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Preparing for a growing model landscape in a fast-changing world

EMEA Model Risk Management Survey

2023

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Foreword

On behalf of Deloitte we are pleased to present the latest edition of the EMEA Model Risk Management Survey. This report presents the latest insights regarding current model risk management practices and challenges faced by insurers across Europe, the Middle East and South Africa.

We would like to express our gratitude to the survey participants for taking the time to provide the responses and valuable insights which are the foundation of this report. The collected inputs have been aggregated to form an insightful picture of the current state of Model Risk Management (MRM) in insurers.

At Deloitte, our mission is to help our clients become more responsible businesses that can grow sustainably. Directly or indirectly, models are used within insurers to inform key decisions that impact customers and therefore also society. As they become more embedded in businesses, the appropriate use of models becomes a critical factor for business resilience. We believe that a mature model risk management framework creates insights into the entire model landscape of the insurer, raising awareness and mitigating model risk across all steps of the model lifecycle. This helps our clients become more responsible and sustainable businesses by ensuring management teams have appropriate safeguards around the use of models in making decisions for their customers.

Model risk management continues to increase in importance, as insurers rely more on models than ever before. The increasing risks (e.g., from AI and machine learning) are recognized by prudential regulators and risk practitioners around the world.

This survey contributes to both a systemic and business-specific understanding of model risk, which will help firms to achieve a more mature model risk management framework and ensure responsible use of models. The survey is based on insights from 34 insurers, ranging in size from balance sheet totals of less than EUR 30 billion to more than EUR 1,000 billion. The survey covers all the critical building blocks of model risk management across four key themes:

1. Model landscape and inventory,
2. Technology and tooling,
3. governance, and
4. artificial intelligence.

We hope that the results of this survey provide you with valuable insights to support your journey to improve model risk management.

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Executive summary

This model risk management survey was conducted between July and September 2023. In total 34 insurers across Europe, the Middle East and South Africa participated in the survey. It covers all the key building blocks of model risk management across four key themes: model landscape and inventory, technology and tooling, governance, machine learning and artificial intelligence. We hope this survey will provide valuable insights into model risk management that will help insurers to create more responsible and sustainable business outcomes.

Model landscape and inventory

The model inventory is the central repository for model related information and the foundation of an effective model risk management framework. It contains the information that defines the scope of model risk management, and is the main source for the majority of information about model risk.

The model inventory starts with a clear and organisation-wide definition of a model. This defines the scope of the models that are included in the model inventory. According to the survey, 74% of participating insurers have a documented model definition (compared to the approximately 90% of banks with documented model definition).

The tendency seems to be that with increasing reliance on models, the number of models in the inventory and the scope of the model risk management framework also expand. Model types that are subject to regulation, such as insurance risk models (pillar 1 capital and accounting), are most frequently included in the model inventory. 60% of participating insurers have started to include other types of models in their risk management framework, market risk models, ESG and other models such as cyber, marketing and HR models.

In general, the larger the size of the company, the more mature the model risk management framework and, as expected, also the higher the number of models in the model inventory. The average number of models in the inventory is around 40 models for small, 210 for medium, and 240 for large insurers. In some cases, large insurers have 1000 models in their model inventory.

Technology and tooling

Successful model risk management framework implementations are often supported by model risk management tooling. Insurers that have a consolidated model risk management tool are able to integrate the model inventory, document repository, lifecycle management and workflow, analytical and reporting capabilities into a single platform. The tool and the functionalities can greatly contribute to the effectiveness of model risk management activities.

For insurers, 40% stated that they do not use tooling for model risk management. For the remaining of the insurers use of MS Excel, vendor or in-house solutions is close to equally distributed. We well continue to observe if the insurers will have the same steps as banks, namely having first MS Excel and vendor solutions and then transitioning to in-house developed solutions, or they will move immediately to in-house developed solutions.

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Strong model governance across the entire model lifecycle of models is a key requirement for the model risk management framework.

The role of model owner is to be seen as important with 74% of respondents having clearly defined and documented the role of the model owner, for banks this ratio stands at 87%. Further, for 64% of participating insurers model owners are being appointed from outside the modelling development teams. This should help firms build stronger knowledge and buy in to the effective use of models in the business.The majority (80%) of the insurers have appointed model owners for at least 75% of their models.

The core challenge for 56% of participating insurers is how to get people feeling responsible for all parts of the model. For 32% of respondents, the challenge is to make people understand the responsibilities of the model owner.The key areas that most respondents identified as needing improvement relate to governance and controls, including monitoring. This is driven by insurers seeking to meet expectations of regulators and other stakeholders (e.g., statutory auditors). Insurers will need to continue to invest, to address specific gaps and make the improvements needed.

For 38% of participating insurers the model risk management function is positioned in the risk function and for 26% it is positioned in the respective model use areas. For the rest it is positioned in the model development, data analytics or other areas of the organisation.

As the model landscape is expanding, there is a need for a committee or role that is responsible for approving the use of models before their implementation, managing model risk, approving model changes, and establishing relevant policies and standards. In general, 56% of participating insurers (compared to the 75% of banks) have such a committee or role but there is a significant difference between insurers based on their size. 89% of large insurers either have a model risk committee or similar role or are planning to have in the future. On the other hand, only 18% of small insurers have such committee or role.

Artificial Intelligence and Machine Learning

More than half of the insurers are using some variation of artificial intelligence or machine learning (AI/ML) techniques. There is a big difference between insurers of different sizes, as 67% of large insurers are using models with AI/ML techniques whereas only 27% of small insurers use such techniques.

Three out of five insurers have analysed the impact of the proposed EU AI Act on their AI/ML models. 28% of the insurers found that their organisation uses high risk AI/ML models.

43% of all respondents have no policies around the use of generative AI and Large Language Models. Notably, large insurers are more likely not to have any such policies.

The top challenges identified by participating insurers regarding the use of AI/ML techniques are transparency and explainability, fairness and impartiality, and skills and capabilities. This indicates that the use of AI/ML techniques requires changes to all phases of the model life cycle.

The emergence of AI techniques alongside traditional insurance risk models brings ethical complexities to the forefront. Finding a balance between innovation and ethics is crucial for organizations, as it ensures that AI models enhance accuracy while upholding fairness and stability within risk modelling.

The most common action taken to ensure fairness is an ethics framework or strategy that covers AI/ML applications, but still, 86% percent of participating insurers have not established processes, methodologies, or tools to ensure the fairness of their AI/ML models.

Even though large insurers tend to agree more, overall, more than three out of five insurers agree that AI/ML is critical to their organisation's overall success in the next 5 years.

"More than half of the insurers are using some variation of artificial intelligence or machine learning techniques".

