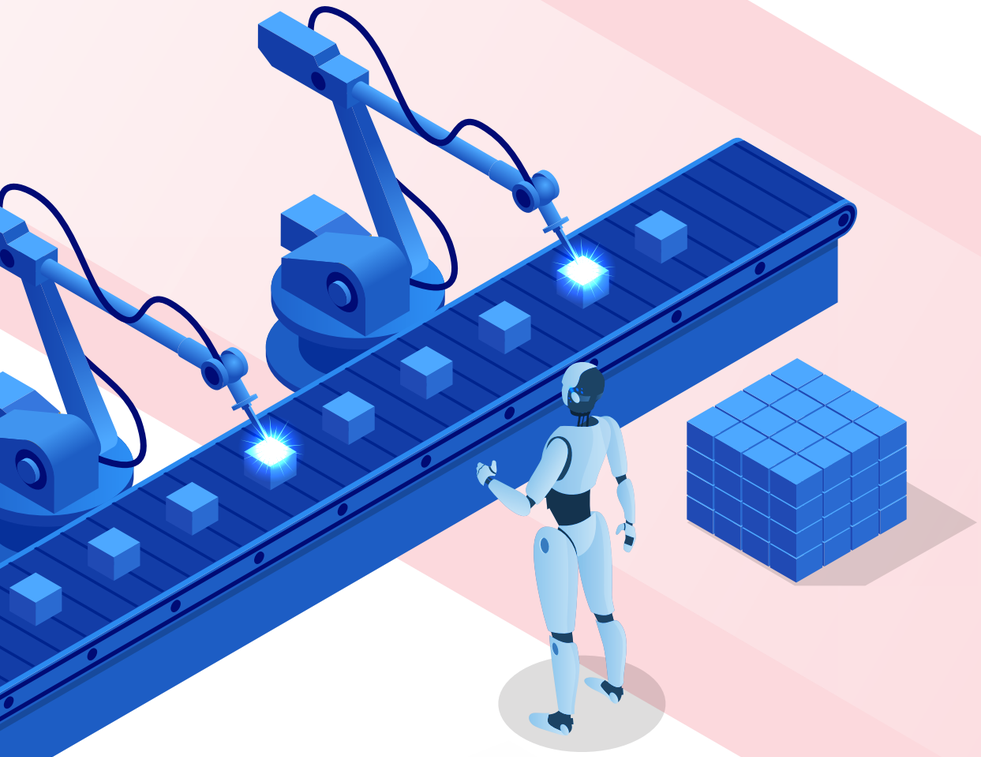
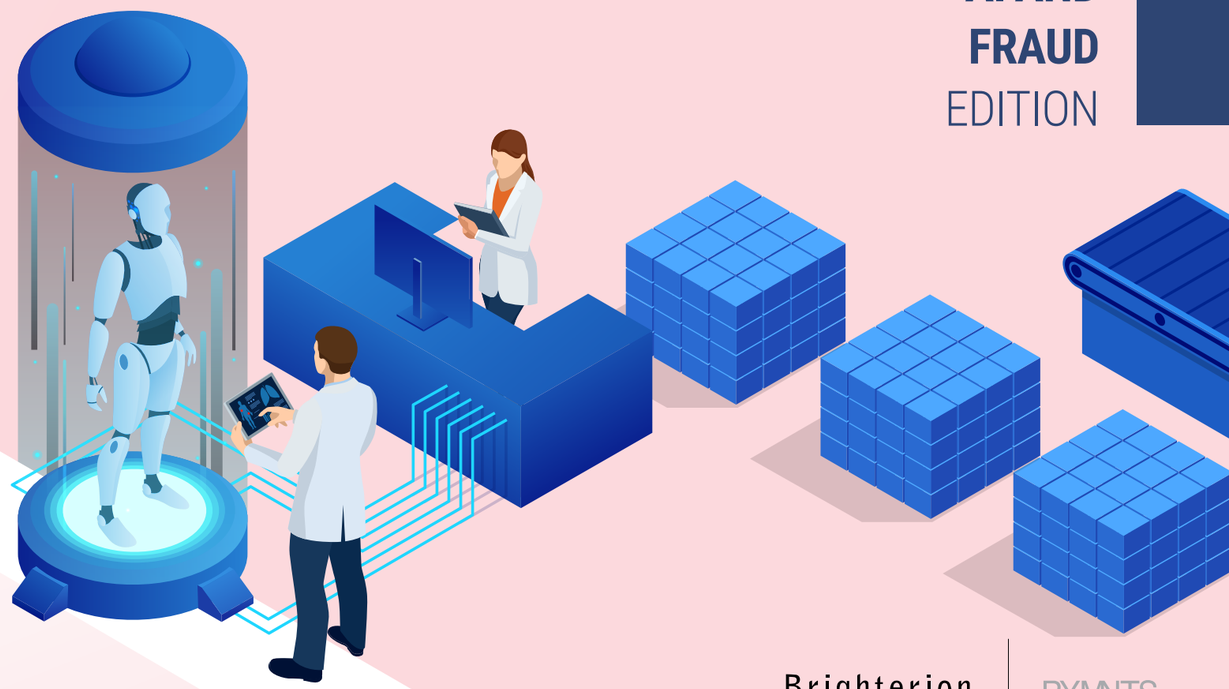


AI INNOVATION PLAYBOOK

PERCEPTION VERSUS REALITY IN PAYMENTS AND BANKING SERVICES

AI AND FRAUD EDITION



The AI Innovation Playbook, a PYMNTS and Brighterion collaboration, analyzes the survey responses of more than 200 financial executives from commercial banks, community banks and credit unions across the United States. We gathered more than 12,000 data points on financial institutions with assets ranging from $1 billion to more than $100 billion, then generated a comprehensive overview of how they leverage AI and machine learning technology to optimize their businesses. This study details the results of our extensive research.

June 2019

Brighterion mastercard | PYMNTS.com

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The AI Innovation Playbook was done in collaboration with Brighterion, and PYMNTS is grateful for the company's support and insight. PYMNTS.com retains full editorial control over the following findings, methodology and data analysis.

INTRODUCTION

Imagine a computer program invented for people who struggle to track their money, one that could manage their finances, prevent overspending and help them save funds by the end of each month. One might expect subpar money managers to at least give such a program a try.

How peculiar would it be if they did not want to tap into that solution, and instead insisted on continuing to do things as they always have?

