to safeguard sensitive financial data. Leading-edge tech is only as good—and as ethical—as the data it's built on.

Leading-edge tech is only as good—and as ethical—as the data it's built on.



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Governance and controls



Leading-edge tech is also only as ethical as its governance and controls can keep it. Organizations that implement these technologies should strengthen their processes to sense and mitigate risk and build in systemic controls for protection—not just from the usual risks that come with any new technology, but also from potential cyberthreats that are likely to be even more prevalent with generative AI.

These cognitive tools could pose even more risk because users don't need any real knowledge of AI, or its power and limitations, to implement and use them. Trust isn't an inherent quality of AI but instead the product of governance, risk mitigation, and the alignment of processes across an organization. Why do cars have brakes? So they can go fast. The same is true for governance and controls and your ability to scale novel and exponential technologies.

Trust isn't an inherent quality of AI but instead the product of governance, risk mitigation, and the alignment of processes across an organization.



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How to get started

For any new technology, the CFO should proceed thoughtfully and carefully. Most of the time, that can mean creating a pilot program. But with these technologies, the investment and the opportunity could be too powerful for that pilot program to fizzle out and never reach true adoption (as pilot programs sometimes do, without stakeholder support and alignment). These technologies tend to change so fast that some investment might not have much return—and that's why it's important that Finance leads the way.

Finance can help leaders pick the areas across the enterprise to test that are likely to have true material impact, build the business case and value assessment, and then implement a pilot program to test (and, hopefully, scale). Behind these decisions should be a careful assessment of capital allocation; these technologies generally come with a high financial and talent investment, and Finance will be charged with enabling these programs while keeping an eye on the bottom line.

Here's a checklist to consider when getting started:

- ✓ Frame and communicate your vision for an AI-enabled Finance function.
- ✓ Come to grips with your data standards and governance.
- ✓ Evaluate and execute a pilot for leading-edge technology in a controlled manner; scale once successful.
- ✓ Make strategic choices about your talent—what do you need that's different from what you have today, and how do you make sure you have what you need for tomorrow?
- ✓ Create an ecosystem for interoperable tech solutions that work together to deliver end-to-end outcomes that can make AI-enabled Finance a reality.



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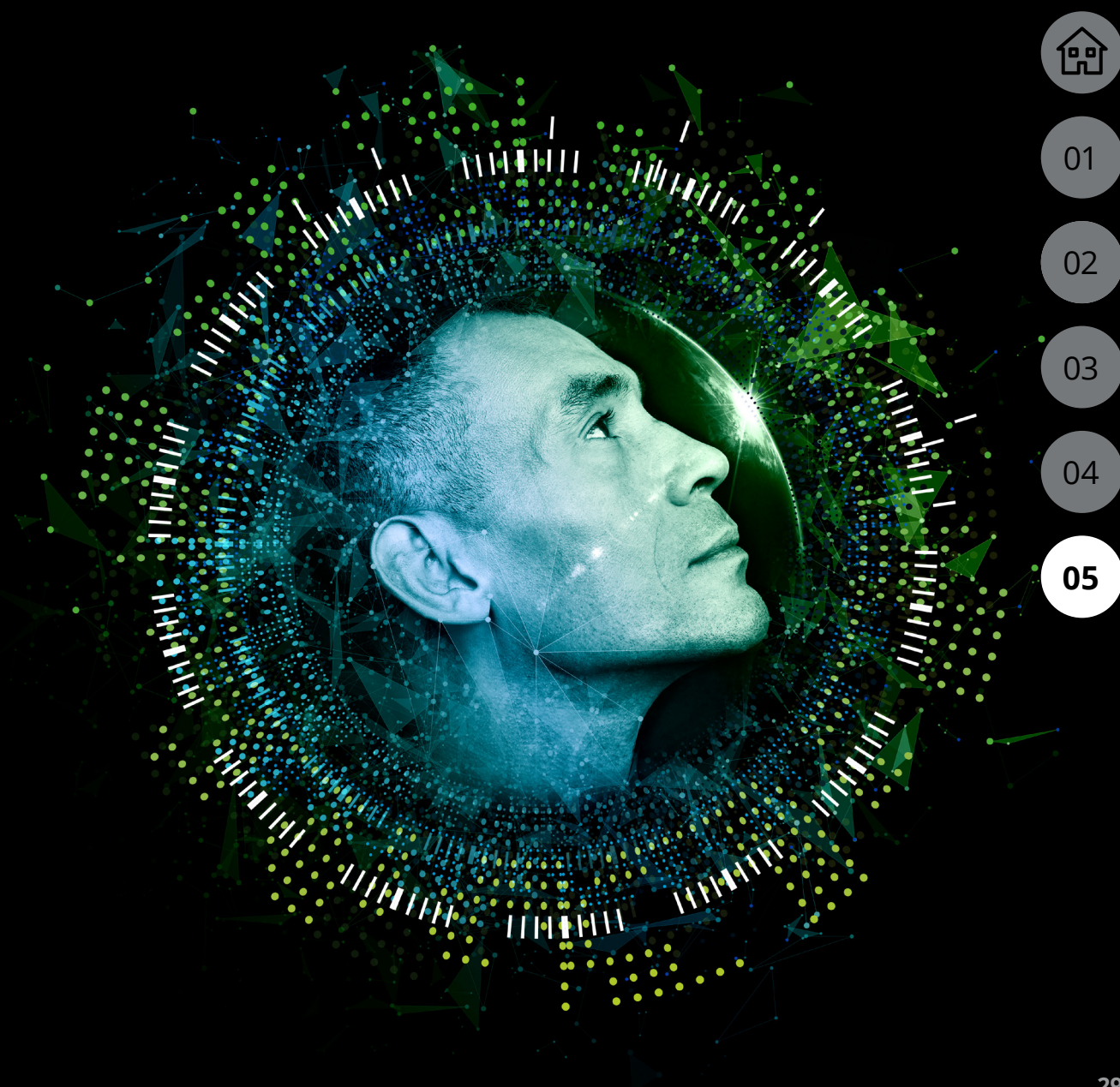
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It's crunch time.

If you've taken the preceding steps, you have a foundational road map. Stay true to it. If a new shiny object comes along—and don't worry, one's likely already on the way—take a step back and consider the fundamentals. How would this technology really create value for my Finance organization and strengthen our position as a business partner? Is this technology really that different from what we've already implemented, or is it truly a game changer? Only you and your organization can answer those questions. However, as you move forward, keep in mind: evolution, not revolution. **It's crunch time.**



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