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Importance of model risk management

Dependence on models and scope extension
Insurers rely more and more on models. Models are used for decision making and execution of policies throughout all operations of the insurer. Changes and innovations within insurers and the marketplace also demand more and better models that enable faster decision making.

Not only is the dependence on models increasing, but the range of models that an isnurer relies on is also expanding. As a result, a growing number of insurers start to include, for instance, ESG and cyber risk models in the scope of their model risk management framework.

This increases the number of models in scope and leads to a larger variety of models. Additionally, models are increasingly becoming more complex with, for instance, the use of machine learning techniques in selecting parameters within models or direct use of machine learning for specific use cases (e.g., insurance pricing and underwriting or AML and fraud detection).

As decisions become more model driven and based on detailed data, stakeholders such as clients, investors and regulators are also demanding a deeper understanding of the way insurers develop, validate, approve, use and monitor models.

Stronger model governance across the model lifecycle
These developments described above require stronger model governance across the entire model lifecycle. The role of the model owner is key in that governance, but insurers observe a large number of challenges around the adoption of that role. More models and more complexity in the model landscape also means that more efficient ways of working need to be introduced to ensure effective and efficient use of the scarce resources available for work on models. Changes might be required in model risk committee structures, in order to enhance efficient decision making on both a strategic and operational level for the large model landscape. Finally, the way model development and model validation teams work and interact throughout the model lifecycle might also needs to change.

Use of technology
In order to create a detailed and up to date overview of the model landscape and keep track of models throughout the model lifecycle, the role of technology in model risk management becomes more important. More and more insurers are developing or buying model risk management tooling as they mature from low-technology model inventory lists. Technology is also key for model monitoring. Automation of model monitoring reduces the manual work for both model development and model validation and increases efficiency in the model lifecycle. In addition, it contributes to a more accurate view of the quality of models, especially when monitoring is performed frequently and automated.

"Models are used for decision making and execution of policies throughout all operations of the insurer".

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About the survey

This report presents findings from Deloitte's assessment of model risk management practices. The survey is based on information gathered from 34 insurers in Europe, the Middle East and South Africa and was conducted from July to September 2023. The survey has roughly even split between large, medium and small insurers with the majority being in Europe.

Figure 1. Percentages of insurers in each of three size categories. Small insurers with a balance sheet total of less than EUR 30 billion, medium between EUR 30 and 100 billion and large with more than EUR 100 billion

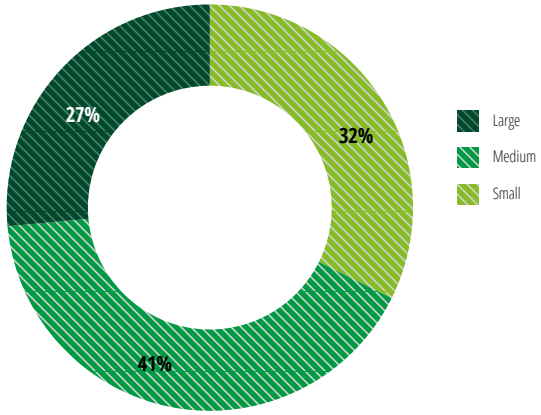


Figure 2. The survey included an even mix of insurers from eight countries with the majority (85%) being in Europe

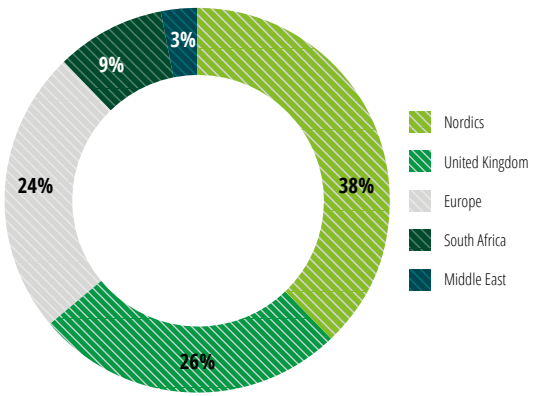
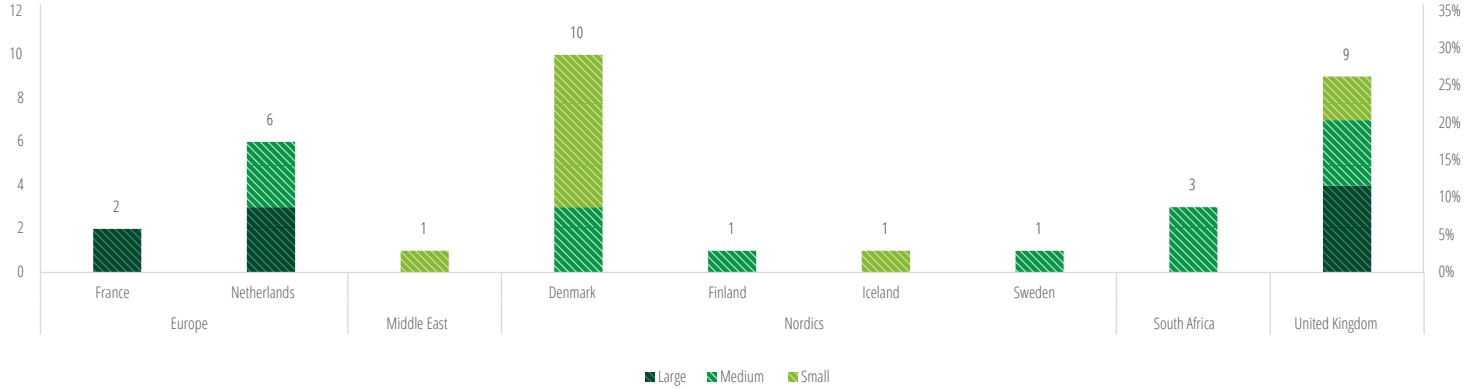