This is essentially how many modern financial institutions (FIs) are fighting fraud. In the age of hacking and cybercrime, they face highly motivated enemies with continuously shifting tactics, and stakes are higher than ever with real-time payments schemes — which settle funds in a matter of seconds rather than days — fast becoming standard.[1]

Artificial intelligence (AI) holds great promise in many financial operations, but one of its most powerful uses may be in combating fraud. Its defining attributes include an ability to process large data volumes, after all, and to "learn" and adapt to real-world scenarios' messiness.

Many FIs are failing to capitalize on this potential, though. Just 5.5 percent of them have adopted AI, and only 12.5 percent of decision-makers who work in fraud detection rely on the technology. They instead rely on more limited — and increasingly outmoded — technologies like business rule management systems (BRMS) and data mining.

This is just one of the findings from the AI And Fraud Edition of PYMNTS' AI Innovation Playbook series, a Brighterion collaboration. The report collection examines FIs' usage of and attitudes toward various machine learning and AI systems, including BRMS, data mining, fuzzy logic and deep learning and neural networks. The third installment focuses on AI and fraud detection.

PYMNTS surveyed approximately 200 decision-makers for this report, polling those from FIs with assets ranging from $1 billion to more than $100 billion. Several factors were considered in determining learning systems' effectiveness in select operations like credit underwriting, fraud prevention and payment and banking services, among many others.

Our research shows that FIs are implementing computational learning systems, but are not wielding them wisely. Nowhere is this clearer than in how they deploy such solutions for fraud prevention: 70.5 percent of surveyed FIs use data mining — making it the most widely adopted learning system. Meanwhile, 92.5 percent of fraud detection and analysis decision-makers use data mining, while 65 percent of professionals in the same area use BRMS. These systems are only as good as the parameters humans plug into them, however, and those that are poorly constructed or ill-placed could do more harm than good. They can provide false senses of security while allowing suspicious activity to go unnoticed, for example.

One need not consult a data scientist to know that data mining and BRMS have shortcomings as fraud prevention tools. Just 28.4 percent of surveyed FIs that employ data mining and 17.6 percent that use BRMS say the respective technologies are effective at reducing payments fraud. This is cited by 63.6 percent of firms that use AI, by comparison. Simply stated, many FIs appear to be fighting fraud with some of the most ineffective tools available.

So, why has AI adoption been so limited? The answer is that firms do not feel they understand the technology enough to gauge its effectiveness, and notably includes the specialists charged with administering and evaluating FIs' anti-fraud programs. Our

[1] Vocalink: How to stop fraud in the era of real-time payments. PYMNTS. 2018. https://www.pymnts.com/fraud-prevention/2018/vocalink-mastercard-faster-payments-b2b-big-data/. Accessed June 2019.

research found that 60 percent of banks' fraud specialists who use AI systems believe the technology is not transparent enough, and the same portion view it as complicated and time-consuming.

FIs are also keenly aware that the learning systems currently employed to combat fraud are not up to the task. They express great interest in smart agents — AI-based systems that make real-time observations about interactions with human users — for example, as the solutions would "know" account holders' normal financial behaviors and could quickly spot unusual activity. More than two-thirds of surveyed fraud specialists view smart agents as ways to reduce manual review, a key priority for FIs in implementing learning system innovations. This may serve as a signpost for the way ahead: Specific applications like smart agents can turn AI from an abstract concept into a very real tool FIs can put to work for them.

The following are some of the key findings from our research:

FIs see AI's potential to more effectively fight fraud, but most don't use it.
Just 5.5 percent of our sample banks employ "true" AI systems, which can process and learn from large data sets and take personalized, case-specific actions. Among those that deploy AI, 45.5 percent use it as part of their fraud prevention efforts. By comparison, 26.2 percent of the 70.5 percent that use data mining do the same. More than 63 percent of FIs that use AI to fight fraud say it is highly effective, as do just 28.4 percent of those using data mining.

FIs believe AI's real benefit is that it reduces manual review and exception processes.
Our research shows that 66.2 percent of FIs' fraud specialists see reducing the need for manual review as a chief learning system benefit. Moreover, 60 percent of these specialists view AI as the best way to tackle complicated fraud prevention tasks while reducing demand on scarce human resources — especially compared to other systems.

Surveyed FIs have concerns about AI's complexity and transparency.
Sixty percent of their fraud specialists feel the technology is not transparent enough, according to our analysis, and an equal share believe AI is complicated and time-consuming compared to the average learning system. In contrast, these specialists are more likely to fault data mining for its lack of adaptability (56.8 percent) and limited real-time functionality (48.6 percent).

FIs express strong interest in using AI's dynamic capabilities to improve fraud prevention.
Ninety percent of respondents involved in fraud detection and analysis are at least "somewhat" interested in smart agents, and most believe the solution would help reduce manual review (66.7 percent) and exceptions (61.1 percent). At the same time, FIs appear to have concerns about such tools' cost and complexity.

These findings demonstrate it is not enough for FIs to simply profess innovation commitments or invest substantial budgets in new computational tools. The AI And Fraud Edition of the AI Innovation Playbook series will explore how FIs are missing the mark when addressing fraud risk — and how they can better focus their aim.

AI: ASPIRATIONS VERSUS REALITY

AI is the computational system driving autonomous vehicle technology development for a good reason: It is designed to respond to real-world events in real time, rather than according to a preprogrammed script. One might thus think AI would be a natural fit for FIs intent on cracking down on the very dynamic problem of financial fraud.

This has not been the case so far, though. AI is among the rarest of available learning systems, employed by just 5.5 percent of FIs. Only 12.5 percent of the decision-makers who work in fraud detection departments use it, and those who work in payroll are more likely to report using AI to aid their operations.

The mismatch between combating fraud and the tools FIs bring to the fight is further evidenced by the most employed fraud prevention tactic: BRMS. These are relatively basic systems, hardly equipped to handle sophisticated attacks, but 65 percent of decision-makers who work in anti-fraud report using them to enhance their operations.

