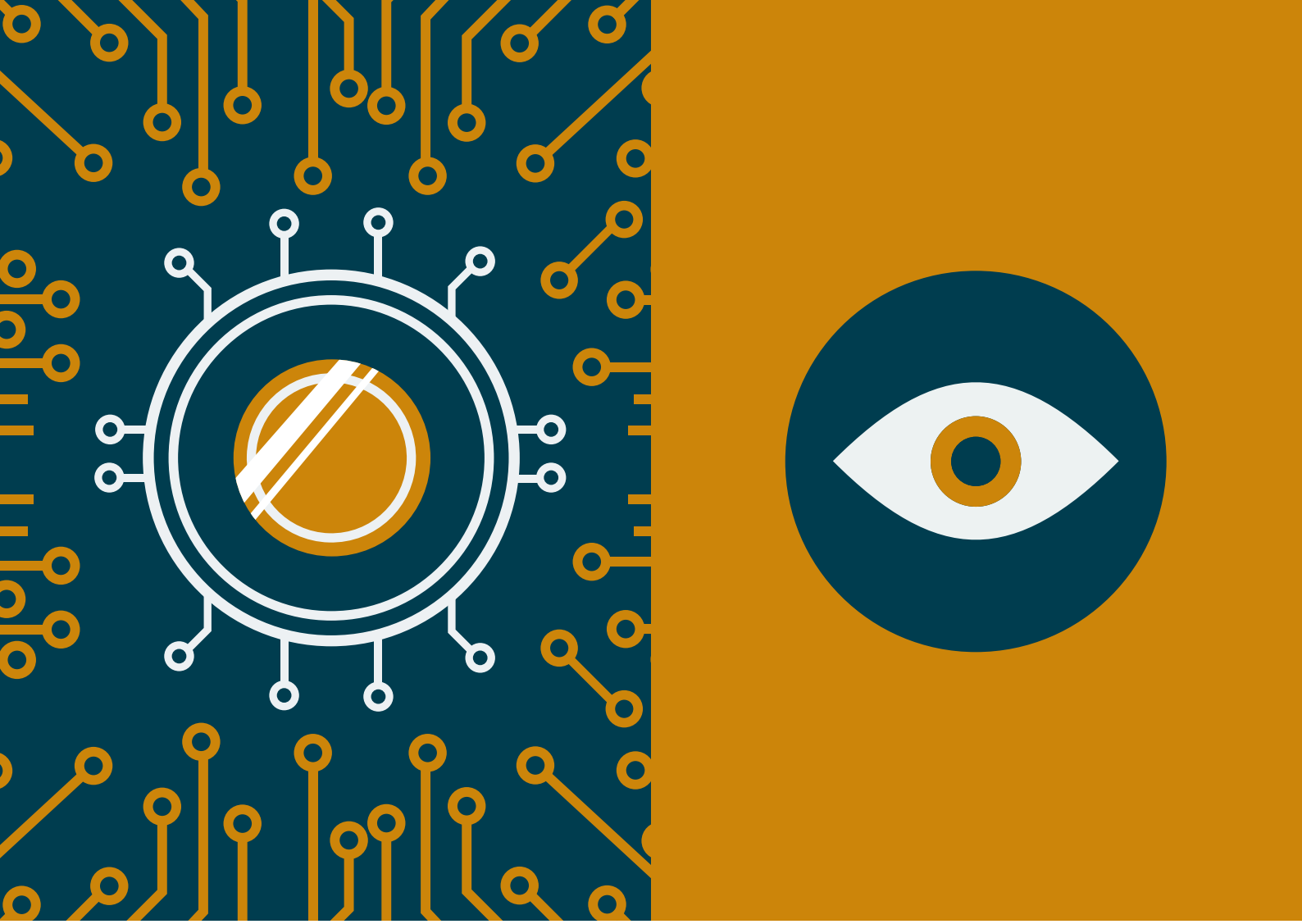

Looking Glass

Wealth Management

Bringing the future of the wealth management industry into focus

thoughtworks

2022

Introduction

There are hundreds of ways in which technology is transforming the wealth management industry. We're here to help you understand which could have the biggest impact on you, your clients and your operations — and which are most deserving of your attention and your modernization budgets.

With an ever-growing global network of consultants and clients, Thoughtworks has a broad view of today's evolving technology landscape. We know what's changing, we understand the opportunities new capabilities are creating, and we can help you turn them into a competitive advantage.

Earlier this year, we created our second annual Looking Glass report, examining 100 technology trends through five "lenses", to help businesses understand what those trends could mean for them. Now, we're taking that analysis a level deeper, looking specifically at what some of these trends could mean for the wealth management industry, and how they're shaping its future.

For the wealth management industry, the digital revolution brings both unprecedented opportunities and new kinds of threats.

It allows wealth managers to capitalize on new and emerging technologies — with the potential to increase operational efficiency, expand reach, meet new demands from clients and deliver better returns, and to navigate regulatory shifts. It's also disruptive, forcing incumbents to ask questions about how they do business, prompting the creation of new firms — and new kinds of businesses — and perhaps creating new openings for the tech giants.

So how should wealth management firms respond? Throughout the report, you'll find information on current and emerging technology trends, all contextualized for the wealth management industry. You'll see how big consumer trends translate into opportunities in your sector, and you'll gain vital insight to help you prioritize transformation projects and drive positive change proactively.

Page 25 has the specific technology trends we believe are most likely to impact wealth management that we believe need to be anticipated, analyzed and adopted.

If you would like to discuss this report further, please get in touch.

Lens one: Realizing the potential of platforms

Through the Looking Glass

For wealth managers, platforms represent both opportunities and puzzles. They provide the means to deliver the digitally-enabled experiences clients expect, they enable the integration of promising technology solutions, and they support the development of new partnerships.

But for many wealth managers building and improving platforms it's also an area fraught with ambiguities. Views on the purpose of a platform can sometimes vary widely and there can be misalignment on what kind of value a platform can best deliver. Not everyone even agrees on the definition of a platform and execution problems can add to the confusion.

The result can often be that initial excitement gives way to a failure to maximize return on investment. With experiences like these becoming widespread, we are seeing a new determination to resolve uncertainties around platforms and connect platform building to clearly-defined business goals.

In essence, a platform is a foundation level of open, flexible technology architecture and capabilities. For wealth managers, this can enable much smoother connections with partners and clients, and the creation, bundling and delivery of diverse services in response to changing market demands.

Potential like this has driven a rush of M&A in the wealth management sector as firms seek greater scale or access to digital capabilities, with examples including JP Morgan's acquisition of Nutmeg for $1bn last year and LGT's purchase of a strategic stake in digital wealth manager LIQID.

Platforms are now not only now critical to customer acquisition and retention, but also facilitate rapid and effective integration of firms post M&A. Platform-based technology architecture with open APIs supports integrations, enabling early value delivery and mitigating risk.

With platform technology allowing emerging wealth tech firms and established investment companies to join forces more easily, newer players and incumbents can offer each other's products economically, with added value and lower friction.

An example of this is the spread of direct indexing (buying up the same stock as an index, in the same weights). While this has long been available to wealthier clients, platform-based technology collaborations with fintech partners have made it possible for investment firms to offer these personalized, tax-advantaged investment products to retail investors as well.

Some traditional investment firms have even built their own direct indexing technology, showing there are multiple paths by which wealth managers are unlocking the potential of platforms.

Signals include:

- The rapid rise of wealth management tech. Recent years have seen the proliferation of firms such as **Investsuite** and **Privé**, which offer highly-specialized, API-based capabilities and services for the wealth management sector that promise to support platform-building with "plug-and-play"-type functionality
- The shift from active to passive investment. The rapidly-expanding passive investment sector has created excess capacity on the active management side and put pressure on fee structures. For wealth managers this translates to a sharper focus on digital transformation, automation and realizing efficiencies through, for instance, platform adoption
- Ongoing consolidation. While the industry remains heavily-fragmented and there are many players of all sizes transacting in the market, M&A activity in the sector is **surging**. This will add impetus to build and adopt platforms that enhance readiness for integration and partnerships
- Pressure to perform. With volatility and a low-yield environment adding to the difficulty of delivering returns, managers are being pushed to innovate in terms of product, build their alternative asset offerings and boost portfolio management and insights. All this will fuel more interest in platforms that allow these capabilities to be rapidly enhanced, or bolted on

The opportunities in wealth management

Streamlining your technology and supporting integration: While not without challenges, platforms bring clear and measurable benefits. These include the ability to centralize (and even commoditize) expertise and to accelerate innovation and time to market. They provide a basis for the integration of systems and data from acquisitions, partners or external service providers. They also enhance operations by providing a base layer of technologies and tools that various parts of the organization can draw on. This helps to consolidate and rationalize different business capabilities and reduce duplication and costs. Risk management is improved by ensuring more consistency and visibility across different layers of the enterprise.