Figure 3. Number of insurance companies in each countries



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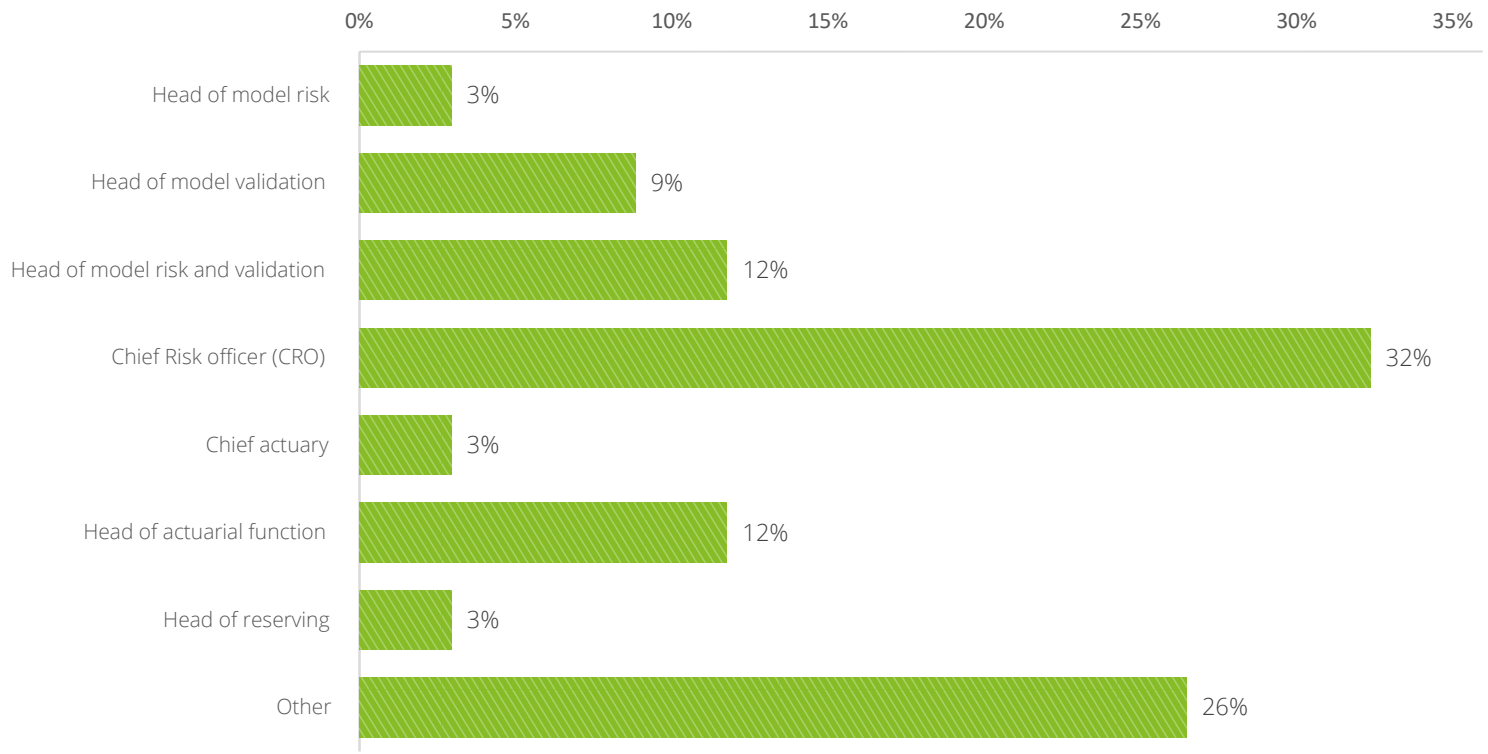
The survey was completed by a variety of persons in the participating insurers. In 32% of cases, it was the CRO.

Figure 4. Role within the insurance company of the participant that completed the survey



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Model landscape and inventory

The model inventory is the central repository for model-related information and the foundation for efficient model risk management. It sets the scope for model risk management, but it is also the source for the vast majority of information about model risk. In general, the larger the size of the company, the more mature the model risk management framework.

Definition of model

74% of the insurers have an organisation-wide model definition. Of these 56% of the respondents indicated that their model definition is based on a regulatory definition, while 44% of the respondents indicated they developed an in-house model definition.

The model definitions, regardless of their regulatory or in-house type, have key statements in common. In most definitions, at least part of the SR 11-7* model definition is used: "a model is a quantitative method, system, or approach that applies statistical, artificial intelligence, economic, financial, or mathematical theories, techniques, and assumptions to process input data into quantitative estimates".

Model inventory

The model inventory is the central repository for all models. It is the foundation for efficient model risk management. It contains the scope for model risk management, but it is also the source for all information about model risk. This includes for instance information about the position of the model in the model lifecycle, information about the quality of the model such as validation results, and the overall model risk appetite statement of the insurance company.

Model risk policy

65% of the insurers answered "yes" to the question of whether there is an existing model risk policy in their organization. This model risk policy specifies, amongst others, the processes, standards, governance, roles and responsibilities relating to the management of model risk in the organization.

"a model is a quantitative method, system, or approach that applies statistical, artificial intelligence, economic, financial, or mathematical theories, techniques, and assumptions to process input data into quantitative estimates"

Figure 5. Insurers with organisation-wide model definition

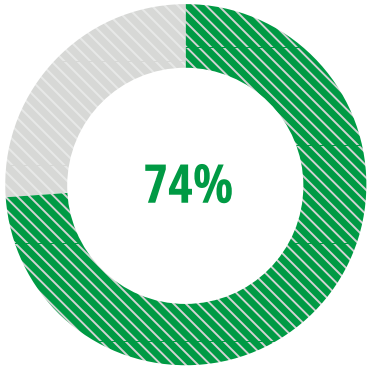
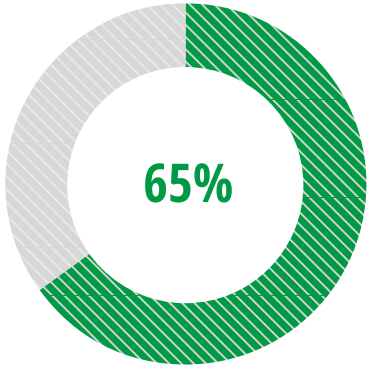


Figure 6. Existing model risk policies



* The Supervisory Guidance on Model Risk Management issued by the Board of Governors of the Federal Reserve System and Office of the Comptroller of the Currency (2011).