TABLE 1:

Learning system implementation

Portion of FIs' decision-makers using select learning systems, by business unit

	Data mining	Business rule management	Case-based reasoning	Fuzzy logic	Deep learning and neural networks	AI systems
Payroll	75.0%	50.0%	50.0%	25.0%	25.0%	25.0%
Fraud detection/analysis	**92.5%**	65.0%	45.0%	25.0%	12.5%	12.5%
Risk management	59.0%	61.5%	35.9%	17.9%	7.7%	7.7%
Accounts receivable	85.2%	44.4%	37.0%	7.4%	3.7%	3.7%
Accounts payable	60.0%	63.3%	30.0%	13.3%	10.0%	**3.3%**
Treasury management	54.5%	68.2%	20.5%	18.2%	18.2%	9.1%
Financial planning/analysis	50.0%	65.8%	27.6%	7.9%	6.6%	5.3%

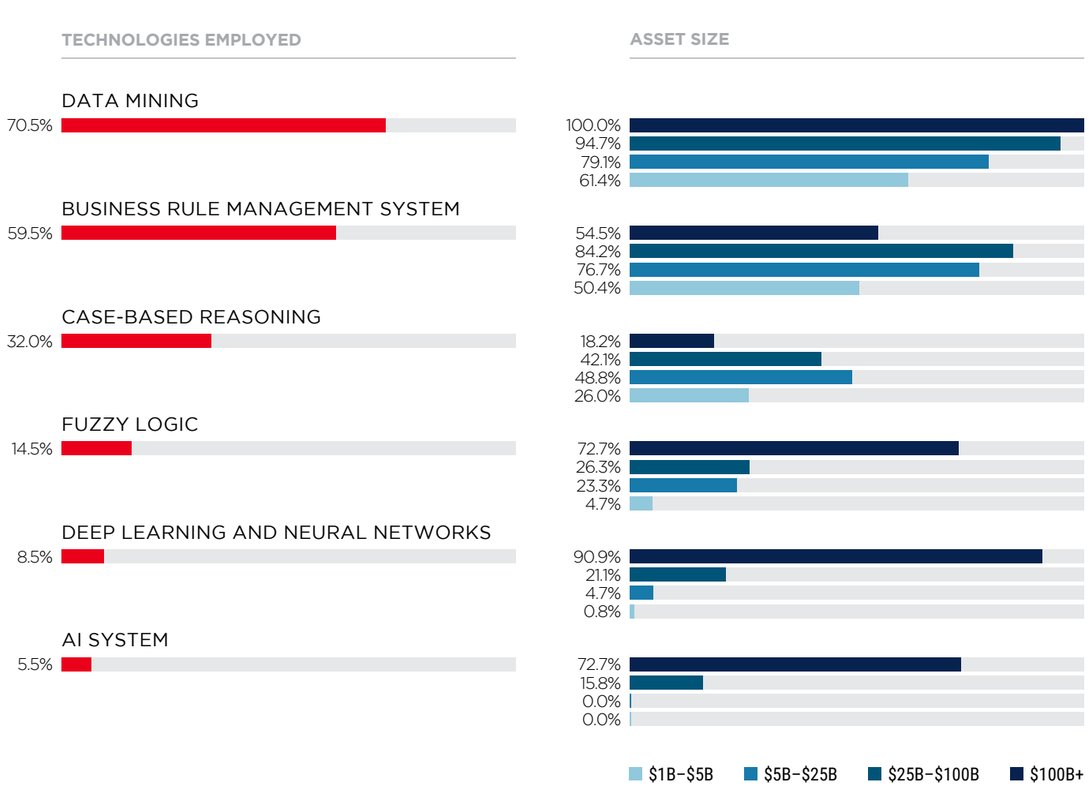
BRMS depend on parameters set by human users, though, and can therefore manifest the same blind spots written into the rules they follow.

This raises the question of why so many FIs are using rule-based systems to fight fraud in the first place.

The answer might be related to such solutions' relatively low costs. Implementing technology requires money, and it is therefore not surprising that a size bias exists among banks when adopting the most advanced learning systems. The greater the dollar value of an FI's assets, the more likely it is to have implemented sophisticated learning systems.

FIGURE 1:

Learning system implementation
Share of FIs that have adopted select learning systems, by size



FIs with more than $100 billion in assets are more likely to have adopted AI, according to our findings, and represent 72.7 percent of those that have done so. Not a single institution with below $25 billion in assets reports using AI technology, presumably because they have fewer funds to invest in more sophisticated learning systems.

Just because a company has the means to adopt state-of-the-art IT systems does not mean it uses them well or efficiently, however. Many FIs even seem to recognize that the tools they employ to fight payments fraud are inadequate. Just 28.4 percent of firms that use data mining say it reduces payments fraud, for example. FIs are even more dubious about the effectiveness of BRMS. Only 17.6 percent of FI decision-makers believe BRMS are effective at reducing fraud, even though 65 percent of decision-makers involved in their firms' fraud detection departments are using them to do just that.

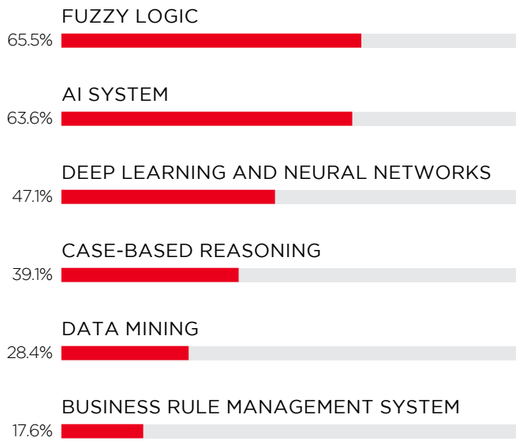
FIs' fraud specialists that use AI to fight fraud appear far more satisfied with their IT systems, though. Despite its limited adoption, 63.6 percent of these respondents say it is effective. Our research also shows that 65.5 percent who use fuzzy logic to fight fraud

63.6%
of FIs believe
AI is an effective tool for stopping fraud before it happens.

