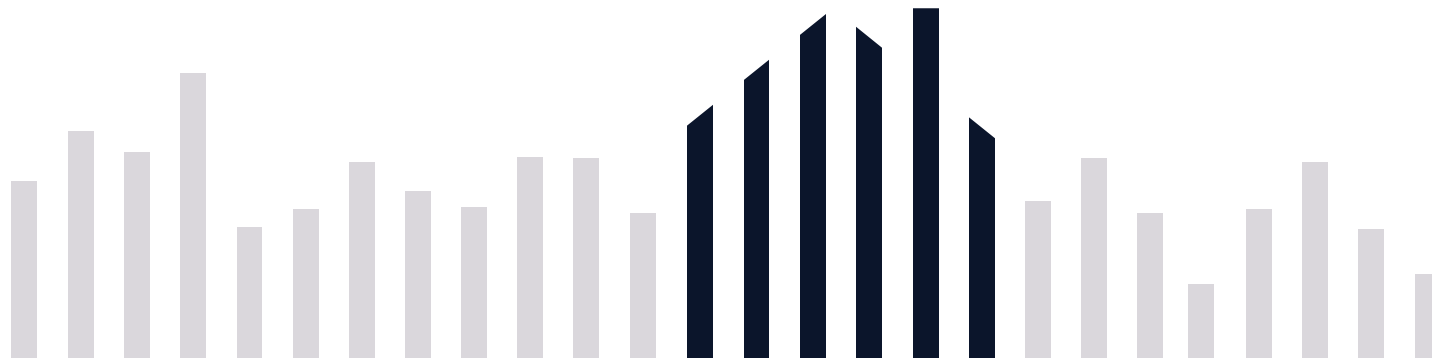# Mortgage Lender Sentiment Survey®

How Will Artificial Intelligence Shape Mortgage Lending?

Q3 2018 Topic Analysis – Published October 4, 2018

Table of Contents

AI applications that focus on improving operational efficiency are most appealing to lenders. Integration complexity with current infrastructure remains a key adoption barrier.

Objectives of AI/ML Technology Adoption

Improving Operational Efficiency

Enhancing Customer/ Borrower experience

Challenges to Implementing AI/ML Technology

Integrating AI/ML applications with **current infrastructure**

Costs are too **high**

Lack of a proven **record of success**

Most Appealing AI/ML Application Ideas

1 **Anomaly Detection Automation:** Enable machines to process data from various sources to identify fraud or detect defects early in the underwriting process

2 **Borrower Default Risk Assessment:** Have machines examine all available information or data (financial and non-financial such as social media activities) to predict the probability of a borrower defaulting on the loan to allow lenders to take proactive steps

Business Context and Research Questions

Business Context

Businesses are increasingly leveraging digital technologies to reduce errors and costs, speed up transactions, and drive richer and better customer service. Over the past couple of years, Artificial Intelligence (AI), including Machine Learning (ML), has gained traction by businesses that deal with large amounts of data to reduce human error and improve operational efficiency. With AI, computer systems are able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, language translation, and decision-making. And with ML capabilities, they also have the ability to process large amounts of data (structured and unstructured) from various sources and recognize patterns in the data to identify opportunities or risks.

Major areas of AI/ML application to the mortgage industry may include identifying anomalies, assessing risk, exploring non-credit bureau data to enhance prediction of loan performance, and answering customer questions (e.g., search tools, improved guides, and chatbots).

Fannie Mae's Economic & Strategic Research Group (ESR) surveyed senior mortgage executives in August through its quarterly Mortgage Lender Sentiment Survey® to understand lenders' views about AI/ML technology and, specifically, to gauge their interests in various AI/ML application ideas.

Research Questions

1. How familiar are lenders with AI/ML technology? How do they currently use AI/ML technology? If they are currently using some AI/ML applications, what are their objectives and use cases?

2. What barriers do they see in adopting AI/ML technology? What would be their adoption status in two years?

3. What AI/ML application ideas are most appealing to them to improve or expand their mortgage business? Ideas tested included chatbots, property valuation, borrower default assessment, and fraud/defect detection.

Q3 2018 Respondent Sample and Groups

This analysis is based on the third quarter of 2018 data collection. For Q3 2018, a total of 195 senior executives completed the survey during August 1-13, representing 184 lending institutions.*

Lender Size Groups**

HIGHER loan origination volume	

Larger Institutions
Top 15% of lenders — 100% / 85%

Mid-sized Institutions
Top 16% - 35% of lenders — 85% / 65%

Smaller Institutions
Bottom 65% of lenders

LOWER loan origination volume	
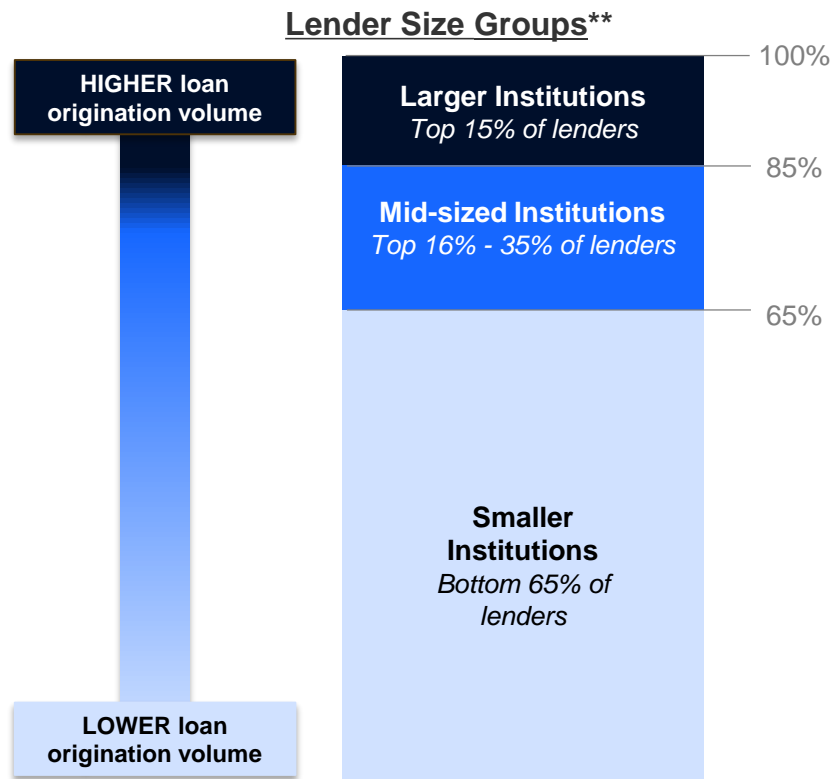
Sample Q3 2018		Sample Size
Total Lending Institutions The "Total" data throughout this report is an average of the means of the three lender-size groups listed below.		184
Lender Size Groups	**Larger Institutions** Lenders in the Fannie Mae database who were in the top 15% of lending institutions based on their total 2017 loan origination volume (above $1.18 billion)	45
	Mid-sized Institutions Lenders in the Fannie Mae database who were in the next 20% (16%-35%) of lending institutions based on their total 2017 loan origination volume (between $400 million and $1.18 billion)	42
	Smaller Institutions Lenders in the Fannie Mae database who were in the bottom 65% of lending institutions based on their total 2017 loan origination volume (less than $400 million)	97
Institution Type*	**Mortgage Banks** (non-depository)	66
	Depository Institutions	68
	Credit Unions	39