Improving experiences and performance for clients: Platforms and their open API frameworks support better, more unified customer experiences by enabling wealth managers to quickly and smoothly leverage "as a service" offerings in response to customer needs. They also contribute to what ultimately matters most to clients — performance — by helping managers make better use of data assets. They provide a rich source of insights that can identify and pave the way for action on market, portfolio or customer trends; and facilitate the processing and analysis of valuable alternative data sets.

Reducing time to market and supporting partnerships: Platforms reduce time to market for new products and services by offering improved delivery infrastructure. This means managers can more easily address shifts in volatile market environments. They also support partnerships with digitally-native and innovative new firms and serve as a gateway to a thriving industry ecosystem. Mutually beneficial alliances like those forged by Nuveen with alternative investment platforms Altive and iCapital last year show the benefits of shared platform vision and execution.

Advice for adopters

Before embarking on platform-building, get all stakeholders in the room and on board

Ensure at the outset that key decision-makers agree on what's being created when you use the word "platform". Set out the specific goals and outcomes the platform is designed to serve. Pay particular attention to the needs of the end consumers of the platform, i.e. clients — not just internal development or product teams — and what you're trying to accelerate for them.

Structure your technology teams to drive value-adding features

A separately-constituted platform team can build all the foundational and undifferentiated capabilities of the platform. This frees up other development teams to focus on building value-adding business features and deploying them rapidly. Firms are increasingly investing in developer experience platforms that enable development teams to collaborate more efficiently.

Pursue platforms in stages

Rather than instantly looking to build the kind of platform that enables revolutionary change, remember that transformation doesn't happen overnight. The best platform strategies are often iterative. Focusing on getting the infrastructure right first can provide a solid basis for the organization to get more adventurous with its platform strategies and construct platforms that contribute genuine innovations on a continual basis.

Technology trends shaping this lens

Platform strategy

Wealth management firms serving a wide variety of client segments need customized offerings that can be easily differentiated and are not too expensive to implement. A platform strategy creates the foundation for digital business capabilities that can be built, modified and rewired easily. The platform is essentially a library of services and business capabilities. The cost of building something new does not need to absorb the cost of changing what is already there. A platform strategy supports scalability while enhancing customer engagement and revenue generation opportunities.

Digital experience platforms

Wealth management clients now want to consume most, if not all, of their services digitally. A digital experience platform enables a wealth management firm to control customer journeys across a multitude of channels and devices. With feature-rich dashboards, intuitive insights, multi-language support and personalized advice, the firm can make a seamless transition from an advisor-led engagement model to an omnichannel digital one.

Collaboration ecosystems

Providing access to new products and services helps to give wealth management firms a competitive edge. Not all firms will have the resources to support this, which is where collaboration ecosystems come in — providing the means for specialist wealth managers to, for instance, offer banking, brokerage, insurance and mortgage solutions with the help of other financial organizations. These ecosystem plays, often relying on digital collaboration tools, present an agile and cost effective way to provide new products and services while retaining client ownership.

Lens two: Partnering with AI

Through the Looking Glass

Machine learning (ML) and AI continue to gain traction across industries, and wealth management is no exception. The size of the global AI in asset management market is expanding at high double-digit rates and is expected to reach more than $15 billion by 2028, as managers strive to draw insight from their data resources and anticipate investment trends.

AI solutions promise a range of benefits. These include better pattern recognition and associated cost efficiencies, greater accuracy in data processing, improved predictive power and the ability to tap into larger and less structured data sets. In the wealth management context excitement surrounds a range of compelling potential use cases, including sentiment and trend analysis, trading signal identification, fraud detection, risk modeling, portfolio management and trade execution.

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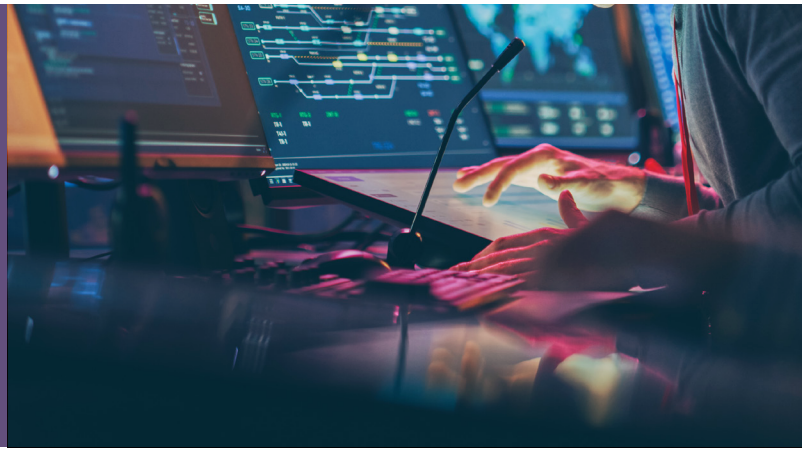


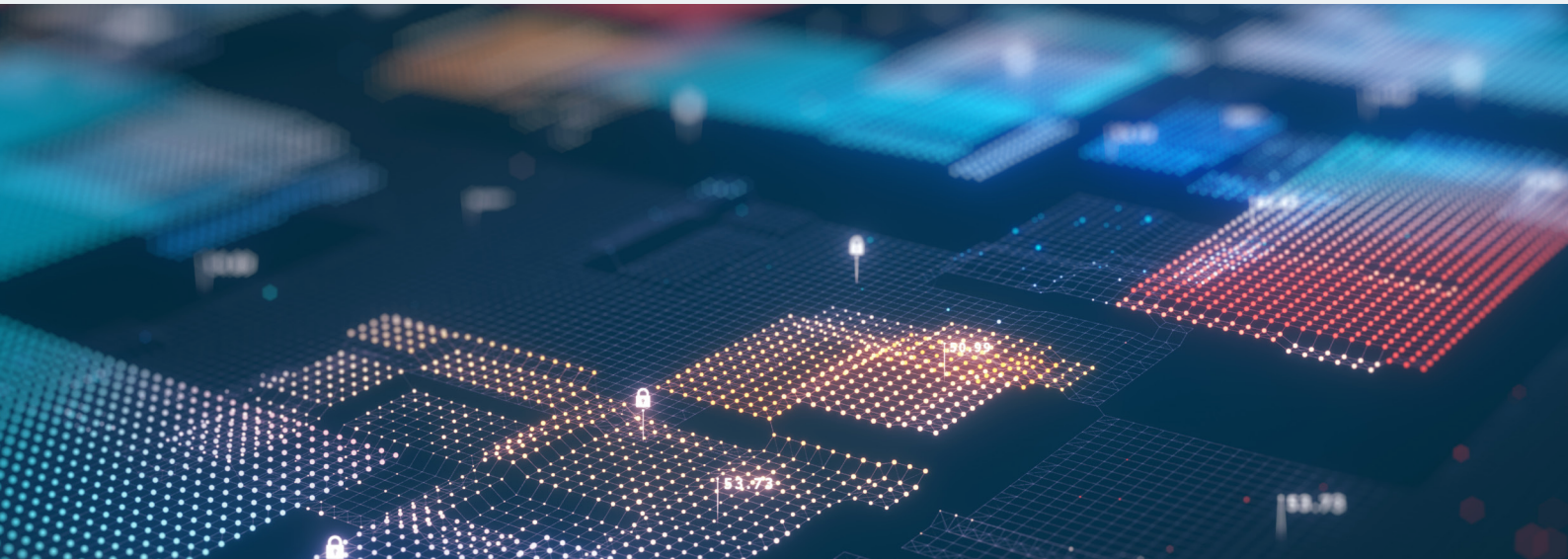
It's no surprise asset management firms are investing heavily in AI and data as they compete to gain an edge in all aspects of their operations. There are already examples of wealth managers using AI-driven dynamic rebalancing to improve portfolio returns, and combining data from social media and other crowd-generated sources to better gauge market sentiment.

Amid all the enthusiasm, wealth managers should bear in mind that AI comes with challenges. The investment process is complex, highly dependent on timing and involves many variables that can't always be effectively modeled. Overdependence on historical data in the training algorithms AI uses to "learn" a subject is another potential problem and can lead to the perpetuation of biases, or suboptimal outcomes derived from out-of-date information.

AI depends as much on organizational and strategic as technological factors, and a successful investment or commercial approach can't be constructed on AI alone. As many wealth managers have discovered, investing in AI is the easy part. Ensuring it delivers returns on that investment and scaling it across the business is another matter. You may need to make organizational changes — perhaps redefining roles or altering data policies — before those investments pay off.