FIGURE 2:

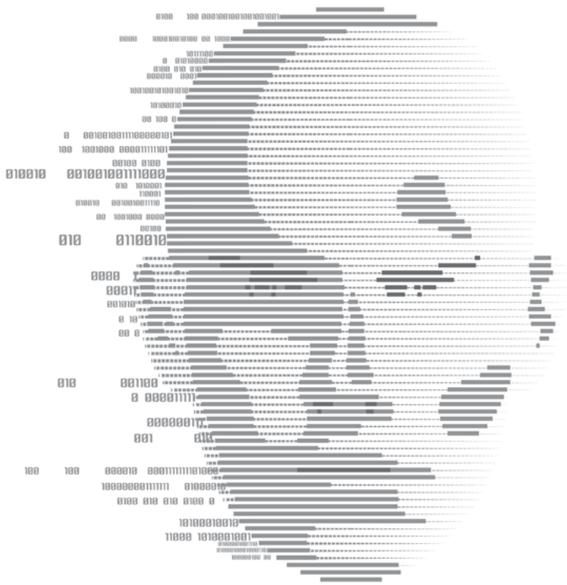
Learning systems' effectiveness in reducing payments fraud

Portion of FIs that believe select systems reduce payments fraud, by system



consider it effective, as do 47.1 percent of those whose FIs use deep learning and neural networks to this end.

The natural advantages AI has on the fraud front come into clearer view when considering which systems are most effective in preventing bad acts before they occur. It is one thing for a system to flag and block attempted hacks or fraudulent transactions, after all, but quite another for it to identify suspicious patterns and vulnerabilities before thefts can be attempted.



22%

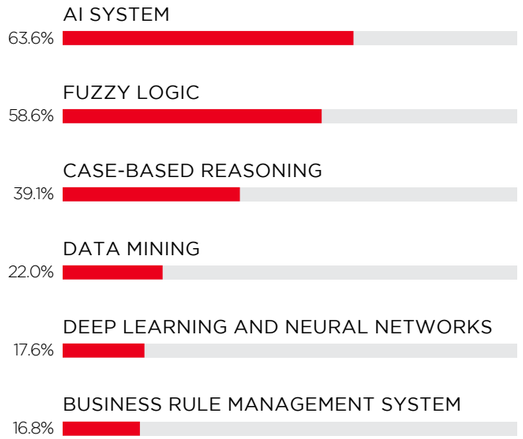
of FIs that use data mining consider it **effective in preventing fraud.**

Our research shows that 63.6 percent of the FIs that use AI believe it is capable of preventing fraud before it happens. Notably, data mining and BRMS, the most commonly used systems, are considered particularly lacking here. Just 22 percent and 16.8 percent of FIs that use these systems, respectively, believe they are effective in preemptively identifying fraud attempts.

FIGURE 3:

Learning systems' effectiveness in stopping fraud before it occurs

Share of FIs that believe select systems prevent fraud, by system

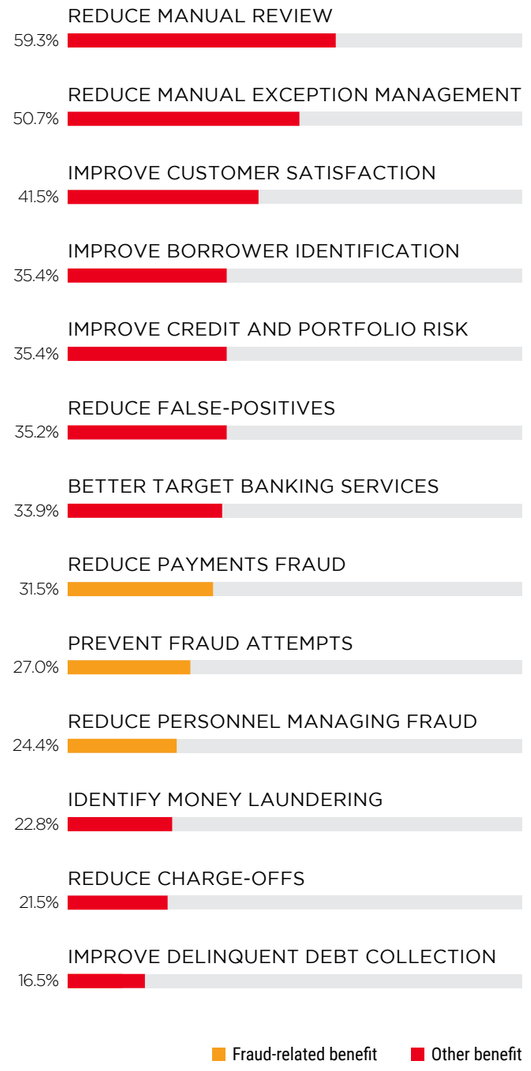


AI'S TANGIBLE BENEFITS

FIGURE 4:

How FIs generally hope to benefit from learning systems

Portion of FIs that cite select benefits of learning systems



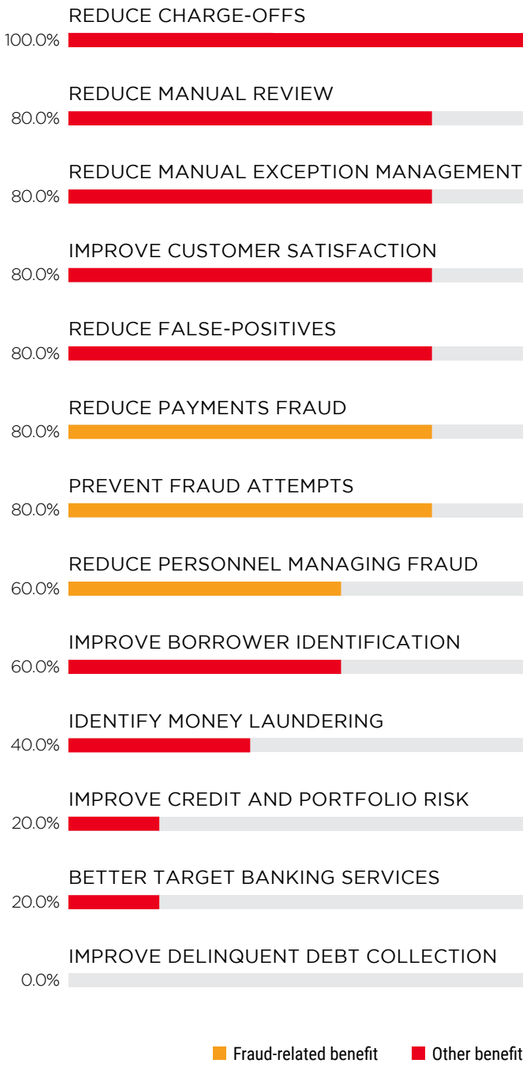
FIs do not invest in innovation for bragging rights or to follow the latest technological buzz, but rather to look for specific ways such systems can streamline their operations and protect them against fraud. These bottom-line considerations are especially vital given all the AI hype today.