* The results of the Mortgage Lender Sentiment Survey are reported at the lending institutional parent-company level. If more than one individual from the same institution completes the survey, their responses are averaged to represent their parent institution.

** The 2017 total loan volume per lender used here includes the best available annual origination information from Fannie Mae, Freddie Mac, and Marketrac. Lenders in the Fannie Mae database are sorted by their firm's total 2017 loan origination volume and then assigned into the size groups, with the top 15% of lenders being the "larger" group, the next 20% of lenders being the "mid-sized" group and the rest being the "small" group.

*** Lenders that are not classified into mortgage banks or depository institutions or credit unions are mostly housing finance agencies.
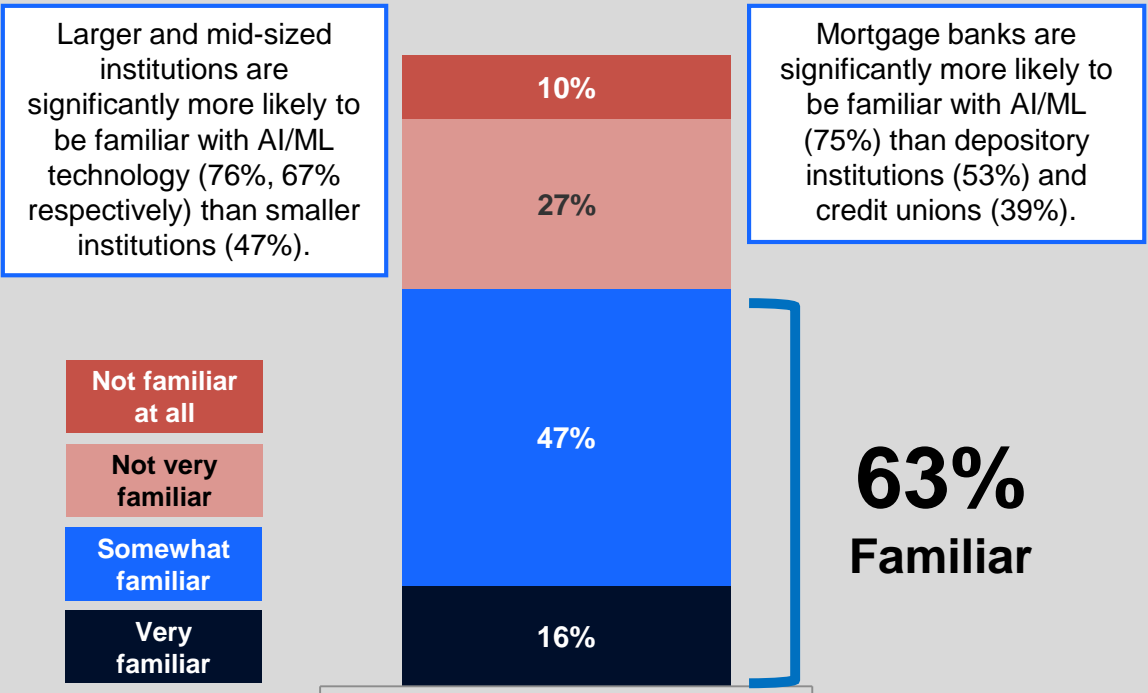
Key Findings