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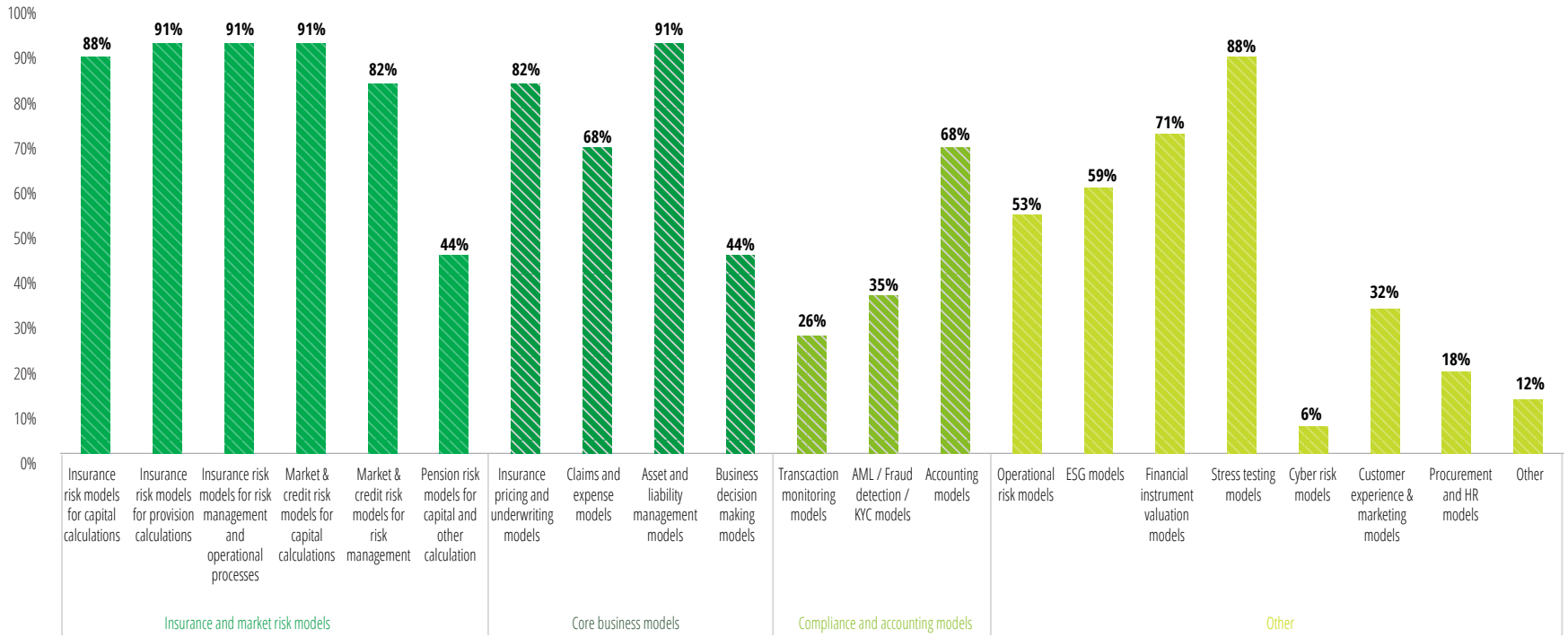
Use of models

Insurance risk models are the most used models within insurers, followed by the market and credit risk models.

Three out of five insurers are using ESG models within their organisation.

Figure 7. Proportion of respondents who have the model type in question in use



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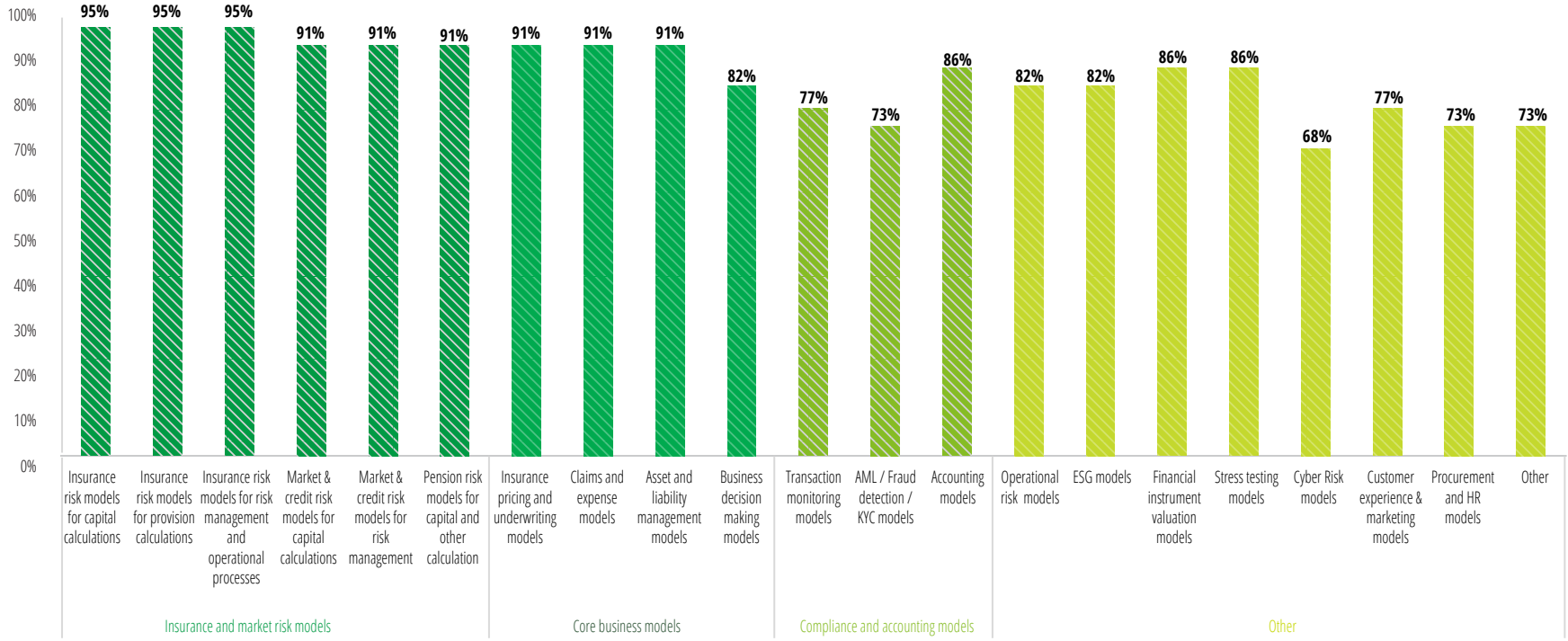
Scope of the model risk management framework

In 95% of insurers in the survey, insurance risk models and market risk models are in scope of the model inventory. It is not surprising, given regulatory attention, that these models for insurance risk and market risk are most often in scope.

86% of the small insurance firms in the survey did not include cyber risk or ESG models in their model risk management scope. The insurers that include the insurance risk models, compliance and other models in their model risk management scope, are mostly large and medium insurers with a more mature model risk management framework.

Figure 8. Scope of the model risk framework for each of the model types as a percentage of respondents that use the model type in question



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ESG and Climate Risk models in scope

Three out of five insurers are using ESG models within their organisation. The most commonly modelled ESG risk driver is the Environmental risk driver. Within the Environmental risk drivers, mainly climate stress testing models are used within insurers followed by GHG emission models.

For ESG models, the main model risks identified are the risk associated with expert judgement and data quality for model development and validation.