AI stands out as a learning system that can confer the tangible benefits FIs seek. Our research shows 59.3 percent of them want to use such solutions to reduce the need for manual review, beating out other benefits like improving customer satisfaction (41.5 percent) and borrower identification (35.4 percent). This makes sense: The great promise of unsupervised learning systems is that they can quietly perform the heavy computational lifting while allowing human "colleagues" to focus on the decisions for which they are best suited.

While 59.3 percent of FIs report reduced manual review and 50.7 percent cite reduced manual exceptions as chief benefits, these proportions are even higher among FI fraud prevention professionals: 80 percent identify each of them. In other words, these respondents seem to view AI as uniquely capable of accomplishing what FIs most want from

FIGURE 5:

Benefits sought from investing further in AI systems
Share of AI-using FI fraud specialists who seek select benefits from learning systems



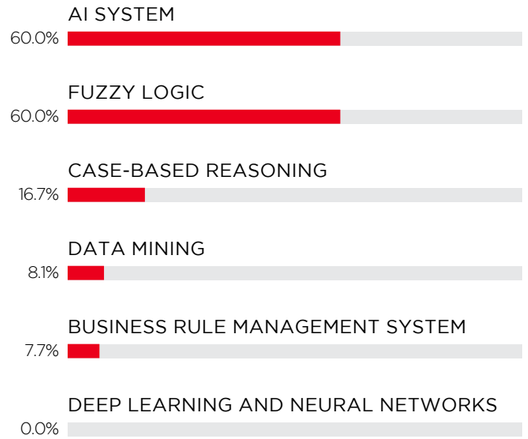
80%
of AI-using fraud specialists believe **the technology could reduce payments fraud.**

learning systems: a reduced need for human interventions that sap valuable time and resources.

It bears noting that specific fraud-related benefits rank lower on FIs' list of those expected from learning systems. These are discrete functions compared to reducing manual review — which is cited by 80 percent and can be applied to many functions — and would seem to further underscore that FIs may not fully appreciate the systems' power to address payments fraud.

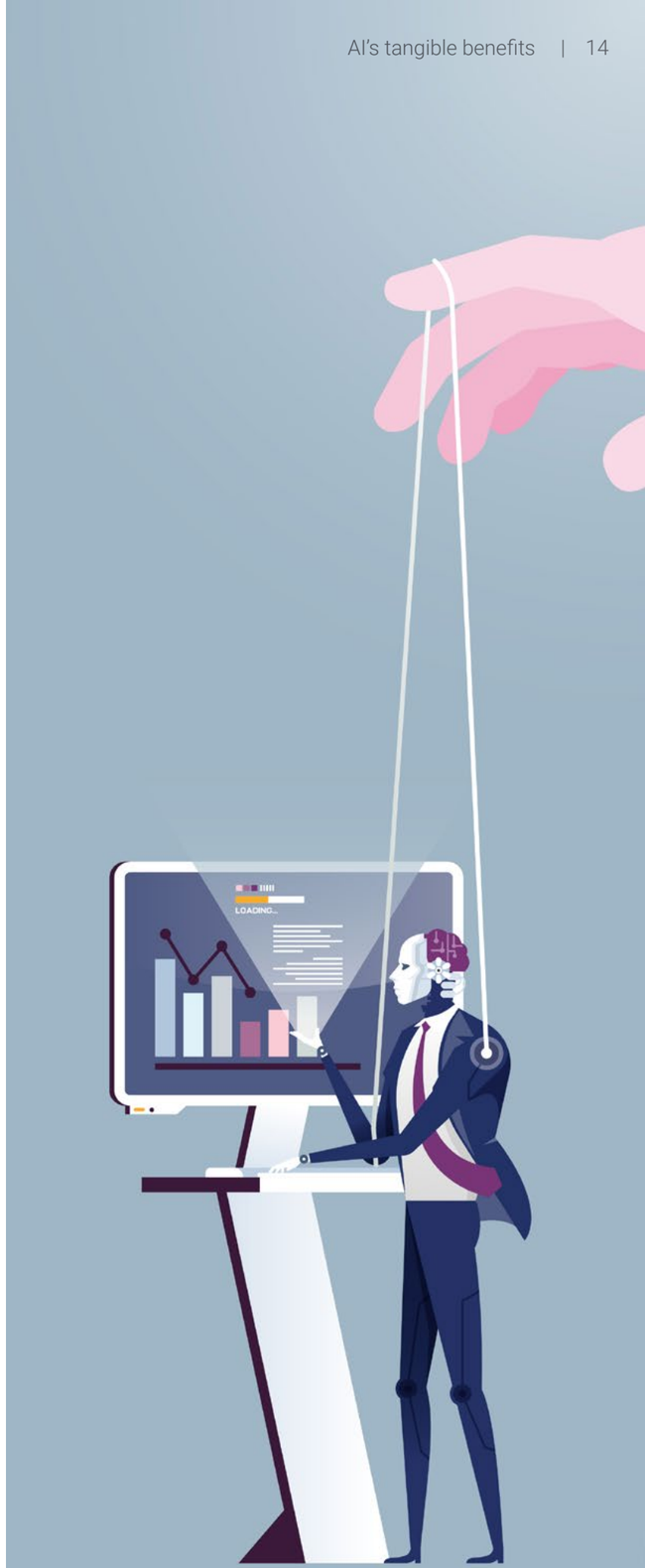
FIGURE 6:

Learning systems' abilities to reduce demands on fraud-related personnel
Portion of FI fraud specialists who believe select systems can reduce demands on required personnel



A corollary to reducing manual review is reducing demands on personnel. AI stands out as especially effective in this regard, with 60 percent of the fraud specialists believing it has the potential to reduce demands on personnel. This is saying something, as the ax would likely fall on their departments. Supervised systems like data mining and BRMS are inherently more labor-intensive and were naturally seen as less effective here.

Most FIs believe AI is the most effective and best equipped to reduce both fraud instances and demands on personnel. Why has it made such limited inroads, then?



AI AND ITS **PERCEIVED LIMITATIONS**

Businesses must first evaluate each technology's potential return on investment (ROI) each time they contemplate investing in new offerings. This means assessing how well that system might perform if implemented. So, what happens when a company does not feel it has the expertise required to gauge these systems' effectiveness?