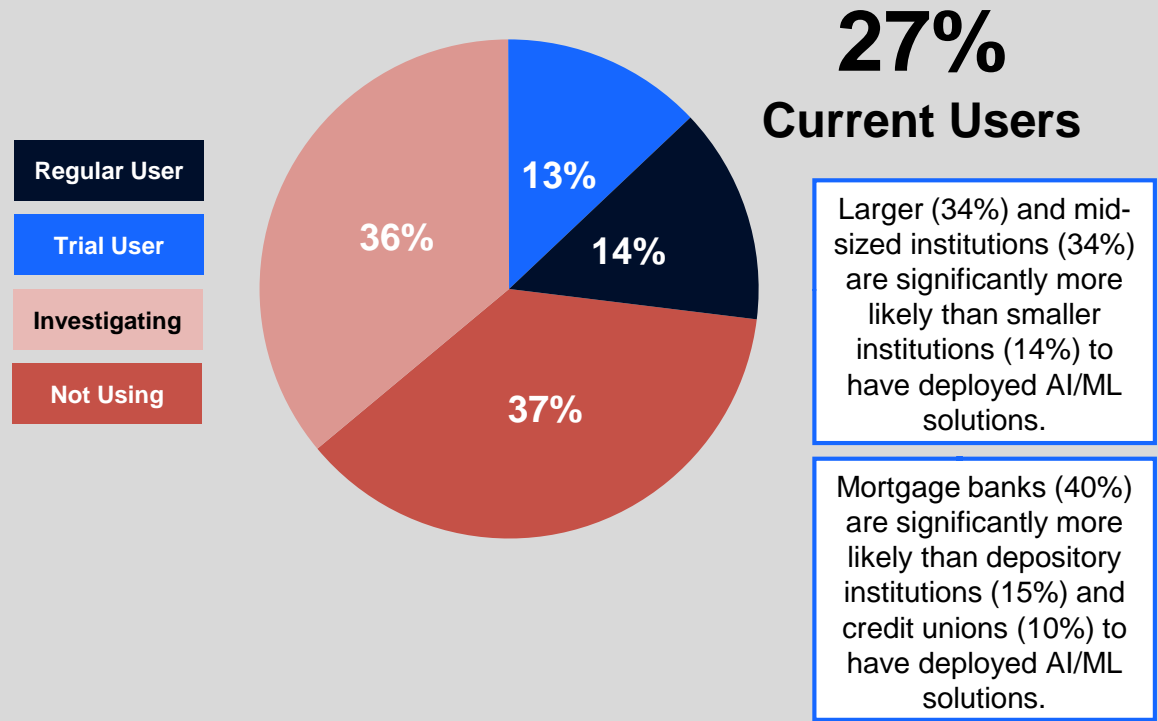# Familiarity and Current Usage of AI/ML Technology

Most lenders say they are familiar with AI/ML technology but only about a quarter have started using it for their mortgage business. Larger and mid-sized institutions are more likely than smaller institutions – and mortgage banks are more likely than depository institutions – to be familiar with and currently using AI/ML technology.

Familiarity with AI/ML Technology

Larger and mid-sized institutions are significantly more likely to be familiar with AI/ML technology (76%, 67% respectively) than smaller institutions (47%).

Mortgage banks are significantly more likely to be familiar with AI/ML (75%) than depository institutions (53%) and credit unions (39%).

- Not familiar at all
- Not very familiar
- Somewhat familiar
- Very familiar

10%
27%
47%
16%

63%
Familiar

Current Usage Status of AI/ML Technology

- Regular User
- Trial User
- Investigating
- Not Using

27%
Current Users

13%
14%
36%
37%

Larger (34%) and mid-sized institutions (34%) are significantly more likely than smaller institutions (14%) to have deployed AI/ML solutions.

Mortgage banks (40%) are significantly more likely than depository institutions (15%) and credit unions (10%) to have deployed AI/ML solutions.

Q: How familiar are you with AI (Artificial Intelligence) or ML (Machine Learning) applications as specifically applied to enhancing your mortgage business processes?
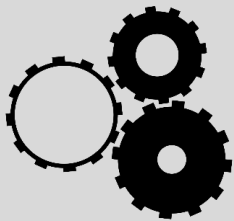
Q: Which of the following statements best describes your firm's current status with AI or ML solutions for your mortgage business?

Primary Objectives and Use Cases for AI/ML Adoption

Lenders who currently employ AI/ML technology say they use it primarily to improve operational efficiency or enhance the consumer/borrower experience. Use cases center around loan application, origination, and underwriting.
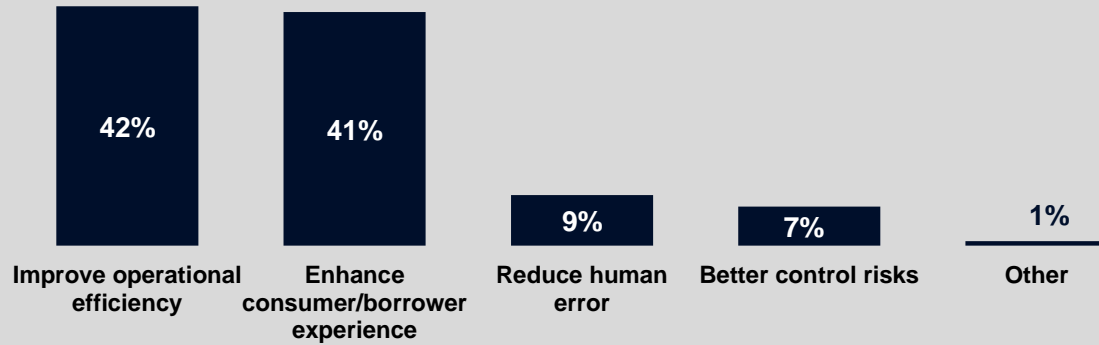
Primary Objective in Exploring AI/ML Tools
Among those who are using AI/ML Tools (N=43)

42%
Say improving operational efficiency

41%
Say enhancing the consumer/borrower experience

Improve operational efficiency	Enhance consumer/borrower experience	Reduce human error	Better control risks	Other
42%	41%	9%	7%	1%

Q: [Among those using AI/ML technology] Which of the following best describes your firm's primary objective in exploring AI/ML tools for your mortgage business?

Specific Functions for using AI/ML Technology
Among those who are using AI/ML Tools (N=26)

Origination and Underwriting Process
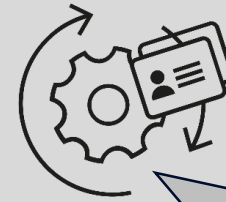
*"**OCR** [Optical Character Recognition] tools for invoice recognition, automatic income analysis, auto indexing borrower documents"* – Mid-sized Institution

*"We have…incorporated machine learning in our **front-end origination** where the system asks for **clarification based on submitted data**."* – Mid-sized Institution

*"**document recognition, data scraping, task routing**."* – Larger Institution

Application Process

*"**Intuitive consumer-facing digital application process**"* – Mid-sized Institution

*"…a **"smart"** application portal, where **the interview questions being asked of a consumer are responsive and intelligent** to the previous responses given."* – Mid-sized Institution

Q: [Among those using AI/ML technology] You mentioned that your firm has started using AI/ML tools for your mortgage business. In the space provided below, can you share with us some specific functions as examples for which your firms uses AI/ML technology for mortgage lending?