Figure 9. Use of ESG model

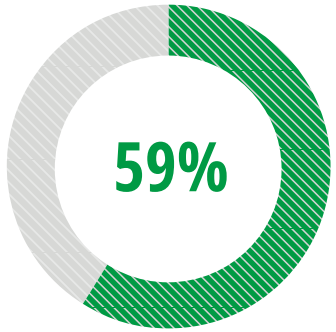


Figure 10. ESG risk drivers modelled

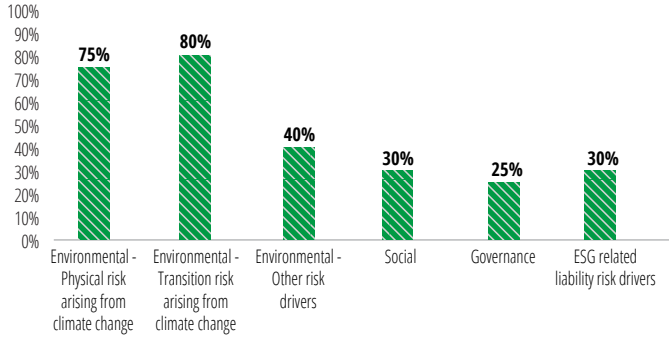


Figure 11. Currently modelled Environmental (E) topics

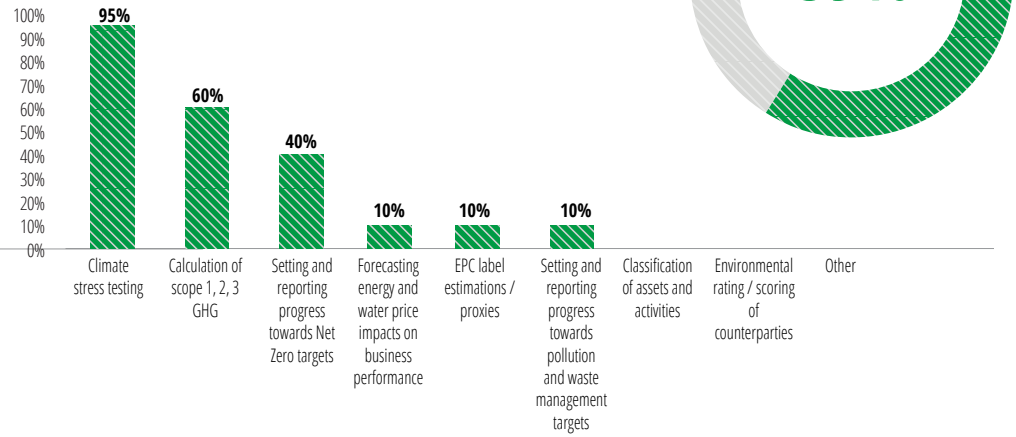
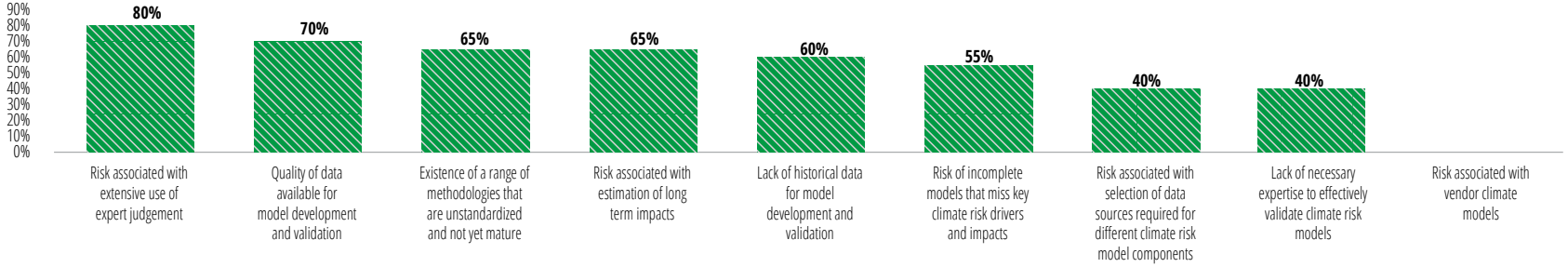


Figure 12. Addressed risks and issues associated with climate risk models



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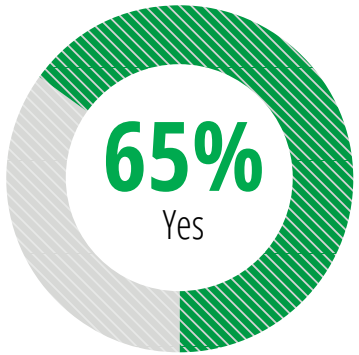
Model inventory size

The number of models in an insurer's model inventory is constantly subject to change. The survey results show that practices diverge widely between small, medium and large insurers. This is not unexpected, as large insurers tend to have more mature model risk management frameworks and also include more model types, as shown in the previous figures.

Small insurers indicate that they have an average of 39 models in their model inventory, medium insurers have 206 models and large insurers 240 models, with strong outliers. These figure, which are in the same range as for banks, should be compared cautiously, as the model definition used by each insurer can vary.

Figure 13. Do you have a model inventory?

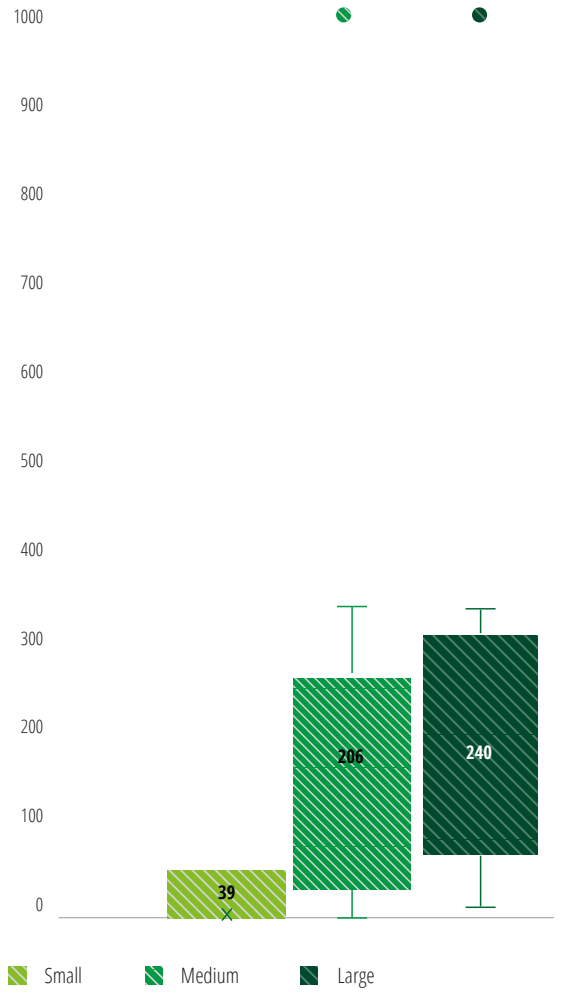


Medium and large insurers have significant variance in the number of models reported in their inventories.

