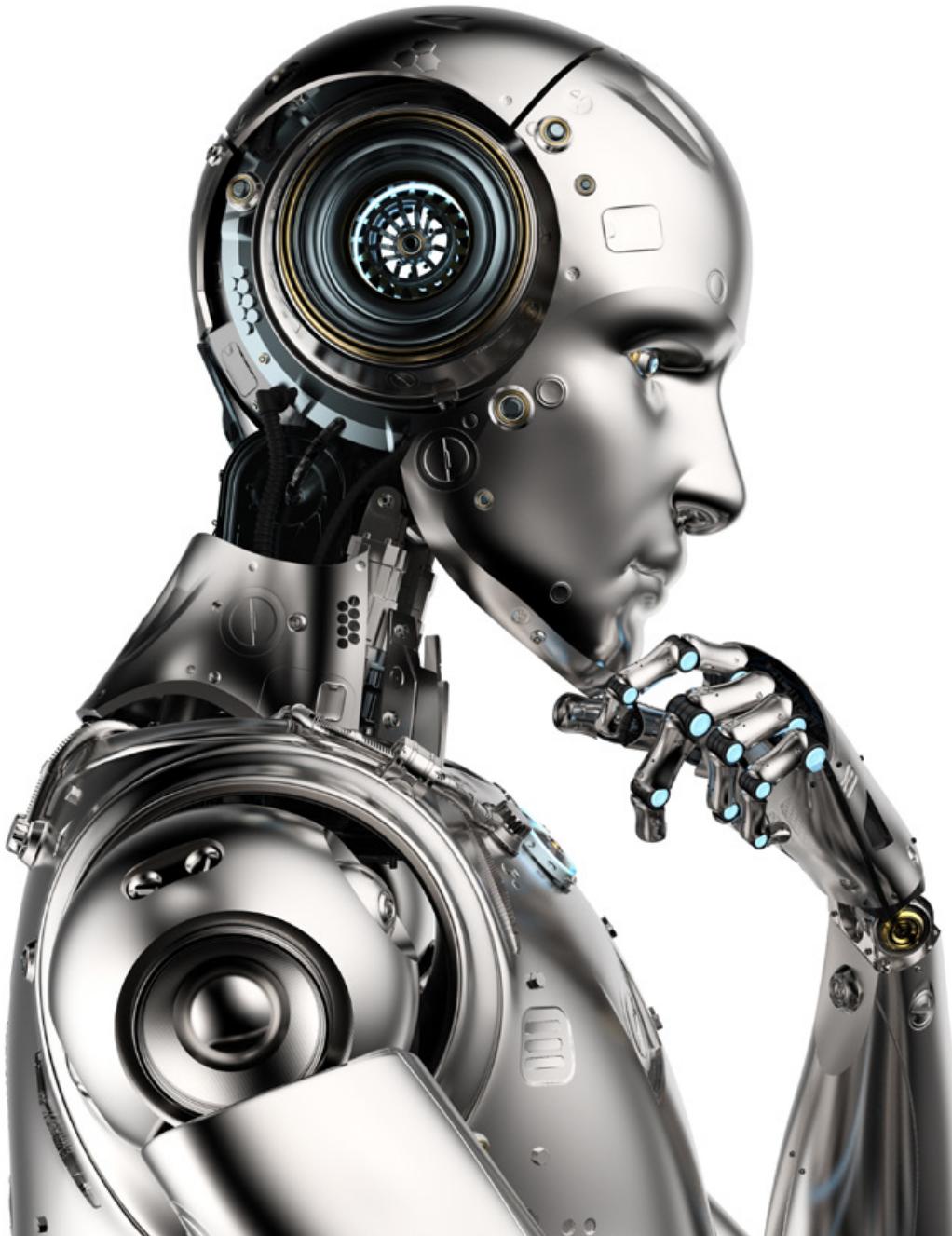




Visa Consulting & Analytics (VCA)

Building inclusive, trustworthy Artificial Intelligence



What is Artificial Intelligence?

Artificial Intelligence (AI) is a powerful tool for unlocking the value of data. Responsible use of AI can extract valuable insights from large amounts of data efficiently and accurately. Automated tools at scale are a significant innovation for businesses and society. At its best, AI is already transforming the world around us, and there is much more to come.