Signals include

- Accelerating spending on AI by wealth and asset managers. This can mean investment in the organization's own AI capabilities, such as BlackRock creating **BlackRock AI Labs**; or investment in AI and data firms, such as Abrdn's investment in Signal AI. Some asset managers are even teaming up with universities and research organizations, as seen in Man's collaboration with the University of Oxford, the **Oxford-Man Institute**, which studies machine learning in investment.
- A data scientist / ML engineer hiring spree as asset managers begin to see AI as a must-have. The talent is not easy to find; recruiters have warned of **competition for data scientists** fueling higher salaries.
- The emergence of "pure" AI-managed or driven funds and investment platforms. An example is **AIEQ**, an equity ETF that, despite underperforming the market benchmark for much of its lifetime, is steadily growing in size and sophistication, drawing on both structured and unstructured data to construct robust readings of market sentiment. There are also interesting startup hedge funds like **Numerai**, which crowdsources investment models from data scientists and rewards them based on the accuracy of their predictions.
- Growing application of AI to regulatory and compliance challenges. Wealth managers are increasingly turning to "**regtech**" to automate parts of the back office or ease the burden on compliance teams from requirements like fraud detection or the logging of communications around transactions.



The opportunities in wealth management

Speed and efficiency: Robo advisory systems can use AI and ML-based algorithms, combined with customer information such as risk appetite and investment horizon, to generate recommendations on asset allocations at a speed and scale human advisors would struggle to match. Examples include firms like Betterment and SigFig. Robo-advisors have proven popular with the mass affluent and young investors, with some analysts predicting they could manage well over $1 trillion in assets by 2024, up from $460 billion in 2020.

Chatbots are also helping reduce strain on experts in the wealth management industry and lowering customer service costs by handling simple interactions and directing only high-priority queries to dedicated personnel. They have proven capable of learning from customer interactions and improving their responses over time.

Smoother customer onboarding: One type of AI, natural language processing (NLP), is easing the inconvenience and regulatory burden of account onboarding and know your customer (KYC) requirements. For client onboarding, wealth management firms must collect detailed due diligence and KYC information without making the client experience cumbersome. Managers need to limit the amount of data that needs to be manually keyed in by the client, while never asking for the same piece of information more than once and covering all compliance bases.

NLP provides a platform to automate elements of this process, smoothing the onboarding experience and helping managers avoid fines and sanctions related to AML/KYC violations.

This is just one example of how regtech is combining and applying AI, ML and NLP to automate compliance and reduce the risks and strain on resources associated with interpreting and responding to extensive rules and reporting requirements.

Freeing up human advisors: Using AI/ML to reduce manual processes and enhance data quality frees up wealth managers and advisors. They can then focus on scaling their offerings and providing more personalized analysis and advice to clients.

Firms like Wealthfront have shown AI can create models based on the client's investment preferences and past behavior, then make recommendations and dynamically rebalance the portfolio based on new information or changing market conditions to correct any drifts from the core strategy. Even in active investing, AI is helping to augment decision-making by supporting risk management through back testing or identifying new opportunities to generate alpha. As a result, advisors can concentrate on the human-dependent aspects of client relationships: making big decisions, building trust and understanding client needs and goals.

Rather than an AI "takeover," the future of the wealth management industry will be defined by machines and people working in tandem, with AI and ML informing and enhancing the central human role in successfully executing strategies, and delivering insights and investment performance.

Advice for adopters

Understand when to use automation vs. augmentation

AI and ML can completely automate some processes and roles, whereas for others technology should be restricted to helping humans make better decisions — and it's critical to understand the difference. Automating minor adjustments to the composition of an ETF may not prompt objections. But a high net worth investor buying an active strategy may react negatively to the outsourcing of major portfolio decisions to an AI model.

Consider the ethical implications of AI/ML and take the responsibility seriously

AI and ML can extend into complex and risky areas, where the impact of decisions can have unintended consequences, particularly when they leverage sensitive customer data or financial information. One such scenario might be a system recommending or making investments in questionable companies or assets that have performed well based on past financial metrics, with no consideration of the ethical or reputational ramifications. Bring any potential implications into consideration early on to assess and catch any issues before it's too late. Also consider using an explainable AI approach, which aims to make AI and ML decisions more transparent.

Prepare advisors for changes to their roles

Employees can find their jobs impacted by AI. Don't underestimate the effort required to support and empower them. It's important to emphasize that automation can free them up to perform higher-level tasks, while augmentation can help them be more productive and foster better client relationships. Develop clear transition and progression plans for advisors to make the most of the AI opportunity and take a more strategic role for clients.

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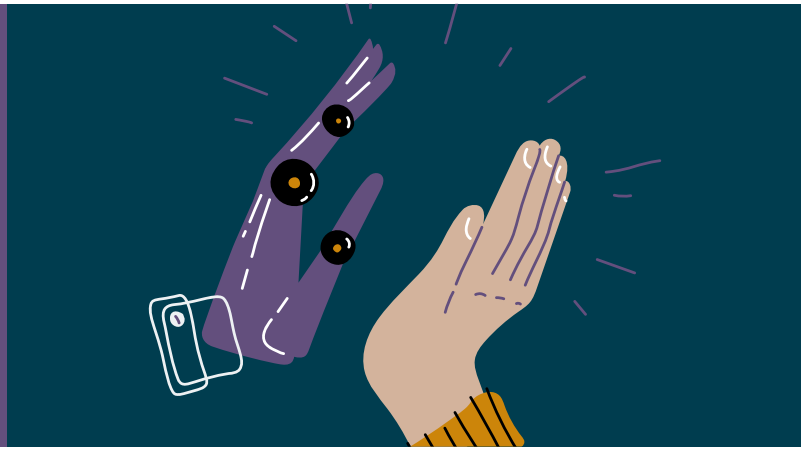


Choose your KPIs carefully

Understand the metrics you are trying to move with AI and ML, whether client retention, new business, or portfolio performance; measure the current process to capture your starting baseline; and use KPIs to evaluate if AI and ML are delivering real business benefits. With the appropriate benchmarks in place, even if a particular AI/ML approach does not work, you can experiment with different techniques to achieve the desired outcome.

Invest in robust data governance and data management practices

AI/ML techniques still require access to data. If your data is siloed and hard to access, progress will be challenging. Consider where data ownership sits within your organization, as well as the external data sources drawn on to make investment decisions, and examine how this data is audited, processed and distributed for signs of quality control issues or roadblocks. The biggest data quality problems tend to emerge from organizational structures and architectures that don't incentivize teams to produce and share the data resources they have, which limits transparency and how effectively data can be used.

Technology trends shaping this lens

Natural language processing (NLP)

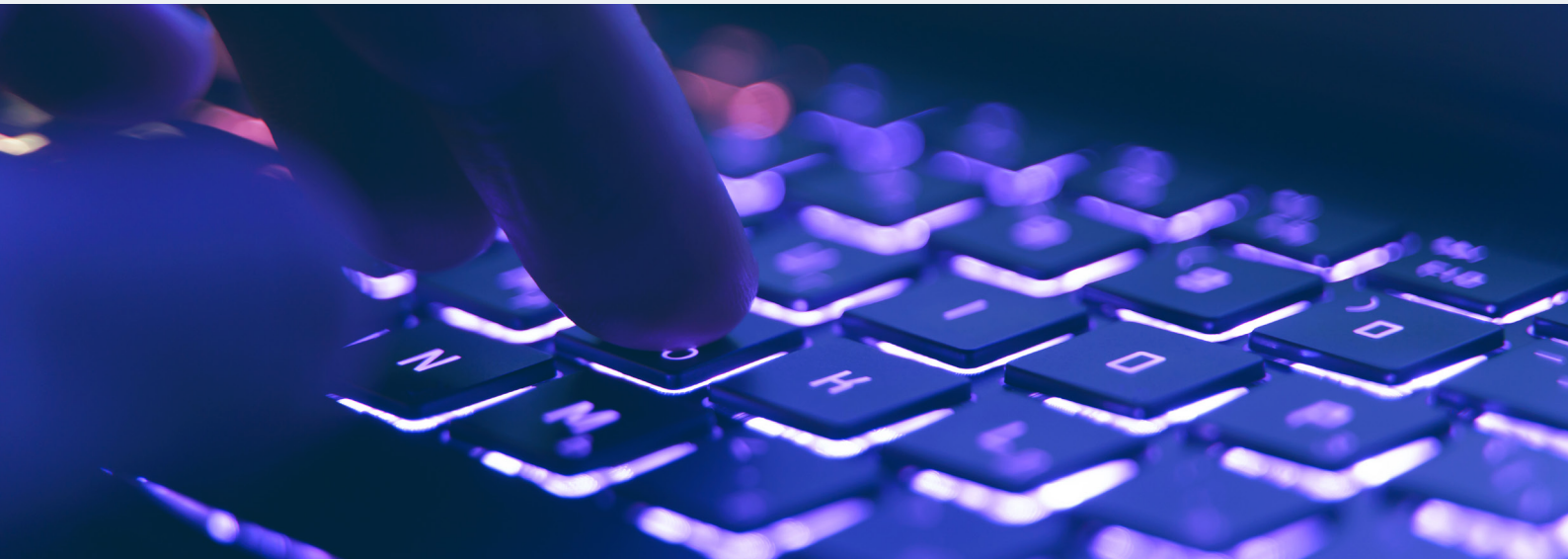
The wealth management process — involving, for instance, idea generation, investment decisions and portfolio generation — requires the analyst to crunch a large amount of structured and unstructured data. The unstructured data could be in the form of news, exchange filings, speeches, analyst reports and other documents. NLP techniques are used to scan through this data and detect hidden signals which could feed into AI models capable of arriving at various investing decisions. NLP techniques can thus help to churn a large amount of data and provide useful insights which can be further processed by a human or other AI tools which require data in specific structured formats.