- For large insurers, the lowest 25% have a maximum of 85 models and the highest 25% have more than 225 models in their inventory.
- For medium sized insurers, the lowest 25% have a maximum of 65 models and the highest 25% have more than 223 models in their inventory.
- For small insurers, these numbers are 19 models for the lowest 25% and 50 models for the highest 25%.

The current maximum observed number of models in an inventory is a several thousands of models for the time being. These numbers are from large insurers that also indicate that they consider their model inventories to be complete in some extent currently.

Figure 14. Number of models in the model inventory



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Model inventory information

The purpose of a model inventory is to store information at the individual model level. Structured and high-quality information is the foundation of efficient model risk management. Small and medium insurers store on average approximately 18 and 25 data fields on the models, where large insurers on average 39 data fields in their model inventory. The number of data fields stored by insurance companies are approximately the 70% of the number data fields stored by banks.

Although these differences may appear minor in terms of absolute numbers, they do mean that bigger insurers store – and need to maintain – approximately 80% more data fields than small insurers and medium insurers.

Model inventories are at least 50% complete in all insurers who provided information. In the majority (approximately 70% of the insurers with model inventory) the model inventories are at least 75% complete.

Figure 15. Number of data fields in model inventory

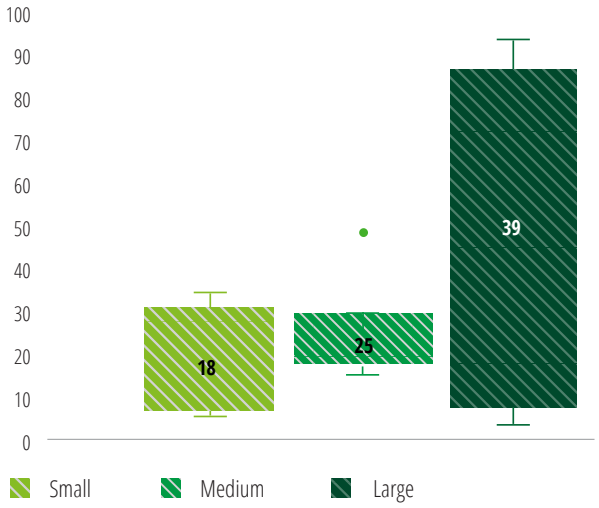
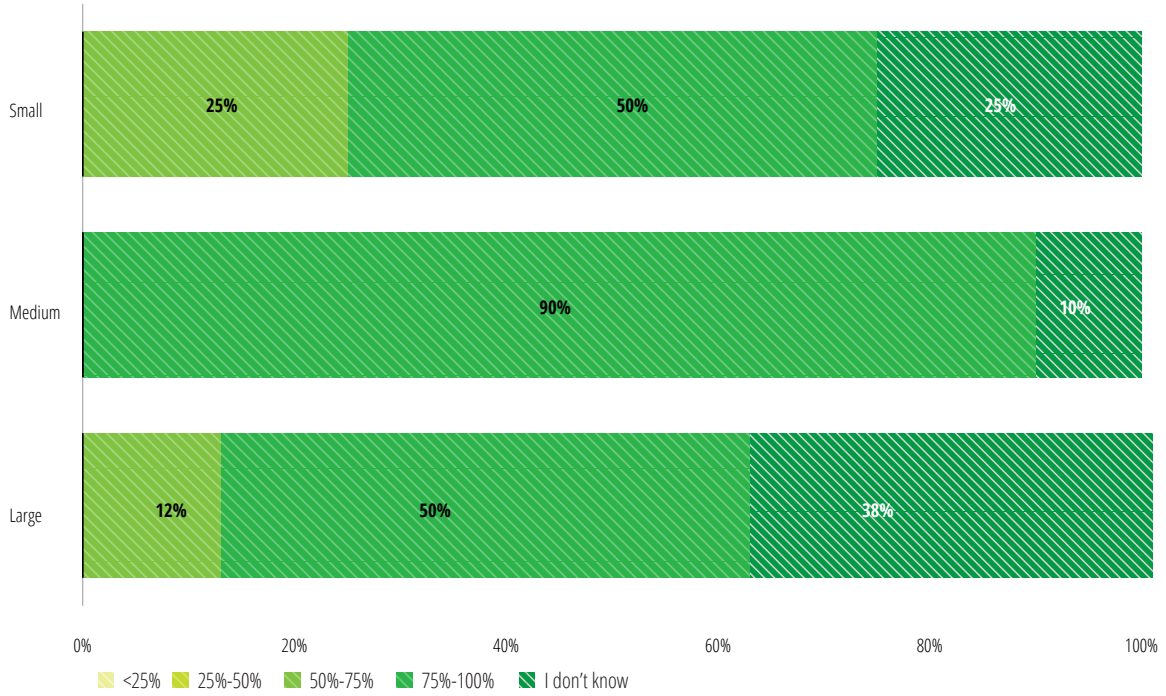


Figure 16. Proportion of models included in the model inventory



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Successful model risk management framework implementations are often supported by model risk management tooling. Model risk management tools integrate the model inventory, document repository, lifecycle management and workflow, analytical and reporting capabilities into a single platform. The use of a singe tool with shared functionalities can greatly contribute to the effectiveness of the model risk management activities.

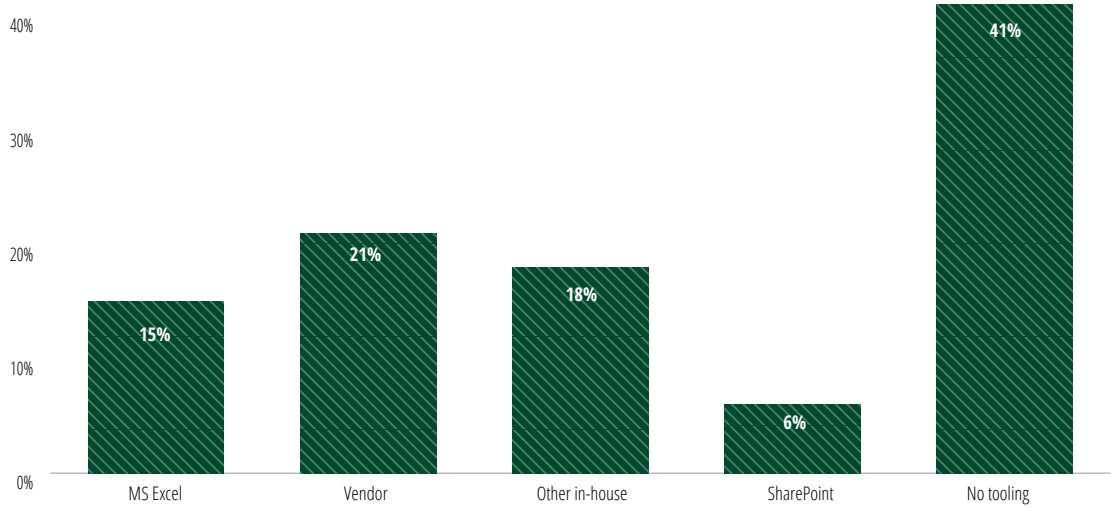
Tooling types: From MS Excel to solutions developed in-house

According to the survey results, 15% of the insurers use MS Excel as their model risk management tooling, making this the most used tooling. 21% of insurers surveyed have a vendor solution in place. This proportion is approximately the same for banks as well. Less frequently, insurers use either SharePoint or a solution that was developed in-house. Some insurers indicate that they use a combination of tooling in order to have all the required functionalities of the tool at hand.