Many FIs face this dilemma as they survey their own systems and the ever-growing field of AI and other learning systems. There appears to be a collective sense that these technologies are "black boxes," which is particularly problematic in the realm of fraud. How would they know if learning systems are doing well at distinguishing between fraud attempts and false-positives without first testing them, after all?

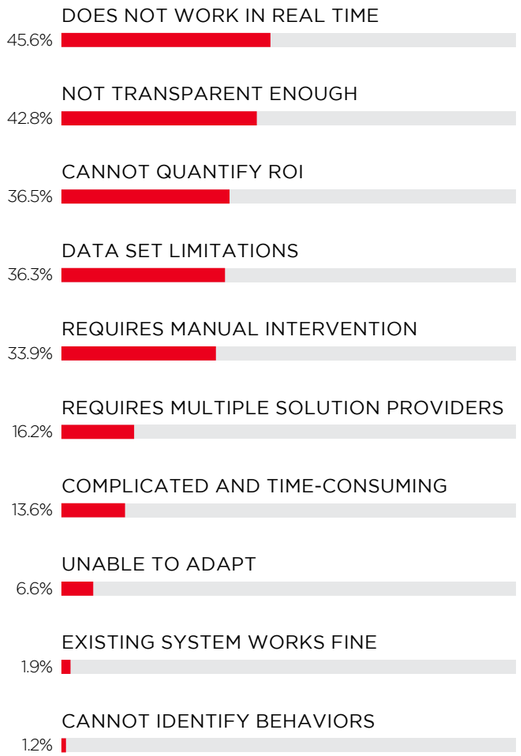
According to our research, 42.8 percent of surveyed fraud specialists believe learning systems are hampered by a lack of transparency, and 36.5 percent say they are unable to quantify related ROI. Thus, more than one-third of the professionals who specialize in detecting and analyzing fraud feel they are unable to accurately evaluate AI systems' effectiveness.

60%
of fraud specialists believe AI systems **lack transparency.**

FIGURE 7:

Learning system limitations

Share of FI fraud specialists citing select learning system shortcomings



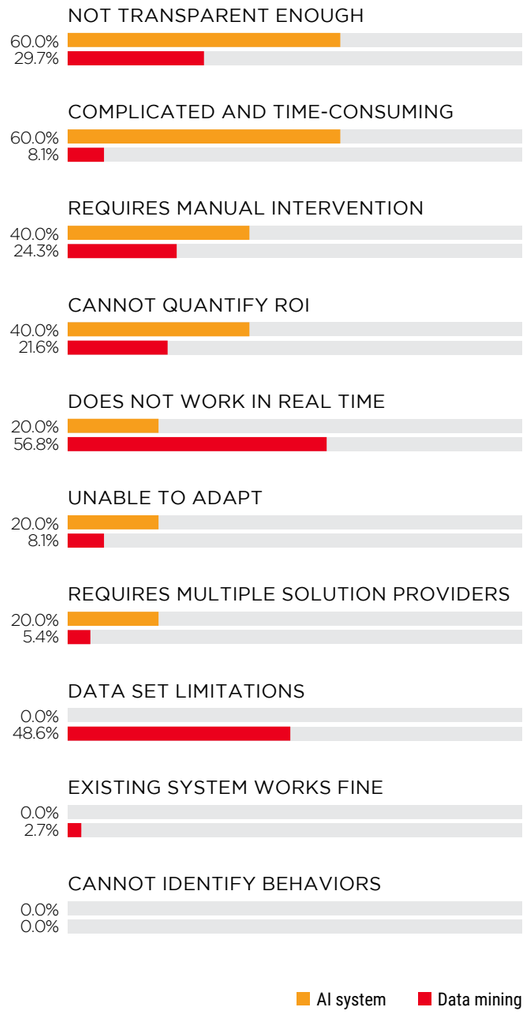
This perceived lack of transparency looms especially large for AI. Sixty percent of surveyed fraud specialists feel the technology is not transparent enough, according to our analysis, and another 60 percent view it as complicated and time-consuming compared to average learning systems. This likely reflects shortcomings in how such systems are presented and explained to those who work with them rather than a design flaw, however. Comprehensible models and metrics must thus be part of the AI solution package.

Fraud specialists do not believe transparency is as big of a problem in data mining as with AI, with just 29.7 percent of them citing it as a shortcoming. These specialists are much more likely to flag two other data mining concerns, though: that it does not work in real time (56.8 percent) and that it deals in limited data sets (48.6 percent). When it comes to responding to urgent and dynamic threats like fraud, these matters would arguably take precedence.

FIGURE 8:

AI and data mining limitations

Portion of FI fraud specialists citing select AI system and data mining shortcomings



A FRAUD SPECIALIST'S VIEW ON **SMART AGENTS**

Smart agents represent the one AI system that appears to be uniquely suited to FIs' operational needs. They learn and make real-time observations from interactions with human users, then use this knowledge to create virtual representations of every entity with which they interact. The result is a digital profile that optimizes customer-facing payments and banking services. Smart agents are thus ideally positioned on the frontlines when battling fraud, because they learn each client's normal financial behavior, quickly flag outlying transactions and decrease the likelihood of false flags that block legitimate purchases.

63.9%
of fraud specialists believe smart agents **could reduce payments fraud.**

TABLE 2:

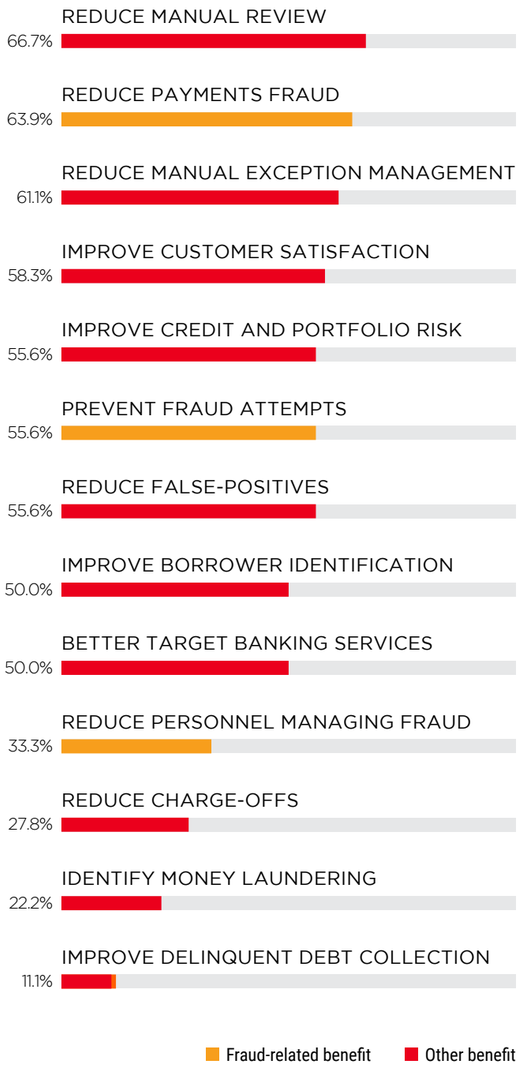
Interest in implementing smart agent systems
Portion of FI decision-makers interested in smart agents, by business unit