Challenges to Implementing AI/ML Technology

Among those who have not used AI/ML technology, the biggest challenges lenders cited include integration complexity with current infrastructure, high costs, and lack of proven record of success.

Biggest Challenges to Implementing AI/ML Technology
Among those who are not using AI/ML Tools (N=142)
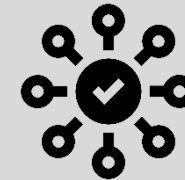
2nd Biggest Challenge

Biggest Challenge
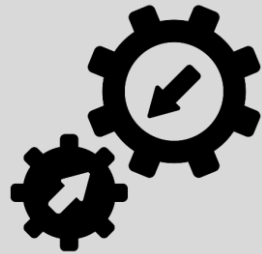
50% Say **integrating** AI/ML applications with **current infrastructure**

30% say **costs too high**

25% Say **lack** of a proven **record of success**

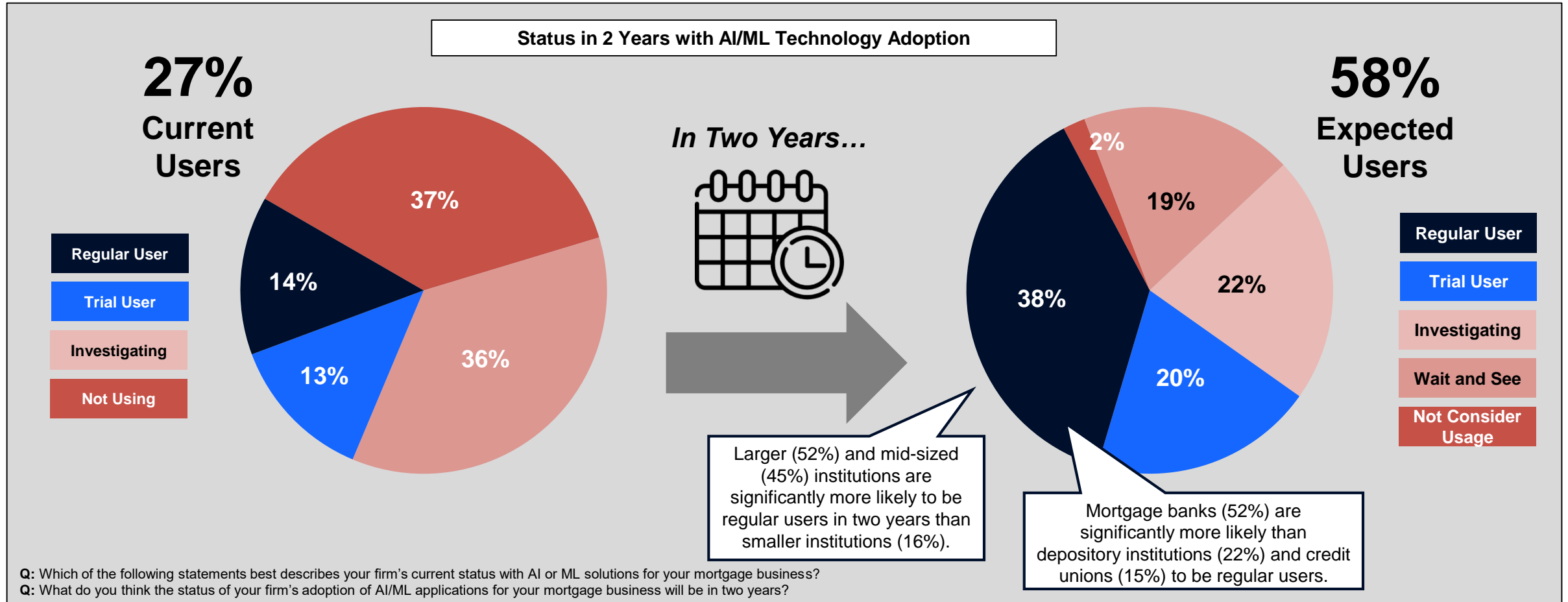| Challenge	2nd Biggest	Biggest	Total
Complexity of integrating AI/ML applications with our existing infrastructure	22%	28%	50%
Costs too high	12%	18%	30%
Lack of proven record of success (concerns over AI/ML accuracy)	13%	12%	25%
Lack of necessary staff skills	13%	7%	20%
Concerns with data quality or availability	9%	8%	17%
No ideas about what to do with AI/ML or where to start	7%	6%	13%
Lack of overall technology strategy at my firm	5%	7%	12%
Challenges of getting consumer consent to use their data	5%	6%	11%
Concerns with data security (data breach) and privacy	6%	4%	10%
Concerns with the potential for AI/ML to come up with discriminatory results	6%	3%	9%

Q: [Among those NOT using AI/ML technology] Earlier you mentioned that your firm has not used AI/ML applications. Listed below are some possible challenges companies might face in implementing AI/ML applications. Please select up to two of the biggest challenges for your firm and rank them in order of importance.

Future Status of AI/ML Technology Adoption

While only about a quarter are current AI/ML users, in two years almost three-fifths of lenders expect to have adopted some AI/ML applications. Larger and mid-sized institutions are significantly more likely than smaller institutions – and mortgage banks are significantly more likely than depository institutions – to say they will adopt.

Status in 2 Years with AI/ML Technology Adoption

27% Current Users

- Regular User
- Trial User
- Investigating
- Not Using

37%

14%

13%

36%

In Two Years…

58% Expected Users

- Regular User
- Trial User
- Investigating
- Wait and See
- Not Consider Usage

2%

19%

22%

38%

20%

Larger (52%) and mid-sized (45%) institutions are significantly more likely to be regular users in two years than smaller institutions (16%).

Mortgage banks (52%) are significantly more likely than depository institutions (22%) and credit unions (15%) to be regular users.