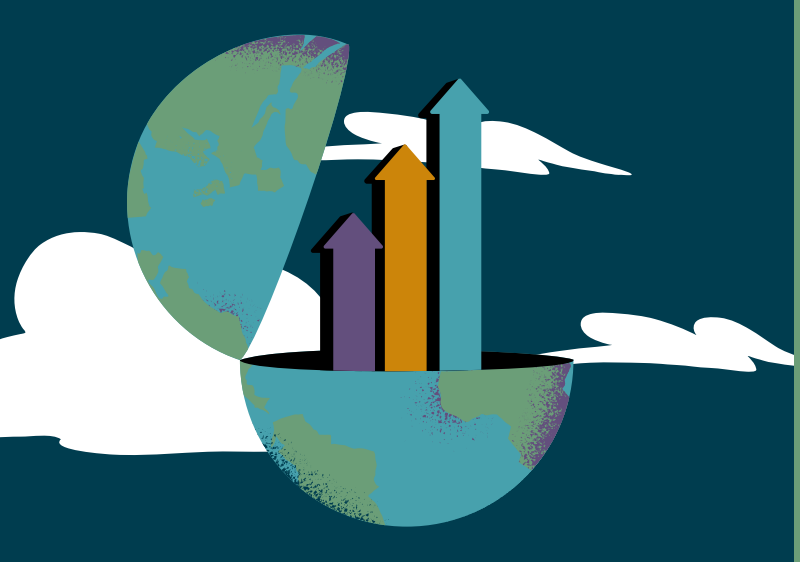
AutoML

Given increased adoption of AI/ML for key services — such as portfolio creation, fraud detection and personalized offerings — data scientists and ML experts are required to train the ML models. AutoML tools allow business specialists to prepare data for the model, and test and tune it. This increases efficiency and reduces dependence on data scientists and ML experts.

Quantum machine learning

Tapping into fast-moving market opportunities requires rapid information processing and equally-quick decision making. Quantum machine learning can provide greatly-improved speed and agility. While widespread commercial application of quantum computing is still on the horizon, it has the potential to provide significant benefits when working with large datasets powered by AI.





Lens three: Accelerating towards sustainability

Through the Looking Glass

Investors are increasingly concerned about environmental, social and governance (ESG) factors when making investment choices. The speed of change is rapid and is driving a seismic shift in the investment landscape. Considerations around climate change and social impact are coming sharply into focus, and some investors are prioritizing or even mandating investment in sustainable companies and assets. Some are even willing to accept lower-than-expected returns, having priced in a preference for ESG-compliant investments.

As investors — and consumers and governments — demand ESG accountability from companies, new business imperatives are being established, such as environmental responsibility, improving corporate governance and advancing diversity. These are, for many stakeholders, no longer “nice-to-haves” but “must-haves”. Wealth managers are responding to these trends by creating more funds and products with a sustainability component.

With this has come a growing emphasis on ESG reporting as a framework for investors to gauge company performance and risk. ESG-related disclosures remain limited and disjointed, partly due to their often-voluntary nature, associated costs and a lack of broadly accepted standards — though this is beginning to change as new benchmarks emerge from organizations such as the U.S Securities and Exchange Commission and the European Union.

Technology and data will be critical for wealth managers working with ESG metrics. They will help them see past “greenwashing” and determine when the appearance of sustainability is being prioritized ahead of substantive measures.

Technology and data will be critical for wealth managers working with ESG metrics. They will help them see past "greenwashing" and determine when the appearance of sustainability is being prioritized ahead of substantive measures. They will also support them as they seek to demonstrate ESG impact and communicate values in a way that resonates with a new generation of clients.

Signals include

- The rapid proliferation and growth of sustainable assets. ESG-focused institutional investment globally is expected to **rise 84%** to $34 trillion in 2026, from $18 trillion in 2021, and make up 22% of assets under management.
- Behemoth investors like **Blackrock** recognizing that climate risk is an investment risk. Large investors are demanding more ESG-related transparency and disclosures from companies, including linking ESG performance to executive compensation, and details of how climate goals are incorporated into long-term strategy
- The U.S. Securities Exchange Commission (SEC)'s **proposed rules** on climate risk disclosures for public companies require them to report climate impact, greenhouse gas emissions and target and transition plans
- Ongoing consolidation and expansion of firms in the ESG data space. Responding to investor demands for credible sustainability information and analytics, investment research and data providers are shoring up their ESG capabilities, often through M&A with specialists. See **Morningstar's acquisition of Sustainalytics**, or **S&P Global's purchase of The Climate Service**
- Increased assertiveness by the fund management industry in attempting to influence the corporate sector. Through stewardship, which includes direct engagement with firms and proxy voting, funds are pushing for changes in firms' sustainability practices. For example, in 2021, activist investors **won seats on Exxon Mobil's board** as part of a bid to change its climate strategy.

The opportunities in wealth management

Rise in principled investment will reward firms with a technology edge: Investors are increasingly willing to put their money where their ESG principles are. A survey of affluent and high net worth investors found over 80% see sustainability, ethical and environmental issues as important in managing their investments, and that almost half expect their entire portfolios to be made up of sustainable investments in the next five years.

As Silent Generation and Baby Boomers pass on wealth to their adult children, this will further increase the importance of ESG, as younger generations place greater emphasis on sustainability and social goals. According to one study around a third of millennials often or exclusively invest based on ESG factors, compared to only 2% of baby boomers.

It will steadily become more critical to provide ESG-related information and associated choices to investors with speed and complete transparency. Flexible technology infrastructures and the fluent use and analysis of data will be needed to support this, and advantages will accrue to firms which are enabled in this way. Technological capability is likely to become a key differentiator for firms in the ESG investment space.

Alternative data sets and AI can be used to assess ESG credentials: Wealth managers can look to offer a differentiated approach to ESG by enhancing the data capabilities they use to assess investments. This could mean applying technology to incorporate and process more granular metrics, and also to better collect and handle unstructured data. Artificial intelligence has the potential to determine whether investments under consideration are actually driving ESG outcomes, or merely laying claim to sustainability performance.

Understanding the ESG implications of new asset classes: Investor demand continues to increase in alternative assets, many of which have significant ESG implications. Crypto mining requires significant computing power and leaves behind a large carbon footprint. In 2020, the Bitcoin network consumed more power than the whole of Argentina. Wealth managers need to be ready to help clients connect to the opportunities emerging from new asset classes while achieving their sustainability ambitions.

Advice for adopters

Make methodologies and metrics used for fund composition consumable

Wealth firms should be clear about the frameworks used to construct portfolios, including weightings for sustainability and other factors, so that investors can make informed allocation choices. Tools such as data visualization and dashboards can be a valuable and dynamic means to share information on fund composition and other key sustainability performance indicators with a client base that increasingly expects seamless, digitally-enabled communication and insights.

Apply technology to help you lead by example

Apply technology to rigorously measure, monitor and report on your own organization's ESG performance, and extend this evaluation where feasible to partners and suppliers. Communicate the results and policies regularly throughout the organization, so everyone from developers to customer-

facing staff understands it's a key strategic consideration. Wealth managers should also consider the influence they can exercise in boardrooms, and demand greater accountability, along with transparent data on sustainability policies and outcomes, from the firms they invest in.