In this paper, Visa Consulting & Analytics (VCA) examines various approaches to fairness, ethics, accountability, and transparency in using responsible AI.

Artificial Intelligence (AI) at Visa

AI is a set of technologies that enable computers to perceive, learn, reason, and assist in analytics or decision-making to solve problems in ways that are similar to what people do.

Visa is an early adopter of AI, harnessing its powers to detect fraud and prevent billions of dollars of loss.

Driving the future

Visa is harnessing AI across product, technology, and research.

Today, we're using AI in various facets of our core business —technology, products, operations, security, and risk.

The image illustrates a futuristic retail experience using AI. A person's hands hold a smartphone, which displays a live video feed of a clothing store. Overlaid on the screen are four digital callout boxes, each highlighting a different garment with its name, price, and a brief description of its features. This demonstrates how AI can enhance traditional retail by providing personalized information and recommendations directly to the consumer through their device.

A few examples of how Visa is using AI today



Fraud prevention

Visa Advanced Authorization (VAA) has prevented billions in fraudulent transactions: an estimated \$26b a year.¹



Frictionless transactions authorization

Smarter Stand-in Processing (STIP) leverages past transaction history and deep learning to approve transactions on behalf of issuers.



Boosting cybersecurity

Visa Account Attack Intelligence applies machine learning and AI to predict and thwart cyberattacks.



Travel predictions

Travel Predict helps clients offer loyalty offerings and products based on cardholder travel behavior trends.



Expanding access to credit

Visa Cardholder Transaction Scores help expand credit approval rates for unbanked consumers or those with limited credit history.



Strengthening operational resilience

AI-based predictive analytics help mitigate **VisaNet** operational issues before they occur, thereby reducing negative impact on our clients and their account holders.

¹ Visa Annual Report 2021, https://s29.q4cdn.com/385744025/files/doc_downloads/Visa-Inc.-Fiscal-2021-Annual-Report.pdf

AI has carved the way for many businesses to better understand their customers and has increased the safety of online purchases. Though we have shown that AI can unlock tremendous business value, managing responsible AI programs comes with a unique set of ethical and governance responsibilities. These responsibilities include aligning fairness, ethics, accountability, and transparency in governance and building and maintaining trust.

#1 Aligning fairness, ethics, accountability, transparency, and governance

As automated tools begin to scale, transparency is key to explaining the logic of the models in ways that are understandable to those they affect. Companies must be able to explain the management, governance, and accountability processes that oversee the development cycle of the AI model. Model governance is critical to building trust in emerging technologies at scale and setting operating standards in a constantly evolving regulatory landscape.



#2 Building and maintaining trust

The financial services industry's trust has been hard won – and we don't want to jeopardize it. It is essential given the challenges AI raises and the importance of maintaining trust. There is a need to consider the risks and governance of AI beyond the existing frameworks that most organizations have traditionally used. Companies must think deeply and holistically about AI: ethically, operationally, culturally, and futuristically for their business operations.



How does the payments industry move forward with responsible AI?

Part of Visa's responsibility as a global network is to share learnings and bring together broad groups of stakeholders to advance progress on responsible AI. Visa believes the payments and financial services industries can work together with research communities and policymakers to raise the bar for responsible AI, particularly through sharing research, learnings, and best practices.

We have identified three areas where valuable insights are guiding our constantly evolving approach to AI:

1

Cross-organizational awareness and accountability

Businesses often operate as siloed entities, which can result in inconsistent AI understanding and expertise across organizations and thus difficulties in governance, accountability, and risk management. To bridge this gap, stakeholders must have a shared understanding of their AI ethics and the organization's governance goals.

To achieve the above, stakeholders must work together to establish technical, operational, and legal expertise across the organization and create cross-functional leadership and governance groups. It is important for businesses to embed accountability in responsible AI and data use to alleviate these difficulties.

2

Ethical organizational structure and ethical decision making

New data-use cases in AI development can often raise ethical dilemmas related to privacy, human autonomy, and fairness. With the proliferating use of AI, sustainable innovation may require a fundamental rethink of business responsibilities to consumers.

Corporate principles and goals should address the ethical use of data and AI. This requires active monitoring of global ethics principles and regulation, as well as extensive external and internal stakeholder engagement.