Q: Which of the following statements best describes your firm's current status with AI or ML solutions for your mortgage business?
Q: What do you think the status of your firm's adoption of AI/ML applications for your mortgage business will be in two years?
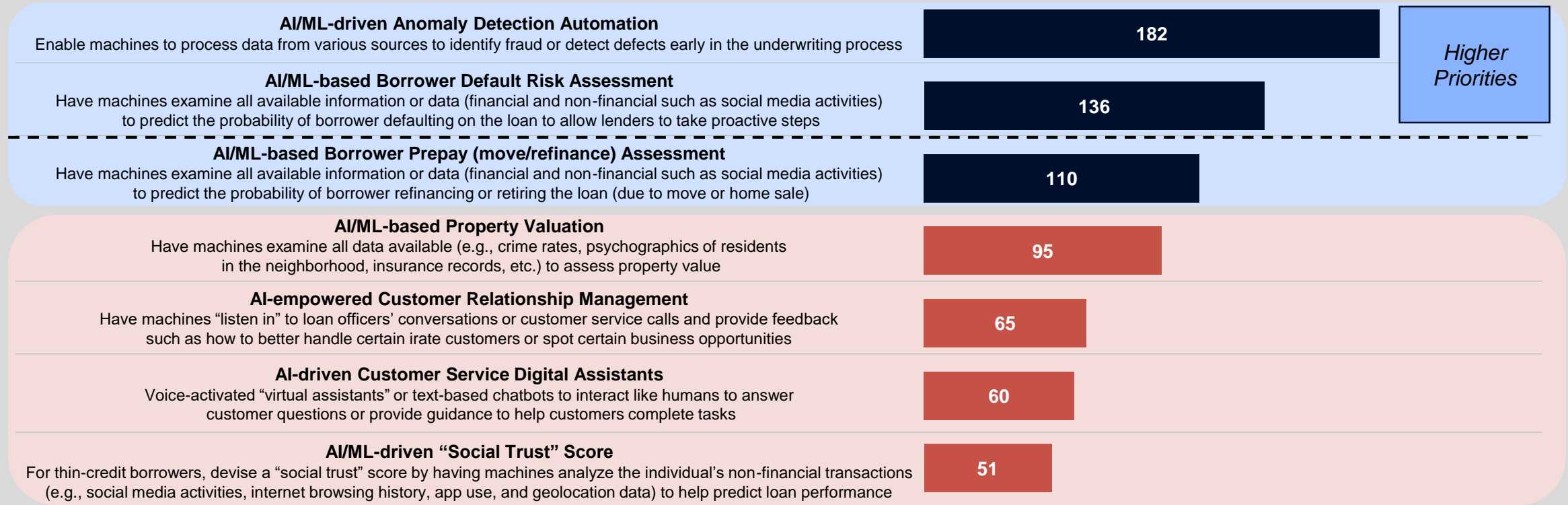
Interest Levels of AI/ML Application Ideas

AI/ML applications relating to improving operational efficiency are most appealing to lenders. Enabling machines to process data from various sources to identify fraud or detect defects ("Anomaly Detection Automation") was the most appealing idea to lenders, followed by "Borrower Default Risk Assessment."

Relative Value of AI/ML Application Ideas (with 100 = average)
Relative Value Scores derived from MaxDiff Analysis (see pg. 15 for additional information)

AI/ML-driven Anomaly Detection Automation
Enable machines to process data from various sources to identify fraud or detect defects early in the underwriting process
182

AI/ML-based Borrower Default Risk Assessment
Have machines examine all available information or data (financial and non-financial such as social media activities) to predict the probability of borrower defaulting on the loan to allow lenders to take proactive steps
136

Higher Priorities

AI/ML-based Borrower Prepay (move/refinance) Assessment
Have machines examine all available information or data (financial and non-financial such as social media activities) to predict the probability of borrower refinancing or retiring the loan (due to move or home sale)
110

AI/ML-based Property Valuation
Have machines examine all data available (e.g., crime rates, psychographics of residents in the neighborhood, insurance records, etc.) to assess property value
95

AI-empowered Customer Relationship Management
Have machines "listen in" to loan officers' conversations or customer service calls and provide feedback such as how to better handle certain irate customers or spot certain business opportunities
65

AI-driven Customer Service Digital Assistants
Voice-activated "virtual assistants" or text-based chatbots to interact like humans to answer customer questions or provide guidance to help customers complete tasks
60

AI/ML-driven "Social Trust" Score
For thin-credit borrowers, devise a "social trust" score by having machines analyze the individual's non-financial transactions (e.g., social media activities, internet browsing history, app use, and geolocation data) to help predict loan performance
51

Q: In this section, you will see some ideas for how your firm could leverage AI/ML technology to improve or expand its mortgage business. The ideas will be presented in a total of 7 sets with each set presenting 3 ideas. For each set, please choose the idea that is the MOST appealing and the idea that is the LEAST appealing to your firm.

Appendix

Research Objectives

- The survey is unique because it is used not only to track lenders' current impressions of the mortgage industry, but also their insights into the future.

- The *Mortgage Lender Sentiment Survey*®, which debuted in March 2014, is a quarterly online survey among senior executives in the mortgage industry, designed to:

Track insights and provide benchmarks into current and future mortgage lending activities and practices.

Quarterly Regular Questions

- Consumer Mortgage Demand
- Credit Standards
- Profit Margin Outlook

Featured Specific-Topic Analyses

- Cost Cutting Business Priorities
- Gig Economy and Mortgage Lending
- Mortgage Data Initiatives
- Lenders' Customer Service Channel Strategies
- Business Priorities (2017) and Housing Market Threats
- Lenders' Experiences with APIs and Chatbots

- A quarterly 10-15 minute online survey of senior executives, such as CEOs and CFOs, of Fannie Mae's lending institution customers.

- The results are reported at the lending institution parent-company level. If more than one individual from the same institution completes the survey, their responses are averaged to represent their parent company.

Mortgage Lender Sentiment Survey®

Survey Methodology

- A quarterly, 10- to 15-minute online survey among senior executives, such as CEOs and CFOs, of Fannie Mae's lending institution partners.
- To ensure that the survey results represent the behavior and output of organizations rather than individuals, the Fannie Mae Mortgage Lender Sentiment Survey is structured and conducted as an establishment survey.
- Each respondent is asked 40-75 questions.