Data visualization and dashboards can be a valuable and dynamic means to share information on fund composition and other key sustainability performance indicators

Technology trends shaping this lens

Green software engineering

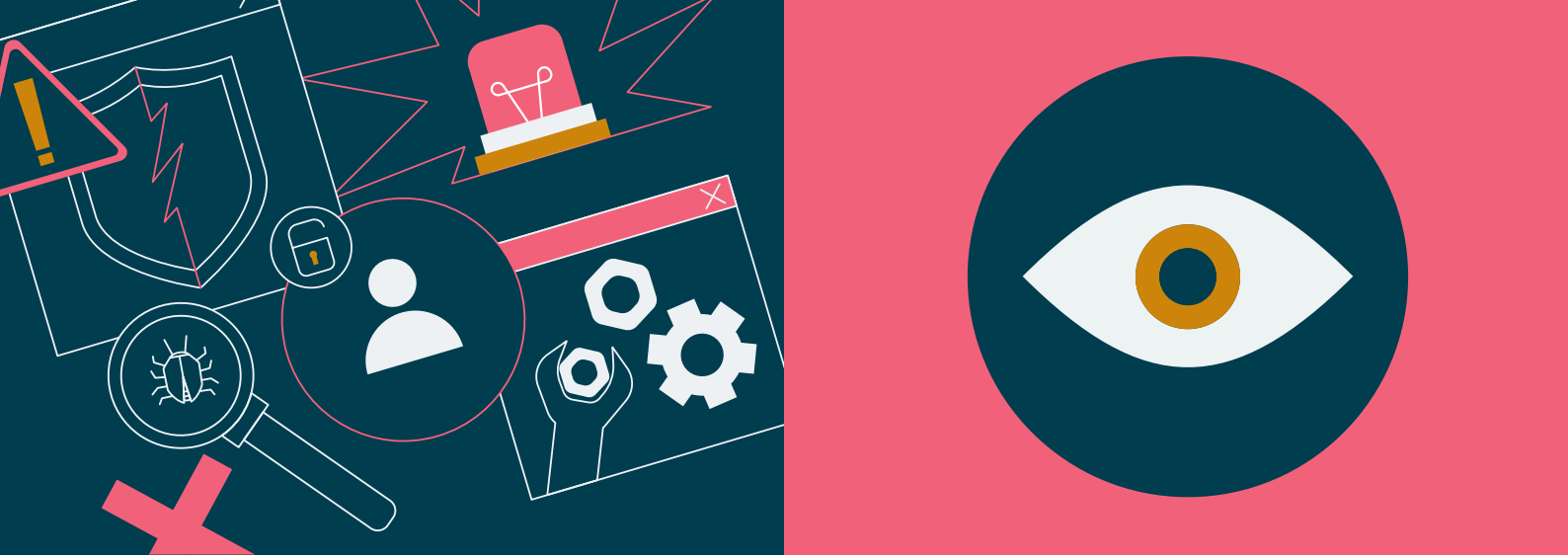
Choice of programming languages and practices affects energy consumption and the environmental impact of a company. Wealth managers can look to adopt, where possible, languages, technology stacks and algorithms that minimize energy use and the amount of carbon dioxide produced by running software. There is also scope to compare the carbon footprint of, say, training AI/ML algorithms with the benefit to the business of doing so.

Green cloud

One of the best sustainability steps a business can take is adopting a greener approach to data centers, which are predicted to take up more than 10% of the global electricity supply by the next decade. As wealth managers increasingly adopt cloud, creating an environmental impact framework for their data center infrastructure allows carbon emissions and water consumption to be measured and monitored. Encouragingly, more cloud and data center providers are documenting and reporting sustainability metrics and practices.

Ubiquitous connectivity

IoT devices paired with 5G technology have the potential to bring a new wave of financial inclusion to communities which are not yet able to take advantage of wealth management-type services. 5G will make it increasingly possible to provide personalized products, services and interactions without the need to visit a branch or an advisor physically. It has the potential to transform the digital offerings of wealth managers and create sustainable value for an inclusive economy.



Lens Four: Expanding impact of hostile tech

Through the Looking Glass

"Hostile" technology is commonly associated with criminal activity such as deploying ransomware, breaking into a system to steal data or creating computer viruses. Cybercrime of this kind is manifesting in the wealth management sector and can have far-reaching consequences given the financial resources, personal information and regulatory responsibilities involved.

Yet this kind of criminal activity is only part of the picture. The landscape is evolving in a way that suggests the definition of hostile tech should be broadened to include legal — even widely accepted — acts that ultimately threaten societal well-being.

In terms of criminal activity, some wealth management firms may feel insulated from cyber threats compared to banking and insurance counterparts because they have less public-facing infrastructure. Most assets and transactions are held at or take place through banks or custodians. However, wealth managers hold intellectual property, including client data and trading strategies, that are highly valuable to both criminals or competitors.

Sensibly, though, wealth managers are becoming increasingly concerned about cybersecurity, with one study flagging it as the top concern for family offices globally, outpacing even market and geopolitical risk, and finding 96% of respondents had been subject to some kind of cyberattack. Meanwhile, attacks are growing more sophisticated, with, for instance, the use of business email compromise (BEC) and ransomware increasing.

One major emerging risk is social engineering and phishing targeting both employees and customers. Cybercriminals are now armed with deep fake and disinformation tools that support sophisticated social engineering scams. Fraudsters have even successfully mimicked the voice of a boss over the phone to direct an employee to make payments into their accounts, while scammers are practised in convincingly assuming the online identities of companies, copying names, logos and website addresses to direct unsuspecting customers to fraudulent sites.

The surge in home-based working using Wi-Fi networks and personal devices, which typically don't have the same degree of protection as company technology assets, has increased vulnerability to network attacks. Bad actors stepped up ransomware and other deceptive activity during the COVID-19 pandemic, raising the urgent need for strategies in response.

What's more, with the rising importance of client data and industry of adoption of big data and AI, managers will have to grapple with the lesser-known, unintentional side of hostile tech — that is, negative personal or societal impacts of the technology they adopt and deploy. Growing dependency on the use and sharing of customer data in product creation and the personalization of services have sparked calls for an industry version of the Hippocratic Oath to ensure use of this information is governed by ethical standards.

Similarly, there are concerns that the growing role of AI in investment decision-making could tilt the balance excessively in favor of pro-cyclical, profit-driven strategies, and diminish the role of sustainability or social impact considerations. Explainable AI, an approach to improving the transparency of AI and ML decisions, could help to provide solutions in this area.

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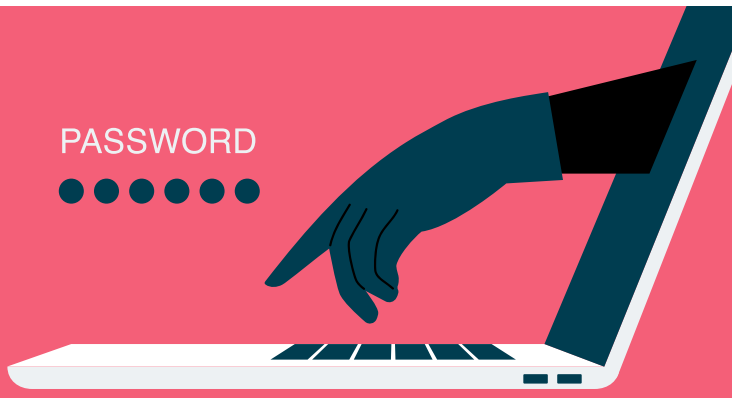


Signals include

- The cost of cybercrime is **predicted to reach $7 trillion** this year and $10.5 trillion in 2025, up from $3 trillion in 2015.
- The rising threat of ransomware, especially against **companies and institutions that provide critical infrastructure**. Major investment and risk management platforms like BlackRock's Aladdin, which serves more than 900 clients across 65 countries, play a central role for the industry's largest players and are **increasingly viewed as systemically important utilities** — making them a potential target
- Security becoming a major focus for wealth managers. In a 2020 **survey** of asset management industry CIOs, cybersecurity and privacy was named the most important area for technology investment, with more than four in 10 organizations reporting a rise in cybersecurity incidents
- Regulators introducing industry-specific rules and standards to combat hostile tech. The U.S. Securities and Exchange Commission **has proposed new regulations** for the investment management sector which will require fund managers to review cybersecurity policies annually and provide notification of significant security incidents
- Increased scrutiny of the wider ethical and privacy implications of technology adoption. Organizations like the CFA Institute have, for some time, **flagged** how the rise of automation and analytics in investing can contribute to misconduct by removing human agency from decisions, and because such tools are not designed with ethics in mind

The opportunities in wealth management

Shore up cybersecurity practices in the fact of threats: Wealth management firms need to shore up their cybersecurity practices in light of the ever increasing threats to their business from bad actors, some of which may even be state-sponsored. The operational and reputational risks that can arise from breaches need to be recognized. Security infrastructure and policies need to be updated regularly to reflect developments in the market and threat environment. A culture of security both within the organization and among clients needs to be fostered by raising awareness of potential attacks or vulnerabilities, and outlining practices that can be adopted in response.

Choose partners carefully: In a complex ecosystem with interconnectivity to multiple entities which themselves may be targets, like brokers, exchanges and custodians, the threat vectors increase significantly for every organization. Wealth managers should employ great care and due diligence in selecting these partners, holding them to a similar standard and ensuring they remain transparent about security and data protection policies.

Make cybersecurity, privacy and ethics your differentiators: Strong cybersecurity policies, successfully executed, can be a differentiator. Wealth managers enjoy high levels of client trust, with most clients willing to share data if it supports more personalized services or better experience. Thoughtful strategies are required to maintain this trust. Defenses against cyberattack need to be shored up, client privacy respected and the ethical dimensions of data use transparently considered.

Advice for adopters

Examine the role AI can play in your cybersecurity...