	Extremely interested	Very interested	Somewhat interested	Slightly interested	Not at all interested
Fraud detection/analysis	2.5%	42.5%	45.0%	10.0%	**0.0%**
Accounts payable	**0.0%**	36.7%	36.7%	26.7%	**0.0%**
Accounts receivable	**0.0%**	29.6%	37.0%	25.9%	7.4%
Payroll	**0.0%**	25.0%	50.0%	25.0%	**0.0%**
Treasury management	2.3%	15.9%	50.0%	31.8%	**0.0%**
Financial planning/analysis	**0.0%**	13.2%	23.7%	61.8%	1.3%
Risk management	2.6%	10.3%	41.0%	46.2%	**0.0%**

FIGURE 9:

Expected benefits of smart agent systems

Share of FI fraud specialists who expect select benefits from implementing smart agents



It is no wonder that FIs' fraud departments are more interested in adopting smart agents than any other business unit in our study. In fact, 45 percent of respondents involved in fraud detection and analysis are "very" or "extremely" interested in adopting such systems.

This is not the only area in which smart agents are viewed as useful, however. Accounts payable and accounts receivable expressed strong interest at 36.7 percent and 29.6 percent of respondents, respectively.

Fraud specialists are naturally most bullish about smart agents' potential to improve fraud detection, although they see the system benefiting nearly every business operation. According to our research, 63.9 percent of those involved in fraud detection believe smart agents would help reduce payments fraud, 66.7 percent believe they would reduce the need for manual review and 61.1 percent note they might aid in exception management.

Fraud specialists are not alone in recognizing the unique value smart agents could bring to reducing fraud and manual review. Nearly all departments at FIs in our survey view these

TABLE 3:

Expected benefits of smart agent implementation

Portion of respondents who expect certain benefits from smart agents, by business unit

	AVERAGE	Payroll	Fraud detection/ analysis	Risk management	Accounts receivable	Accounts payable	Treasury management	Financial planning/ analysis
N Percentage		2.0%	20.0%	19.5%	13.5%	15.0%	22.0%	38.0%
Benefits								
Reduce manual review	80.4%	0.0%	66.7%	33.3%	83.3%	68.2%	66.7%	64.3%
Reduce payments fraud	72.3%	0.0%	63.9%	23.8%	83.3%	59.1%	53.3%	60.7%
Reduce manual exception management	65.9%	100%	61.1%	38.1%	44.4%	40.9%	53.3%	53.6%
Better target banking services	65.4%	66.7%	50.0%	42.9%	55.6%	50.0%	53.3%	50.0%
Improve customer satisfaction	64.0%	33.3%	58.3%	23.8%	61.1%	63.6%	46.7%	50.0%
Reduce false-positives	61.9%	33.3%	55.6%	33.3%	55.6%	50.0%	50.0%	46.4%
Improve credit and portfolio risk	53.7%	33.3%	55.6%	47.6%	27.8%	54.5%	20.0%	42.9%
Improve borrower identification	52.8%	66.7%	50.0%	33.3%	38.9%	45.5%	30.0%	42.9%
Prevent fraud attempts	52.7%	0.0%	55.6%	28.6%	44.4%	40.9%	46.7%	35.7%
Reduce managing fraud	42.1%	33.3%	33.3%	23.8%	27.8%	27.3%	33.3%	39.3%
Identify money laundering	33.6%	33.3%	22.2%	38.1%	22.2%	31.8%	23.3%	21.4%
Reduce charge-offs	22.8%	33.3%	27.8%	23.8%	16.7%	18.2%	13.3%	10.7%
Improve delinquent debt collection	19.4%	0.0%	11.1%	23.8%	5.6%	18.2%	16.7%	14.3%

as paramount benefits, with 64 percent of financial planning specialists citing the latter and 61 percent of them noting the former.

Smart agents have not been adopted by any of the FIs in our survey, despite their expected benefits, and cost is likely a factor. All fraud specialists who are not interested in the technology expressed the view that implementing such systems is too expensive.

Smart agents' perceived complexity is another impediment to adoption, with 75 percent of fraud specialists believing the technology is too complicated, requires too much specialized knowledge or that its benefits were too intangible. Indeed, significant shares in nearly every FI department viewed intangible benefits as a deterrent to using the system.

Concerns about smart agents largely follow AI's contours, including that they are too costly and complex. Such concerns often accompany new technologies' introductions, but some firms discover too late that by not innovating, they risk being left behind by competitors.

80.4%
of FIs believe smart agents **would reduce the need for manual review.**

TABLE 4:

Inhibitors of smart agent systems
Share of FI decision-makers citing select inhibitors to smart agent adoption, by business unit

	Payroll	Fraud detection/ analysis	Risk management	Accounts receivable	Accounts payable	Treasury management	Financial planning/ analysis
Intangible benefits	0.0%	75.0%	73.7%	55.6%	50.0%	57.1%	44.9%
Lack necessary skillsets	0.0%	75.0%	57.9%	44.4%	37.5%	35.7%	40.8%
Untrustworthy results	100.0%	0.0%	21.1%	22.2%	12.5%	42.9%	36.7%
Implementation is too expensive	0.0%	100.0%	42.1%	11.1%	75.0%	28.6%	30.6%
Technology is too complicated	0.0%	75.0%	36.8%	22.2%	75.0%	14.3%	24.5%
Systems are too complicated	0.0%	25.0%	26.3%	44.4%	25.0%	14.3%	18.4%

CONCLUSION

FIs have long enlisted software tools to streamline and secure tasks associated with managing their clients' money. AI opens up a whole new optimization frontier with its ability to process and find data patterns in real time, yet is still scarcely used — even where it could have the greatest impacts, like in fraud prevention.