Sample Design

- Each quarter, a random selection of approximately 3,000 senior executives among Fannie Mae's approved lenders are invited to participate in the study.

Data Weighting

- The results of the Mortgage Lender Sentiment Survey are reported at the institutional parent-company level. If more than one individual from the same parent institution completes the survey, their responses are averaged to represent their parent institution.

MaxDiff Methodology for Q3 2018 MLSS

What is MaxDiff?

- Maximum Difference Scaling, or simply MaxDiff, is an approach to measure preference or importance scores on a number of items or "attributes" (e.g., product benefits, advertising claims, brand claims).

- Each respondent will go through a number of exercises, and, for each exercise/set, choose the most important (most preferred) option and the least important (least preferred) option. In the Q3 2018 MLSS, we tested 7 different ideas on AI/ML technology applications. Respondents were shown randomly preselected sets of 3 ideas each for a total of 7 sets. An example set that respondents were shown is below:

Below are some ideas for how your firm could leverage AI/ML technology to improve or expand its mortgage business. Please choose the idea that is the MOST appealing and the idea that is the LEAST appealing to your firm.

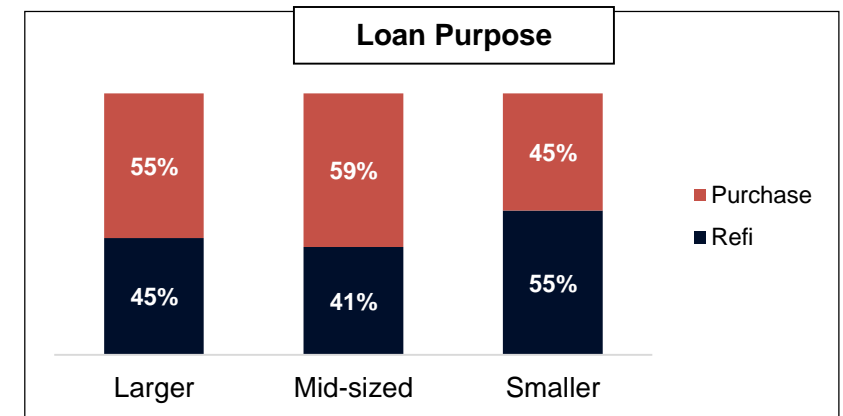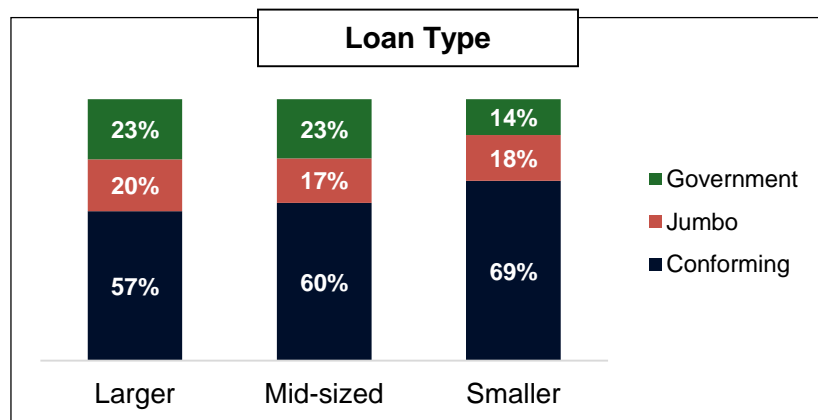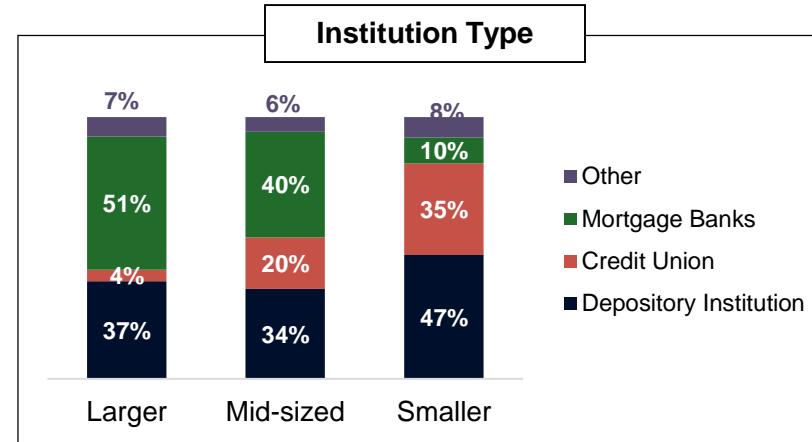| Most appealing		Least appealing
○	**AI-driven Customer Service Digital Assistants:** Voice-activated "virtual assistants" or text-based chatbots to interact like humans to answer customer questions or provide guidance to help customers complete tasks	○
○	**AI/ML-based Property Valuation:** Have machines examine all data available (e.g., crime rates, psychographics of residents in the neighborhood, insurance records, etc.) to assess property value	○
○	**AI/ML-based Borrower Default Risk Assessment:** Have machines examine all available information or data (financial and non-financial such as social media activities) to predict the probability of borrower defaulting on the loan to allow lenders to take proactive steps	○

Interpreting MaxDiff Results

- MaxDiff analysis produces a "utility" value for each attribute. To help ease the interpretation, utility scores are converted and expressed as index values, with 100 = average. Higher scores above the average of 100 indicate stronger preferences or higher importance.

Lending Institution Characteristics

Fannie Mae's customers invited to participate in the Mortgage Lender Sentiment Survey represent a broad base of different lending institutions that conducted business with Fannie Mae in 2017. Institutions were divided into three groups based on their 2017 total industry loan volume – Larger (top 15%), Mid-sized (top 16%-35%), and Smaller (bottom 65%). The data below further describe the composition and loan characteristics of the three groups of institutions.