AI is fast becoming a popular tool to help organizations fight security threats, with a wide variety of products emerging to meet rising demand. The aim is to automate manual detection tasks, providing intelligence such as intrusion alerts and scrutinizing network traffic to detect odd behavior, policy breaches or bad bots. Perhaps the most critical aspect of AI-enabled approaches is the ability to not just limit the attack surface and plug gaps but also to help predict where future attacks might occur, thus allowing risk mitigation strategies to be adopted in advance.

... While remembering that AI is not a silver bullet

Any technology used for defense can also be used by attackers and while an organization might benefit from AI, it's not a silver bullet. In particular, enterprises should move away from seeing AI, machine learning and data-oriented tools as "one size fits all" solutions. Instead, all tools need to be part of a pervasive intelligence strategy embedded throughout the organizational structure. Machine learning, for example, can't support effective security in isolation — it requires managing the lifecycle of data and models and feeding back outcomes.

Underline that security is "everybody's problem"

Security needs to be seen as everybody's problem — including clients, who, as prominent investors or high net worth individuals, may be targeted by scammers or bad actors directly. This can be supported by zero-trust architectural approaches to subdivide the physical network and overlay security and data access principles in a way that scales safely and makes information available as needed — no more than is necessary for privacy purposes but no less either.

Employ a data ethics framework

Show your employees and clients how data is stored, used and kept safe by adopting or constructing a data ethics framework. We advise only keeping the data you need and no more. The demands of modern compliance and privacy laws, particularly in financial services, can be turned into a competitive advantage, given that data protection is among the top expectations of clients. Any failure to do so can attract harsh punitive action and **fines from regulators**. A robust data ethics framework can also play an essential role in your overall data strategy by serving as the basis of retention policies and data set construction and usage.

Technology trends shaping this lens

Explainable AI

The use of AI and ML tools to analyze data and produce recommendations creates the black box conundrum, whereby it is difficult to explain why the AI gives a particular result. With money being invested based on AI models, and compliance responsibilities, it is important to understand the result, establish traceability and check if any bias may have crept in during the design phase. Explainable AI refers to a set of tools and approaches to understanding the rationale used by an ML model in reaching a conclusion.

Security as a first class citizen

The nature of the wealth management industry makes it a natural target for cybercriminals and a security breach could lead to financial loss and reputational damage. Regulatory scrutiny associated with the sensitive data means security needs to be ingrained in the DNA of the firm and in every aspect of its business including its IT systems. Security considerations should be embedded throughout software development processes (rather than addressed at the end) and automated security considered to reduce vulnerabilities.

Biometrics

The risk of identity theft and financial fraud is creating a need to look beyond password-based security solutions. Transactions processed by wealth managers often need to be confirmed by the customer, but calls and emails do not offer fully-secure assurance, and nor do paper-based identity documents, even when examined in-branch. Biometrics uses distinctive biological patterns in the human body to confirm identity — with techniques including fingerprinting, iris scanning, facial recognition and voice prints.

Compliance automation

Wealth management firms need to gather and maintain a variety of client data including KYC information, risk profile scores, agreements and term sheets. This sensitive client data needs to be protected from unauthorized access. Compliance automation supports the processes related to these activities.

Lens Five: Evolving the human machine experience

Through the Looking Glass

Investors are changing the ways they interact with the digital world and what they expect from it. In wealth management, a mass migration to digital methods of engagement is well underway, with research showing investors — regardless of age or net worth — strongly prefer to connect with wealth management providers via apps or websites rather than face-to-face.

New solutions and platforms will accelerate this trend. Traditional devices are extending their reach with gestures and voice interaction, and real-world scenarios are being tested through the use of digital twin simulations that can guide customers and model results. While there's no shortage of tech industry buzz around ideas like the metaverse, it's too early to predict how this will play out. What's more certain is that the trend of the physical and digital worlds further converging will open new doors for wealth managers.

Emerging technologies — such as augmented (AR), virtual (VR), mixed (MR) and extended (XR) reality — are likely to reshape our ideas of services and advice.

Emerging technologies — such as augmented (AR), virtual (VR), mixed (MR) and extended (XR) reality — are likely to reshape our ideas of services and advice. In the next few years a quarter of the population will be spending more than an hour in the metaverse every day, according to Gartner. An estimated 30% of corporations will have products and services ready for the metaverse in that period.

In a post-COVID environment, VR or AR-based interactions can provide a near face-to-face experience for clients with added safety and convenience. BNP Paribas is already offering virtual banking solutions that allow customers to explore highly-accurate renderings of potential real estate investments from thousands of miles away.

Interactions that bridge the human and machine worlds also provide a means to realize operational efficiencies and drive leaner processes. Phone and face-to-face channels tend to remain high touch, manual and conversational. The processes involved are expensive and may cause inconsistent outcomes and unintended operational risks.

Chatbots, voice assistants and virtual platforms supported by intelligent workflows can improve automation of these processes and deliver more consistent results, as well as a better experience for clients aiming to transact digitally. Similar experiences can be delivered in the remote working environment to drive collaboration and creativity amongst employees. Wealth manager St. James Place, for one, is exploring virtual reality-based training to help build the confidence of new hires.

Signals include

- A marked increase in acquisition activity by tech giants like Apple, Microsoft, and Google in the interactive entertainment and metaverse space, such as Microsoft's acquisition of Activision Blizzard
- A surge of investment in XR consumer solutions in readiness for the metaverse and related services. Chip giant Qualcomm Technologies' announcement of plans for an XR R&D hub in Europe envisioned as a "ticket to the metaverse" is one recent example
- Wealth managers adopting more virtual platforms and boosting investment in digital channels to satisfy the demands of a digital-first client base, as seen in J.P. Morgan Asset Management's launch of a mobile-based AR version of its guide to major market themes for investors
- A spike in investor interest in AR, VR and metaverse-themed investment products and assets such as metaverse exchange-traded funds (ETFs), which could reach assets under management of $80 billion by 2024.
- Digital assistants, like the one implemented by Truist Financial Corporation, using the latest AI technologies to enhance client experience and provide personalized financial insights.

The opportunities in wealth management

Engaging with the digitally-native generation: Wealth management firms need to consider the platforms they will develop and offer to interact with customers who expect a more readily accessible, engaging and even gamified experience. The younger generation which will benefit from the great wealth transfer is digitally native, having grown up around devices and in virtual worlds, and wants services to be tailored and delivered on its choice of tech-enabled platforms.

Automation to streamline operations: Client demand and shrinking revenue streams should also fuel a push for greater automation to streamline operations. We are already seeing increased use of chatbots for specific use cases such as customer onboarding.

XR for employee training: In the workplace, there are fewer opportunities to gather in physical workspaces in the post-COVID world and fatigue with video calls has set in. Wealth managers can invest in XR to deliver a superior employee experience that promotes greater collaboration and experimentation. Emerging virtual platforms can replicate real-world interactions for training purposes to help employees hone their skills, and test out different approaches to client engagement.

Stay ahead by keeping in close touch with virtual worlds: Managers who are early movers in exploring the potential of virtual worlds in investment portfolios and in their own operations will be best aligned with the expectations and ambitions of investors today and tomorrow.

Advice for adopters

Build capabilities to leverage emerging technologies

AR, XR, the metaverse and other emerging technologies require specialized knowledge which is lacking in traditional wealth management software development. For example, clients will interact in a VR environment in completely different ways than they interact with web-based applications. This requires application creators to think about user choices and experiences that did not exist previously — wealth managers aiming to leverage these new experiences need to start building capabilities now.

Be actively on the lookout for the next dominant technology sets

Relatively simple AR offerings are already translating into available products and will become more commoditized. More advanced applications and some of the more ambitious virtual world-building efforts, are, for now, likely to lie outside the priorities or investment tolerance of most wealth managers. It will take time to work out which XR/metaverse platforms and solutions will lead the space for the long term, and those currently available could turn out to be the Netscape of the metaverse. Wealth managers should be actively on the lookout for the platform that will be the Google, or at least the Yahoo!, of these fields.

Bear in mind that these technologies change the user experience and design process

In XR for example, working across multiple dimensions well is a challenge and the complex interplay of identity and emotions need to be considered. Managers and clients may represent differently in virtual

worlds, which can have moral and ethical implications. In addition, it is all too easy for interactions to be impacted or thrown off course when emotional signals are transmitted differently or difficult to assess.

Be prepared to change tack

A certain degree of vendor lock-in is inevitable, whether in devices, digital worlds or the data generated. Accept this but also be prepared for change. Embracing one AR or metaverse platform may be the best solution for your organization now but not necessarily over the longer term, depending on how the ecosystem and your needs develop.