Although MS Excel is the most used tool for all sizes of insurers, large insurers use a vendor solution or a solution that was developed in-house more often than medium or small insurers.

Furthermore, almost half of the medium and small insurers indicate they do not use tooling for model risk management at all.

Figure 17. Tool or system used for model risk management practices



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The role of model owner is to be seen as important with 74% of respondents having clearly defined and documented the role of the model owner. The model owner role is separated from the model developer role for 64% of respondents. The core challenges are how to get people feeling responsible for all parts of the model and to make people understand the responsibilities of the model owner.

Model owner

One of the key roles for effective model risk management is that of model owner. The model owner is responsible and accountable for a specific set of models, including the quality of those models. The model owner also acts as a bridge between the first line of defence and others, for instance by ensuring that findings from independent model validation are resolved with appropriate resources on a timely basis. 74% of the insurers have indicated that the role of the model owner is clearly defined and documented. Large and medium insurers have clear definitions in almost all the cases while half of the small insurers said that they do not have a clear definition for the role of "model owner". Two thirds of the insurers, the model owner comes from a different team than model development.

80% of all insurers have appointed model owner for at least 75% of their models for all sizes of insurers.

Figure 19. Proportion of the model landscape with appointed model owner

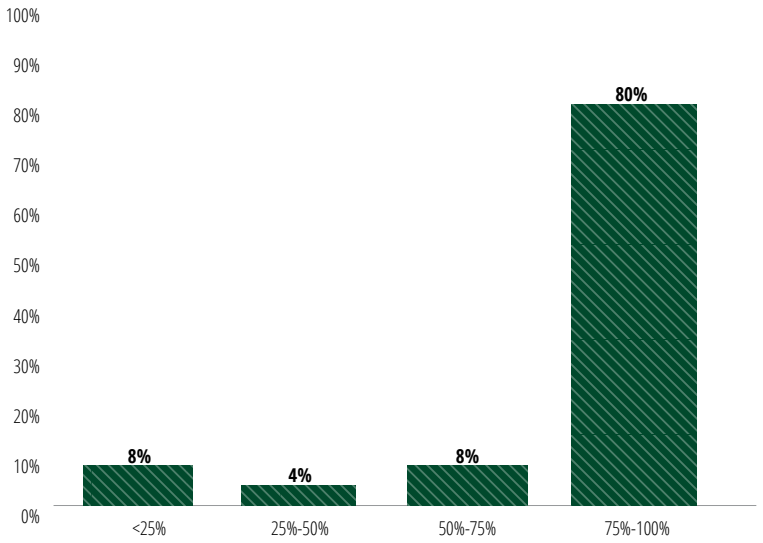


Figure 18. Percentages of insurers that clearly defined and documented the role of the model owner in the model risk management documentation

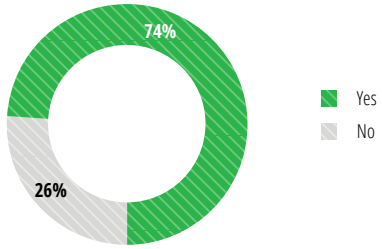
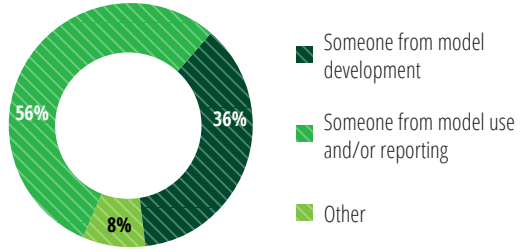


Figure 20. Most often appointed model owner



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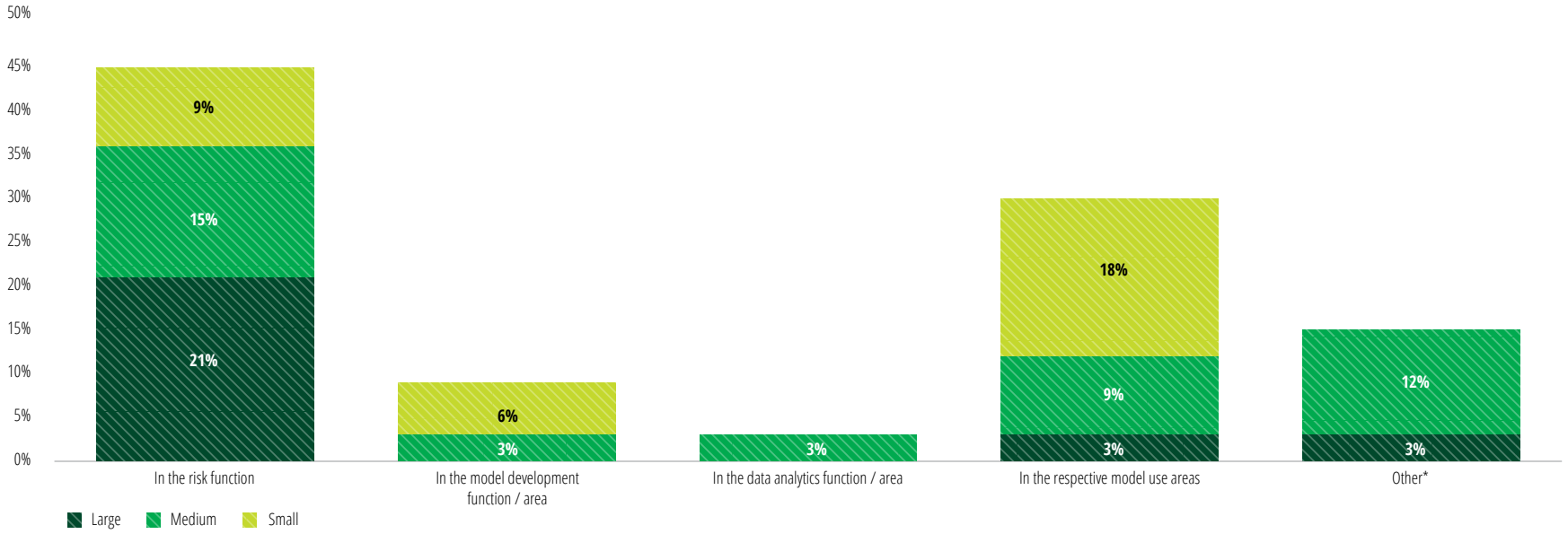
Model risk management teams

A few years after more specific guidance in Europe on Solvency II, stand-alone model risk management departments or teams have emerged, especially at the larger insurers. For 38% of the participating insurers the model risk management function is positioned in the risk function and for 26% it is positioned in the respective model use areas. However, good practices are that a mature model risk management framework requires a separation of model risk management responsibilities and model validation responsibilities. For 75% of the banks surveyed the model risk management team is either a separate team or the responsibilities of it are carried out by the model validation team.