3

Global regulatory, industry, and civil society debate

Currently, regulatory foundations on AI are fragmented across sectors and jurisdictions. Policymakers are still evolving their approaches to emerging technology, and as such the existing body of regulations and technology policy on AI is progressively becoming more interdisciplinary and cross-functional.

In this fast-moving global conversation, it is important to be an active participant in such discussions – whether through government outreach, industry councils, or intergovernmental organizations.



With these goals in focus, Visa entered the Global Veritas Challenge to tackle responsible AI and fairness issues in the context of financial sector use cases.

Responsible AI principles in practice

Showcasing our recent success at the Monetary Authority of Singapore (MAS) Veritas Hackathon

Background

As part of the Veritas initiative, the MAS organized a hackathon: the inaugural Global Veritas Challenge 2021 – Codifying Responsible AI.

The event addressed problem statements for Artificial Intelligence and Data Analytics (AIDA) solutions in product marketing, risk, lending, and credit underwriting.

Visa was selected as one of the 10 finalists to build the solution for Responsible AI in product marketing and won alongside two other recipients of the Veritas Challenge.²

Solution

Following a human-centric design approach, we formulated a holistic and stakeholder-centric approach enabling multiple perspectives on fairness leading to shared accountability for AIDA solutions.

We developed a decision support toolkit to allow the AI model stakeholders to build fair, responsible, and contextual AI models by balancing accuracy, fairness, outcomes, and explanations in the context of product marketing.

Visa's AI fairness toolkit - Human-centric AI

The AI Fairness Toolkit was designed as a flexible tool to enable stakeholders to select their fairness strategies depending on their use cases.

The challenge is there is no single definition of "fairness in marketing" due to the different metrics and viewpoints that represent different balances of interests.

Building another piece of code or toolkit is not a silver bullet. A true solution would require socio-ethical and legal approaches and technical solutions. There is a need to apply a user-centric design framework to understand the stakeholder needs in the AI-driven.

How to build human-centric, responsible, and fair AI?

With any Visa-designed product, we must always put ourselves in the shoes of the consumers who are impacted by automated tools. Therefore, at Visa, we look at fairness through a human-centric lens. By formulating a holistic approach that places our stakeholder at the center, Visa can consider multiple perspectives when developing AIDA solutions.

In the context of "fairness," there are multiple proposed definitions. In some cases, fairness means the most qualified individuals should receive the better outcome regardless of their demographics, so their background should not be a deciding factor. It is a term we refer to as "individual fairness."

² MAS.gov.sg, MAS Announces Winners of the Global Veritas Challenge 2021 at Singapore FinTech Festival, Nov. 9, 2021, <https://www.mas.gov.sg/news/media-releases/2021/winners-of-the-global-veritas-challenge-2021>





In other scenarios, demographic parities and equitable outcomes between groups are needed, so this is another perspective on fairness called "group fairness." Here are the four categories of stakeholders: developer, deployer, regulator, and consumer:



Developer

Responsible for designing and training models



Product/Model Deployers

Work to ensure the models they deploy will mitigate harm to consumers or financial, reputational, or regulatory damage to the business



Oversight/Auditor (Regulator)

Responsible for ensuring the solution is safe for consumption and meets regulatory frameworks or industry best practices



Consumers

Seek assurance from the deployer or product owner that the decision impacting their services, benefits, or product offers is made based on eligibility and need, and supported by appropriate explanations and rationale

Harms and benefits assessment

Applying a generic harms and benefits framework to assess the impact of AI for every use case and user above is not always straightforward. Therefore, we adopt the stakeholder-centric approach to address potential pitfalls from a user-centric point of view.

Implementing principles to practice

Consumers would like to receive products and services from a financial institution based on their needs, requirements, risk appetites, and capabilities. Therefore, access to financial products should not be restricted based on demographics like age, gender, zip code, or education.

Consider the scenario in which a bank's product manager wants to use AI to decide which customers should receive an offer for a financial-investment service. Since AI relies on training models with historical data, there is a risk that recommendations for the product may be biased towards certain age groups and/or under-represented demographics.

For example, affluent males aged 35–50 may be more likely to receive the product offer than would other groups. This replicates a historical trend where males in that demographic group were over-represented as consumers of those products, so the AI learned from traits that disproportionately relate to that demographic.

This scenario may not be suited for a consumer who does not fit into the segment of affluent males aged 35–50. In this situation, the consumer would lose out on an opportunity to invest in the financial product. It is simultaneously within a consumer's interest to purchase financial products that fit their needs.