Institution Type

	Larger	Mid-sized	Smaller
Other	7%	6%	8%
Mortgage Banks	51%	40%	10%
Credit Union	4%	20%	35%
Depository Institution	37%	34%	47%

Loan Type

	Larger	Mid-sized	Smaller
Government	23%	23%	14%
Jumbo	20%	17%	18%
Conforming	57%	60%	69%

Loan Purpose

	Larger	Mid-sized	Smaller
Purchase	55%	59%	45%
Refi	45%	41%	55%

Note: Government loans include FHA loans, VA loans and other non-conventional loans from Marketrac.

2018 Q3 Cross-Subgroup Sample Sizes

	Total	Larger Lenders	Mid-Sized Lenders	Smaller Lenders
Total	**184**	**45**	**42**	**97**
Mortgage Banks (non-depository)	66	22	27	17
Depository Institutions	68	15	8	45
Credit Unions	39	4	6	29

How to Read Significance Testing

On slides where significant differences between three groups are shown:

- Each group is assigned a letter (L/M/S, M/D/C).
- If a group has a significantly higher % than another group at the 95% confidence level, a letter will be shown next to the % for that metric. The letter denotes which group the % is significantly higher than.

Example: | How familiar are you with AI (Artificial Intelligence) or ML (Machine Learning) applications as specifically applied to enhancing your mortgage business processes?

	Total	Larger Institutions (L)	Mid-sized Institutions (M)	Smaller Institutions (S)	Mortgage Banks (M)	Depository Institutions (D)	Credit Unions (C)
N=	184	45	42	97	66	68	39
Very familiar	16%	18%^{S}	24%^{S}	6%	22%^{D,C}	9%	3%
Somewhat familiar	47%	58%	43%	41%	53%	44%	36%
Not very familiar	27%	22%	29%	31%	20%	31%	33%
Not familiar at all	10%	2%	5%	22%$^{L,\,M}$	5%	15%	26%^{M}
Don't know/Not sure	0%	0%	0%	1%	0%	0%	3%

18% and 24% are significantly higher than 6% (smaller institutions)

22% is significantly higher than 2% (larger institutions) and 5% (mid-sized institutions)

Calculation of the "Total"

The "Total" data presented in this report is an average of the means of the three loan origination volume groups (see an illustrated example below). Please note that percentages are based on the number of financial institutions that gave responses other than "Not Applicable." Percentages below may add not sum to 100% due to rounding.

Example:

> How familiar are you with AI (Artificial Intelligence) or ML (Machine Learning) applications as specifically applied to enhancing your mortgage business processes?

	Total	Larger Institutions (L)	Mid-sized Institutions (M)	Smaller Institutions (S)
N=	184	45	42	97
Very familiar	16%	18%[S]	24%[S]	6%
Somewhat familiar	47%	58%	43%	41%
Not very familiar	27%	22%	29%	31%
Not familiar at all	10%	2%	5%	22%[L, M]
Don't know/Not sure	0%	0%	0%	1%

> "Total" of 16% is
> (18% + 24% + 6%) / 3

Appendix

Additional Findings

AI/ML Technology Familiarity

How familiar are you with AI (Artificial Intelligence) or ML (Machine Learning) applications as specifically applied to enhancing your mortgage business processes?

	Total	Larger Institutions (L)	Mid-sized Institutions (M)	Smaller Institutions (S)	Mortgage Banks (M)	Depository Institutions (D)	Credit Unions (C)
N=	184	45	42	97	66	68	39
Very familiar	16%	18%ˢ	24%ˢ	6%	22%ᴰ,ᶜ	9%	3%
Somewhat familiar	47%	58%	43%	41%	53%	44%	36%
Not very familiar	27%	22%	29%	31%	20%	31%	33%
Not familiar at all	10%	2%	5%	22%ᴸ, ᴹ	5%	15%	26%ᴹ
Don't know/Not sure	0%	0%	0%	1%	0%	0%	3%

L/M/S - Denote a % is significantly higher than the annual loan origination volume group that the letter represents at the 95% confidence level
M/D/C - Denote a % is significantly higher than the institution type group that the letter represents at the 95% confidence level

AI/ML Technology Usage

Which of the following statements best describes your firm's current status with AI or ML solutions for your mortgage business?

	Total	Larger Institutions (L)	Mid-sized Institutions (M)	Smaller Institutions (S)	Mortgage Banks (M)	Depository Institutions (D)	Credit Unions (C)
N=	184	45	42	97	66	68	39
We have not yet looked into AI/ML solutions for our mortgage business.	37%	23%	26%	60%[L, M]	23%	53%[M]	60%[M]
We have started investigating AI/ML solutions, but have not yet used any, for our mortgage business.	36%	42%	40%	26%	37%	32%	29%
We have started deploying AI/ML solutions, but on a limited or trial basis, for our mortgage business.	13%	24%[S]	10%	6%	18%	9%	5%
We have deployed AI solutions and incorporated some of the tools into our current mortgage process.	14%	10%	24%[S]	8%	22%[D, C]	6%	5%

L/M/S - Denote a % is significantly higher than the annual loan origination volume group that the letter represents at the 95% confidence level
M/D/C - Denote a % is significantly higher than the institution type group that the letter represents at the 95% confidence level

AI/ML Technology Objectives

[If uses AI/ML tools] Which of the following best describes your firm's primary objective in exploring AI/ML tools for your mortgage business?

	Total	Larger Institutions (L)	Mid-sized Institutions (M)	Smaller Institutions (S)	Mortgage Banks (M)	Depository Institutions (D)	Credit Unions (C)
N=	43	16	14	13	26	10	4
Reduce human error	9%	0%	21%	0%	8%	10%	0%
Enhance consumer/borrower experience	41%	52%	32%	38%	51%	29%	0%
Better control risks	7%	6%	0%	22%	4%	29%M	0%
Improve operational efficiency	42%	42%	46%	32%	34%	32%	100%M, D
Other	1%	0%	0%	8%	4%	0%	0%

AI/ML Technology Adoption Outlook

[If does not use AI/ML tools] What do you think the status of your firm's adoption of AI/ML applications for your mortgage business will be in two years?