Bad actors are constantly shifting their tactics to find loopholes and vulnerabilities in existing security systems. AI is better-suited to blocking attacks and fraudulent transactions than supervised learning systems like data mining or BRMS, which points to an open opportunity for FIs and their partners to enlist powerful AI-based tools in the fight against fraud.

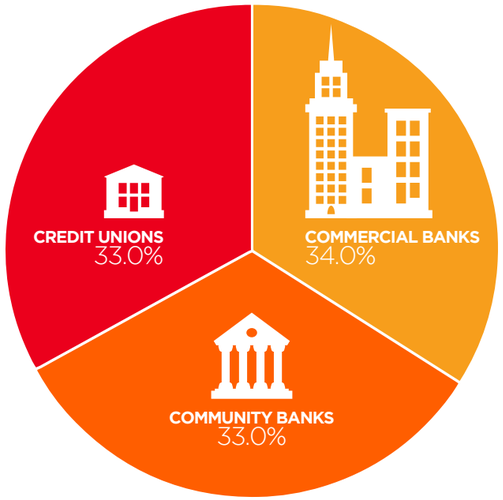
The trick is to seize that opportunity.

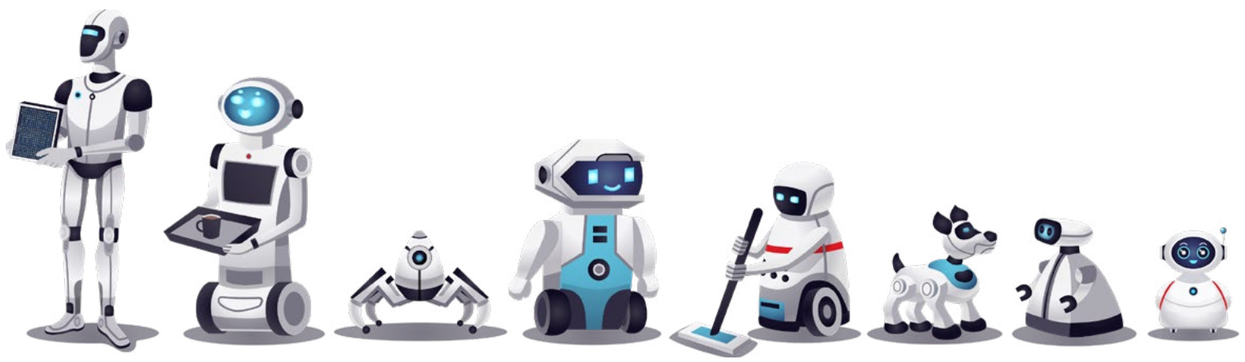
METHODOLOGY

FIGURE 10:

FI types represented in our sample

Share of CUs, commercial banks and community banks included in our analysis





The AI Innovation Playbook: AI And Fraud Edition, a PYMNTS and Brighterion collaboration, draws its data from an extensive survey that investigated how FIs leverage a wide variety of supervised and unsupervised learning systems to optimize payments, cash flow management, regulatory and credit risk, financial fraud and other business operations. Though most may not qualify as true AI, and despite the fact that both their perceived costs and a lack of understanding hinder their implementation, these learning systems still help businesses alleviate operational pain points.

To learn more about how FIs are leveraging these technologies, we interviewed 200 senior executives at commercial banks, community banks and credit unions with assets ranging from $1 billion to more than $100 billion. The industry distribution of participating firms was almost evenly split, with each representing approximately one-third of the overall sample.

As shown in Figure 11, the vast majority of participating firms held assets between $1 billion and $25 billion, and approximately 15 percent held assets of more than $25 billion.

Participating FIs were also diverse in terms of the number of branches they managed. The sample included banks and credit unions with anywhere from a single branch to more than 5,000 branches across the U.S., and half of all the FIs we surveyed managed between one and 25 branches.

FIGURE 11:

Sample distribution, by assets

Portion of respondents categorized by asset value

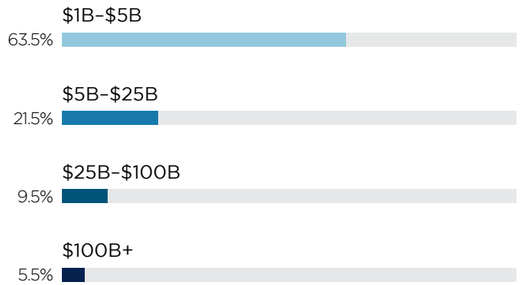
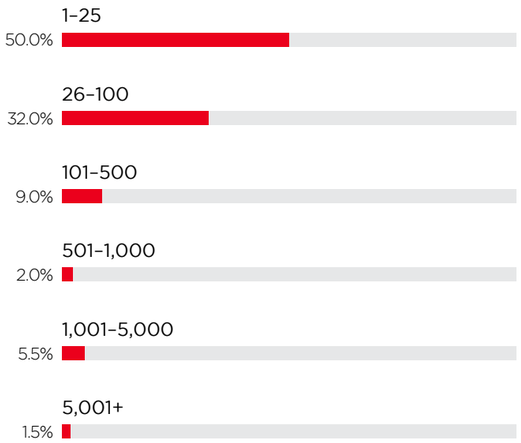


FIGURE 12:

Number of bank and credit union branches

Share of respondents classified by the number of branches they manage



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Brighterion
mastercard

Brighterion, a Mastercard company, offers a portfolio of artificial intelligence and machine learning technologies, providing real-time intelligence from all data sources regardless of type, complexity and volume. Brighterion's technology is and serves as a general-purpose AI platform across varying industries to manage anti-money laundering, acquiring fraud, omni-channel fraud, early delinquency/collections and credit risk for businesses, governments and healthcare organizations through personalization, adaptability and self-learning that enables discovery, identification and mitigation of anomalous activities.

We are interested in your feedback on this report.
Please send thoughts, comments, suggestions or questions to theaigap@pymnts.com.

THE AI GAP STUDY:
Perception versus reality in payments and banking system

AI INNOVATION PLAYBOOK I:
How FIs are using artificial intelligence and machine learning

AI INNOVATION PLAYBOOK II:
Moving toward a future of smart agent adoption

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