For a financial institution, sending the offer to the groups that historically respond to the campaign may be the most profitable strategy. However, in the long run, banks may be unintentionally excluding other groups from accessing new financial services, which can lead to attrition of groups who are under-represented in the training data (e.g., females, younger customers, etc.) and reduce the customer diversity with an associated impact to business resilience, sustainability, and performance.

Therefore, with the AI Fairness Toolkit we can provide stakeholders a more flexible perspective on fairness and the ability to understand how higher diversity and inclusion can lead to business value in the future. Integrating the AI Fairness Toolkit in AI solutions permits the following:

- AI developers to optimize for performance and fairness
- Financial Institutions to understand the long-term value of fairness and inclusion
- Risk and audit teams to ensure trust, transparency, and accountability for the AI Solutions used by financial institutions



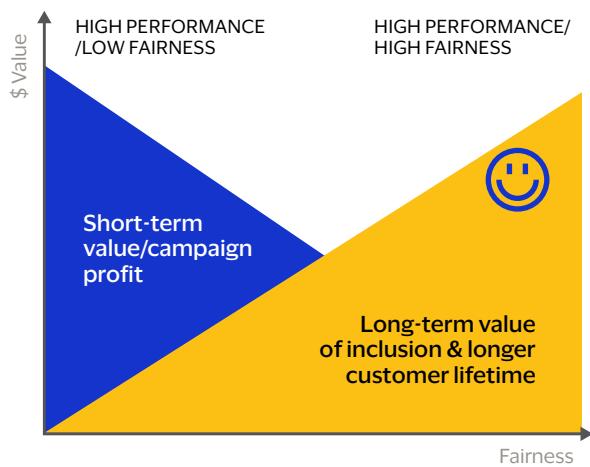
Human-centric AI design methodology for fair models

The business value of more inclusive AI

The AI Fairness Toolkit provides metrics and methodologies to support a fair, ethical, accountable, and transparent decision tool. It does so by achieving a balance among performance, fairness, and business metrics, supported by explanations.

We have also developed a Fairness Dashboard over the AI Fairness Toolkit for all the stakeholders of an AI model, enabling us to showcase the value for all decision-makers.

Many AI solutions learn from historical examples, so if the data is skewed, models will only reflect that disparity and amplify it. Thus, it is important to update models in such a way that they represent a more current view. In the earlier example, not providing a service to other demographics can create missed opportunities and can eventually lead to customer attrition and reduced diversity.



Illustrative

Assumptions - Increase in model fairness leads to drop in model performance. Short-term model performance directly linked to potential AI-driven campaign profit

Conclusion

Responsible innovation is possible if organizations adopt clear values and ethics, prioritize diversity and inclusion in the product, and reinforce the awareness and expertise at all levels of the business through a mix of top-down and bottom-up approaches.

Lessons learned from responsible AI innovation and the Veritas effort:

1. Value-driven stakeholder engagement to align on a user-centric approach to AI
2. Addressing the business context and commercial use case of AI models to align and track AI fairness principles with practical business outcomes
3. Supporting internal risk management and governance frameworks by engaging legal and compliance teams in cross-functional discussions about responsible AI
4. Prioritizing diversity and inclusion to foster a strong culture for responsible AI

Responsible innovation is possible when companies



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| Articulate a standard of ethics and values for the digital world. | Build cross-functional awareness and accountability on AI. | Engage in global regulatory, industry, and civil society debate. |
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About Visa Consulting & Analytics

We are a global team of hundreds of payments consultants, data scientists and economists across six continents.

- Our consultants are experts in strategy, product, portfolio management, risk, digital and more with decades of experience in the payments industry.
- Our data scientists are experts in statistics, advanced analytics, and machine learning, with exclusive access to insights from VisaNet, one of the largest payment networks in the world.
- Our economists understand economic conditions impacting consumer spending and provide unique and timely insights into global spending trends.

Combining our deep payments consulting expertise, our economic intelligence and breadth of data allows us to identify actionable insights and recommendations that drive better business decisions.

For help addressing any of the questions raised in this paper, please reach out to your Visa Account Executive to schedule time with our Visa Consulting & Analytics team or send an email to VCA@Visa.com or visit us at Visa.com/VCA

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