Technology trends shaping this lens

Metaverse and Web3

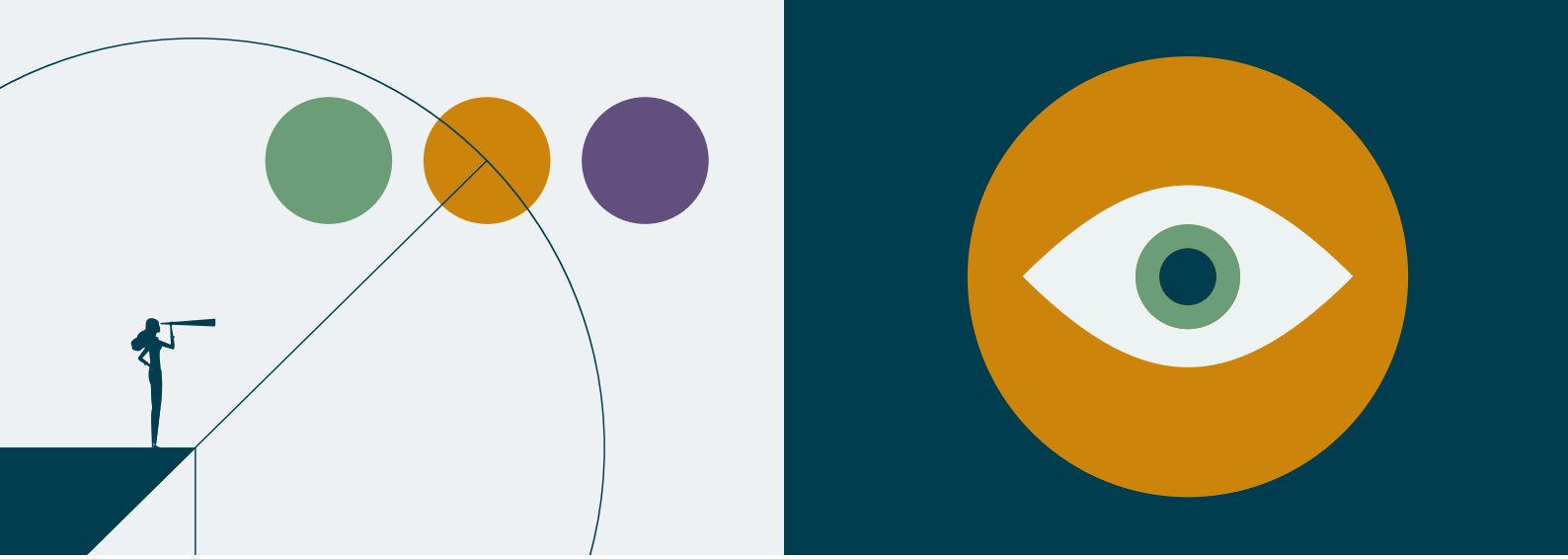
Hype around metaverse and decentralized "Web3" technologies continues and Meta describes its commitment to metaverse as "multi-year", despite **reported failures** to meet some internal targets. Wealth management firms need to assess the capabilities required for investors to acquire, hold, report and value related assets seamlessly as part of their overall portfolio.

Intelligent automation, agents and bots

Automation technologies like optical character recognition (OCR) can reduce paperwork and make the process of opening accounts faster. Many backend processes, such as reconciliations, can be automated using robotic process automation (RPA) tools. Chatbots have evolved from answering simple service queries to using AI techniques and predictive analysis, enabling them to provide personalized financial advice to clients. Intelligent automation technologies like these can lead to better customer service and increase operational efficiency.

Edge computing

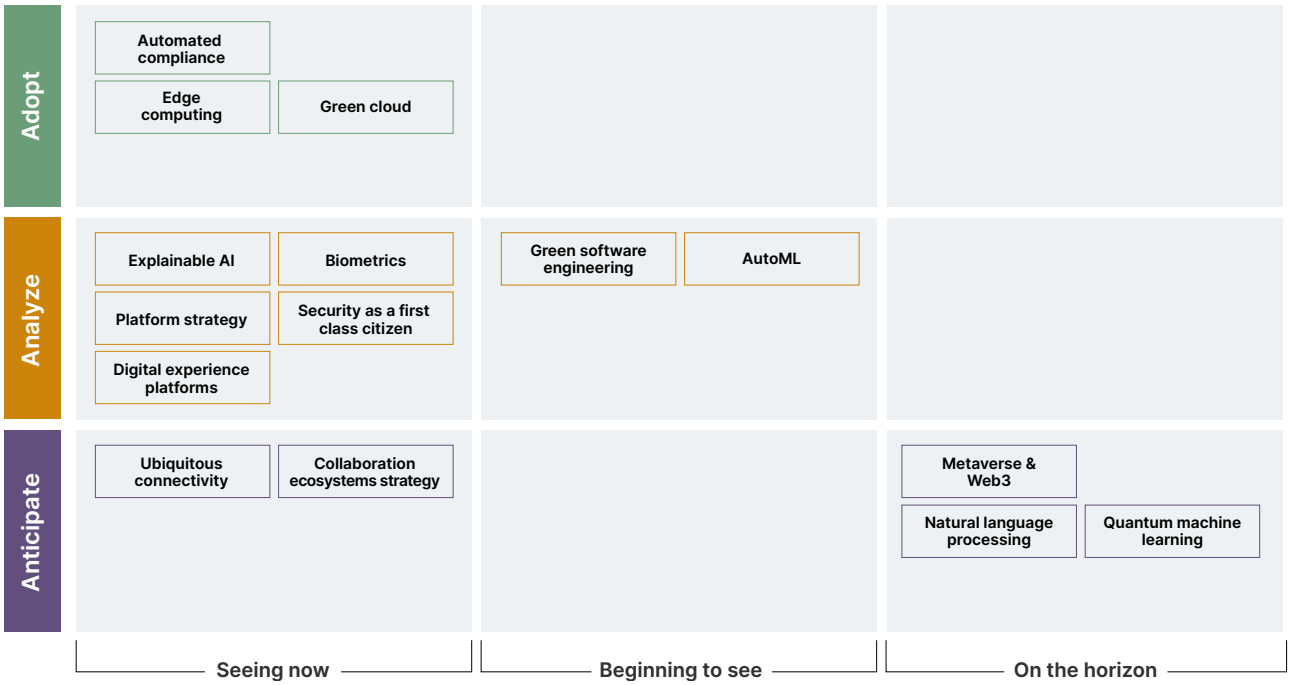
Edge computing means storing and processing data in a distributed way — for instance on a device rather than in a central location — enabling faster processing. This can be helpful, for instance, in a branch — enabling facial recognition to prevent fraud as it is happening, or to offer relevant services or advice quickly. The speed of processing allows real-time decisions to be made — while less energy is required to send data to a central location, potentially reducing carbon footprint.



The future of wealth management in focus

Each of the technology trends explored within our five key lenses has the power to transform multiple aspects of the wealth management industry. But, when applied together, they can drive broader changes at the firm level and thereby accelerate shifts across the industry.

In the chart below, we've included the emerging and maturing technology trends most likely to impact wealth management, mentioned throughout the report.



The trends in the top left of the diagram should be the initial focus to consider for adoption. As you move outwards from that point, we introduce trends to watch and analyze as they develop. These might not be things you can dive into today, but they should be on your radar over the coming years.

We've identified three major shifts that can take shape when organizations in the wealth management industry apply the right combination of technologies from across our transformation lenses.

Trend #1: Democratization of wealth management

Wealth management services have been traditionally seen as catering to only high net worth (HNW) and ultra-high net worth (UHNW) client segments. Numerous boutique wealth management firms cater to the financial needs of small numbers of super rich clients and family offices. They have access to superior research, advice and investment options through which they can generate better returns on their investments.

Retail investors on the other hand have access to a limited set of investment tools and the services of wealth advisors have remained out of reach. This is now beginning to change. With technology enablement and innovations from startups, retail investors are being offered a level playing field. Certain investor communities which were earlier overlooked are now being offered customized offerings to meet their specific financial needs.

The potential for change

The emergence of a flourishing middle class, especially in the Asia-Pacific region, has led to an increased demand for financial advice and investment-related services. Inflationary pressures in an uncertain economic environment have forced individuals to seek greater returns on their investments. For wealth management firms this represents a huge untapped market. Firms like Robinhood have brought new investors into the market in large numbers, who are now looking for similarly simple, intuitive solutions for their financial planning needs.

Wealthtech startups have already started offering robo advisory, alternative investments, structured products and digital assets to retail investors. Their DIY approach to wealth management and digital channels focussed on used experience are drawing in new and seasoned investors alike.

Traditional wealth managers are not being left behind though. Leveraging technology investments, they are extending their offerings to a much wider set of customers. A hybrid advisory business model brings in an additional, steady stream of income from the self service channels while the advisors continue to focus on the wealthier clientele.

Key Challenges

To effectively provide wealth management services across the customer spectrum is not without its set of challenges. Each client segment has their own unique requirements and satisfying each can be tricky.