	Total	Larger Institutions (L)	Mid-sized Institutions (M)	Smaller Institutions (S)	Mortgage Banks (M)	Depository Institutions (D)	Credit Unions (C)
N=	184	45	42	97	66	68	39
Not consider usage	2%	0%	0%	5%	0%	4%	3%
Wait and see	19%	13%	6%	37%L,M	8%	33%M	36%M
Investigate usage	22%	12%	26%	27%L	18%	24%	28%
Use on a trial basis	20%	22%	23%	16%	22%	17%	18%
Roll out more broadly	38%	52%S	45%S	16%	52%D,C	22%	15%

AI/ML Technology Challenges

[If does not use AI/ML tools] Earlier you mentioned that your firm has not used AI/ML applications. Listed below are some possible challenges companies might face in implementing AI/ML applications. Please select up to two of the biggest challenges for your firm and rank them in order of importance. *Showing Biggest + Second Biggest Challenge*

	Total	Larger Institutions (L)	Mid-sized Institutions (M)	Smaller Institutions (S)	Mortgage Banks (M)	Depository Institutions (D)	Credit Unions (C)
N=	142	30	28	84	40	59	35
Complexity of integrating AI/ML applications with our existing infrastructure	50%	58%	43%	50%	55%	50%	43%
Costs too high	30%	23%	34%	32%	37%	30%	27%
Lack of proven record of success (concerns over AI/ML accuracy)	25%	39%S	29%S	12%	22%	20%	15%
Lack of necessary staff skills	20%	14%	23%	23%	24%	19%	22%
Concerns with data quality or availability	17%	14%	27%	12%	14%	9%	31%D
No ideas about what to do with AI/ML or where to start	13%	6%	4%	25%L, M	9%	19%	20%
Lack of overall technology strategy at my firm	12%	14%	7%	14%	8%	18%	12%
Challenges of getting consumer consent to use their data	11%	17%	7%	9%	10%	12%	9%
Concerns with data security (data breach) and privacy	10%	10%	13%	8%	10%	12%	6%
Concerns with the potential for AI/ML to come up with discriminatory results	9%	6%	15%	8%	8%	12%	6%
Other	1%	0%	0%	4%	0%	0%	9%

L/M/S - Denote a % is significantly higher than the annual loan origination volume group that the letter represents at the 95% confidence level
M/D/C - Denote a % is significantly higher than the institution type group that the letter represents at the 95% confidence level

Most/Least Appealing Ideas for AI/ML Technology for Mortgage Business (MaxDiff)

In this section, you will see some ideas for how your firm could leverage AI/ML technology to improve or expand its mortgage business. The ideas will be presented in a total of 7 sets with each set presenting 3 ideas. For each set, please choose the idea that is the MOST appealing and the idea that is the LEAST appealing to your firm *Showing Relative Importance Scores*

	Total	Larger Institutions (L)	Mid-sized Institutions (M)	Smaller Institutions (S)	Mortgage Banks (M)	Depository Institutions (D)	Credit Unions (C)
N=	184	45	42	97	66	68	39
AI-driven Customer Service Digital Assistants: Voice-activated "virtual assistants" or text-based chatbots to interact like humans to answer customer questions or provide guidance to help customers complete tasks	60.32	65.78	56.19	59.00	47.59	59.72	75.92
AI-empowered Customer Relationship Management: Have machines "listen in" to loan officers' conversations or customer service calls and provide feedback such as how to better handle certain irate customers or spot certain business opportunities	65.30	70.88	69.98	55.05	77.84	53.65	54.42
AI/ML-based Property Valuation: Have machines examine all data available (e.g., crime rates, psychographics of residents in the neighborhood, insurance records, etc.) to assess property value	95.04	91.98	87.18	105.98	91.60	112.33	94.04
AI/ML-based Borrower Default Risk Assessment: Have machines examine all available information or data (financial and non-financial such as social media activities) to predict the probability of borrower defaulting on the loan to allow lenders to take proactive steps	136.25	132.03	131.15	145.56	132.71	145.66	143.78
AI/ML-based Borrower Prepay (move/refinance) Assessment: Have machines examine all available information or data (financial and non-financial such as social media activities) to predict the probability of borrower refinancing or retiring the loan (due to move or home sale)	110.03	110.01	105.30	114.79	104.69	119.19	109.54
AI/ML-driven "Social Trust" Score: For thin-credit borrowers, devise a "social trust" score by having machines analyze the individual's non-financial transactions (e.g., social media activities, internet browsing history, app use, and geolocation data) to help predict loan performance	50.91	35.88	55.48	61.36	51.72	48.81	57.19
AI/ML-driven Anomaly Detection Automation: Enable machines to process data from various sources to identify fraud or detect defects early in the underwriting process	182.14	193.44	194.73	158.26	193.85	160.64	165.11

Question Text

qR268. How familiar are you with AI (Artificial Intelligence) or ML (Machine Learning) applications as specifically applied to enhancing your mortgage business processes?

qR269. Which of the following statements best describes your firm's current status with AI or ML solutions for your mortgage business?

qR270. You mentioned that your firm has started using AI/ML tools for your mortgage business. In the space provided below, can you share with us some specific functions as examples for which your firms uses AI/ML technology for mortgage lending?

qR271. Which of the following best describes your firm's primary objective in exploring AI/ML tools for your mortgage business?

qR272. What do you think the status of your firm's adoption of AI/ML applications for your mortgage business will be in two years?

qR273/qR274. Earlier you mentioned that your firm has not used AI/ML applications. Listed below are some possible challenges companies might face in implementing AI/ML applications. Please select up to two of the biggest challenges for your firm and rank them in order of importance.

MaxDiff: In this section, you will see some ideas for how your firm could leverage AI/ML technology to improve or expand its mortgage business. The ideas will be presented in a total of 7 sets with each set presenting 3 ideas. For each set, please choose the idea that is the MOST appealing and the idea that is the LEAST appealing to your firm.

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