- **Business model realignment:** Wealth managers need a different business model to serve a large number of customers at scale. It requires significant technology investments to build and maintain a digital wealth platform. While larger firms can run a hybrid business model, smaller firms will have to decide their target customer segment and design their service offerings accordingly.
- **Due diligence while offering complex products:** Offering complex structured products and alternative investments to the mass affluent clients tends to require detailed regulatory, compliance and suitability checks. Ensuring compliance with all the requirements can pose operational challenges.

The technology behind the change

- **Intelligent assistants, agents and bots:** Serving large numbers of diverse clients implies a digital approach under which many activities are handled by intelligent assistants. In wealth management, primary uses are goal planning, risk profiling and portfolio allocation, together with solving generic servicing queries for mass affluent clients.
- **ML platforms:** With a wider variety of client segments being targeted by wealth management firms, the need to create, train and manage different ML models has increased. Having an ML platform eliminates the need to develop these capabilities from scratch and provides end-to-end solutions for data management and model deployment. They also improve collaboration between data scientists, engineers and the rest of the business.

What we've seen

Providing investing capabilities and wealth advisory access to all kinds of investors is one of the key focus areas for many wealth management firms. Apart from providing access to markets, firms are also focussing on helping and educating investors on the journey to their financial goals. Through financial insights gained from digital advisory solutions, these investors stand to benefit from the expertise and knowledge of the wealth managers. Achieving this on scale helps firms target a much wider set of potential clients.

Trend #2: Changing business models in wealth management

Wealth management has historically been an advisor-driven business. Clients rely on the expertise of the advisors for financial advice and implementation of investment strategies. This fee-and-commission based model is now under threat from new entrants who are offering low-cost digital solutions addressing all aspects of financial well being. Onboarding, goal planning, advisory, investing and reporting are all activities now being offered with no or little manual intervention. There are companies offering specialized services in each of these areas and wealth management firms can pick and choose the provider to partner with. This collaborative model is beneficial for wealth managers, service providers and clients alike. Wealth managers directly benefit from specialized services without having the need to build and maintain the same.

Other factors prompting existing wealth management firms to redesign their businesses include changing market dynamics, customer expectations and competitive forces. Many large firms are considering a hybrid approach to wealth management, whereby advisors continue to serve a smaller set of wealthier clients and the mass affluent segment is supported through self-service.

The potential for change

The expectations and investing behavior of today's younger adults are very different from their Silent Generation and Baby Boomer predecessors. The younger generation of investors — used to accessing services like shopping, transport and holiday planning on their phones — is also demanding a DIY approach to investing and wealth management. Engaging and servicing the needs of these investors will require wealth firms to be agile and digital in their approach while at the same time providing a personalized experience.

Client demands are also increasing for all their financial services to be under one umbrella, giving them a complete "wealth view". Sharing client financial information through secure APIs not only makes it easier for clients to view their current consolidated financial position, it also gives wealth managers and other institutions a chance to offer innovative new financial products.

Cost pressures and competition from startups are pushing traditional wealth managers to explore newer client segments and create digital ecosystems to meet their needs. Various players come on to the platform and bring in their expertise in niche areas to provide products and services relevant to the client.

Key Challenges

Wealth management firms might encounter several challenges while transitioning to a different business model to serve their clients

- **Heavy technology investments:** Moving to a digital engagement model requires time and financial commitment from the management team with clear objectives of what they want to achieve. A partially-executed strategy can prove costly and damage the reputation and relationships of the firm.
- **Rigid legacy systems:** Technology challenges might limit the extent to which businesses can adapt to changing client expectations. The firm's legacy core systems might either prevent a seamless digital experience for a client or automated workflow-based processing which could have resulted in increased efficiency.

The technology behind the change

Technology is being used to solve a lot of customer problems and reduce operational inefficiencies. Some of the key ones impacting this trend are

- **Platform strategy:** A business capability platform built on top of an infrastructure platform can add the maximum value to an organization by delivering new products faster, increasing customer engagement and satisfaction and ultimately increasing revenues.
- **Collaboration ecosystems:** Different client types, systems, niche service providers and wealth managers can collaborate, and complement their capabilities, to create an ecosystem which is beneficial to all stakeholders. The client gets a bouquet of products and services in one place and the wealth firms have the opportunity to cross-sell their other offerings as well.

What we've seen

Thoughtworks worked with the private banking division of a large banking group to create a new data platform across various functions. This helped the firm make informed decisions about future growth opportunities while empowering its clients and employees through high-quality information about portfolios in real time. Having a solid technology foundation in place allows the bank's data models to expand in step with its evolving business.

Trend #3: Personalization of advice

Each wealth management client has specific goals, biases, preferences and risk tolerances when it comes to investment decisions. For example, a client might have reservations in investing in stocks of a particular company due to the ecological impact that company's business might have. Typically, wealth managers would sit with the clients, document all these variables, prepare a financial plan and then go about executing it.

As digital engagement with clients increased, this advisory started to be addressed by robo advisors. This was especially true for mass affluent client segments where the investible amounts might not be big enough to warrant an advisor to get personally involved. Backed by AI and machine learning technologies, these robo advisors are now helping clients plan goals, determine their risk profiles and then select target portfolios based on these parameters.

However, achieving personalization at scale is challenging. A robo advisor churning out advice based on few basic questions and parameters could end up giving commoditized responses and disappointing the firm's clients. Firms are deploying AI/ ML technologies and training the models with larger historical datasets to provide more meaningful advice.

While robo advisors are definitely cheaper and more efficient, they lack the emotional connection and personalization brought by human advisors. Commoditized advice, devoid of empathy and emotions, may not always resonate with clients.

Many firms are therefore investing in tools which enable human advisors to have higher-quality more meaningful conversations with clients. Relevant client information, market insights and portfolio analytics are among the tools which can aid advisors when speaking with their clients and increase personalization.

The potential for change

Technology-led personalization is present in many aspects of our lives. From the news we read, the movies we watch, to the things we buy on e-commerce sites and the food we order — we are used to a curated experience which satisfies our needs and makes it easier to make a decision. Clients are expecting a similar nudge when it comes to their financial decisions. They do not want to spend time going through extensive research material, analyzing market data and then making an informed decision. Innovative use of technology can help bridge this divide and present clients with multiple investment options to choose from.

Advisors as well prefer having some insights into the client before starting a conversation or going into a meeting with them. Typically this will require a lot of work to sift through a lot of client data and blend it with market insights to create an actionable plan for the particular client. Any assistance on generating the analytics required to generate the advice would ease up the advisor's job and increase their productivity.

Key Challenges

Providing a personalized experience or service to a client, or enabling an advisor to provide the same has numerous challenges for a wealth management firm

- **Segregated data within the firm:** Different types of client, transaction and market data required for analytics and intelligent recommendations is often stored in different silos within the firm's IT organization. Having disparate systems with non-standardized data formats makes it challenging to implement any effective engagement tool.
- **ML model training data:** AI technology is only as good as the data used to train the model. Creating the right dataset which encompasses all the aspects of the investor behavior is key in the success of the ML model.

The technology behind the change

- **Edge computing:** As IoT and devices like mobile phones become more powerful, more processing capabilities are being added to them to speed up the response times. Cameras recognizing a customer walking into a branch and intimating customer-specific details to an advisor can enhance the service experience
- **AI/ ML technologies:** AI-assisted robo advisors or chatbots can help assess the financial needs of a client and recommend a plan for achieving their financial goals. While leveraging historical data and digital feedback loops, it is possible to apply AI to automate processes and decision making for advisors, thus strengthening their relationship with the client.

What we've seen

Traditional as well as new age wealthtech firms are racing to **build intelligent wealth management systems** which can cater to the needs of a range of clients in a personalized, secure and intuitive way. Some of the benefits in play include: offering tailored financial advice to a broader client base; dynamic portfolio optimization; AI-driven insights; and emotional intelligence-powered robo advisors. Client perception of increased personalization is likely to be driven by a combination of these technologies.

Conclusion

In conclusion, a range of emerging technologies are being adopted across functions within the wealth management industry. They are helping firms uncover new ways of engaging with clients and bringing personalized solutions to them. Clients are thus able to make more informed investment decisions, with many of them also getting access to products which were earlier out of their reach.

At Thoughtworks, we work closely with organizations across all industries to carefully analyze their needs and work backwards to determine which technologies and capabilities are best suited to deliver the results they want to achieve.

As you look to the future and consider what you want your offerings to look like over the coming years, we're here to help you explore your options, prioritize your budgets and efforts, and bring your vision of smarter, more efficient and more accessible wealth management services to life.

To find out more, and learn how our team can help you, talk to us today.

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Thoughtworks is a global technology consultancy that integrates strategy, design and engineering to drive digital innovation. We are 12,000+ people strong across 50 offices in 18 countries. Over the last 25+ years, we've delivered extraordinary impact together with our clients by helping them solve complex business problems with technology as the differentiator.

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