Figure 21. Where is the MRM function positioned within the organisation?



*For insurers in the "Other" category MRM mostly conducted by both the first and second line of defence

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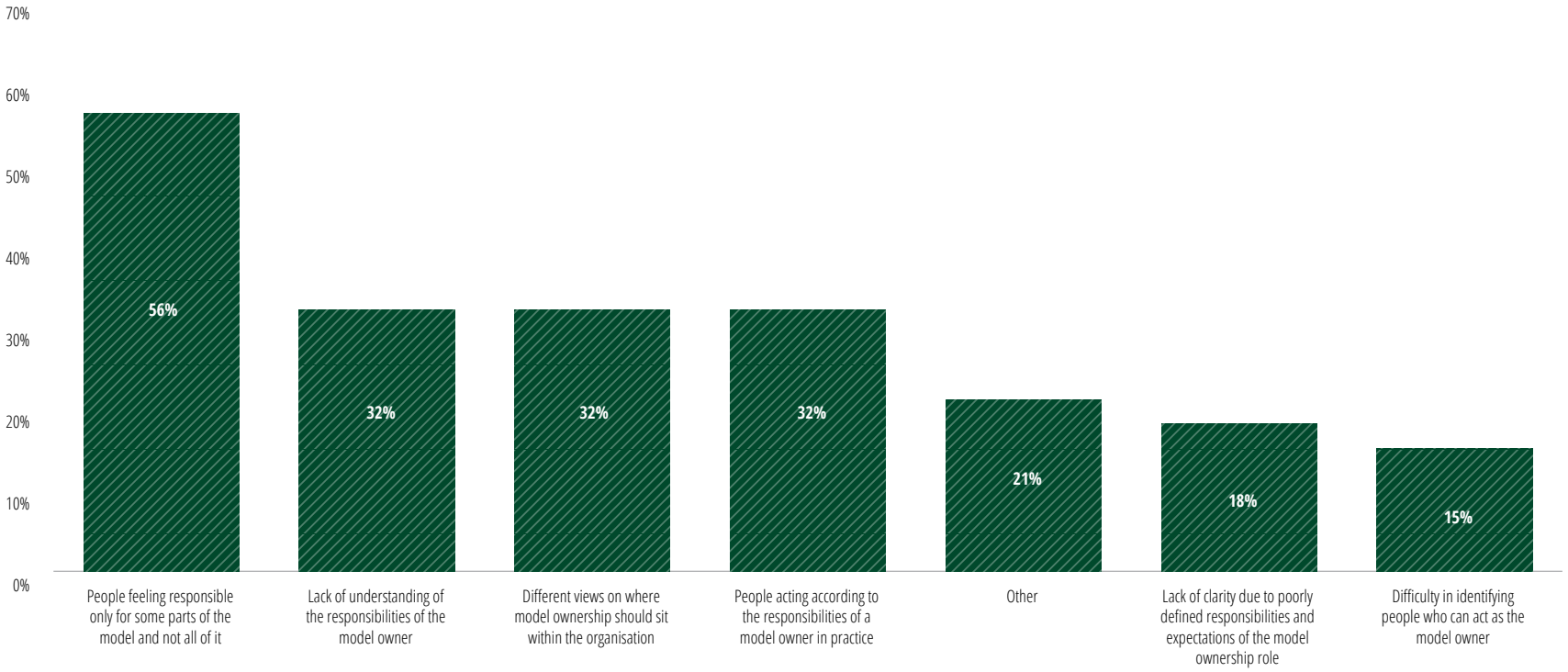
Main challenge in getting model ownership adopted

The main challenge identified by 56% of respondents in getting model ownership adopted was the lack of feeling responsibility for the entire model.

32% of participants identified lack of understanding model owner responsibility, different views on where the model ownership should sit, and people need to act in practice according to the responsibilities of a model owner as the next most common challenge.

Figure 22. Main challenges in getting model ownership adopted



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Model risk appetite and reporting to management board

44% of the respondents indicated that they have a defined risk appetite for model risk. 66% of large insurers have such a risk appetite (which is the same as the proportion of banks with defined risk appetite for model risk), while only 10% of small insurance companies have such risk appetite. Almost all respondents indicated that they – at least partially – report MRM topics to the management boards.

Figure 23. Insurance companies with risk appetite for model risk as a risk type

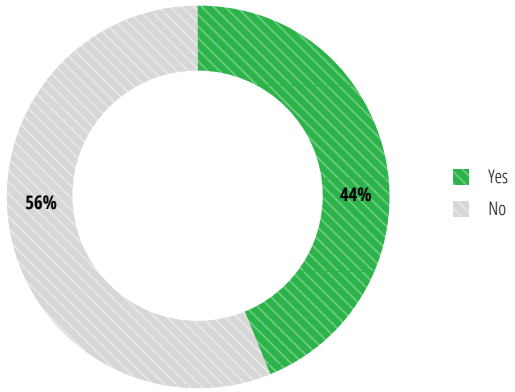
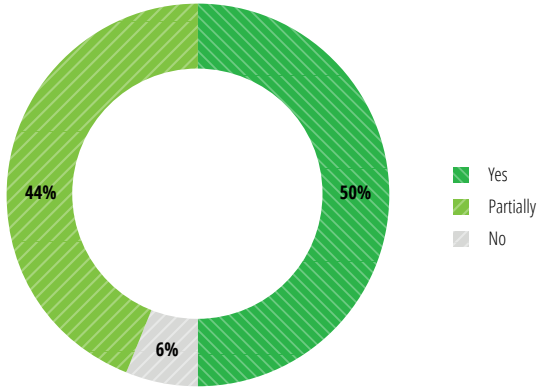


Figure 24. Reporting to board about the use of models and potential risks associated with them



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Number of FTEs dedicated to model risk management and model approval committees

Insurance companies indicated that on average 4-6 FTEs are dedicated to model risk management (after outliers were removed).

Most (56%) insurers have a model risk committee or similar committee that is responsible for approving the use of models. Only a small percentage of respondents indicated that they are aiming to set up such a committee or role in the next year.

Figure 25. Number of FTEs dedicated to model risk management*

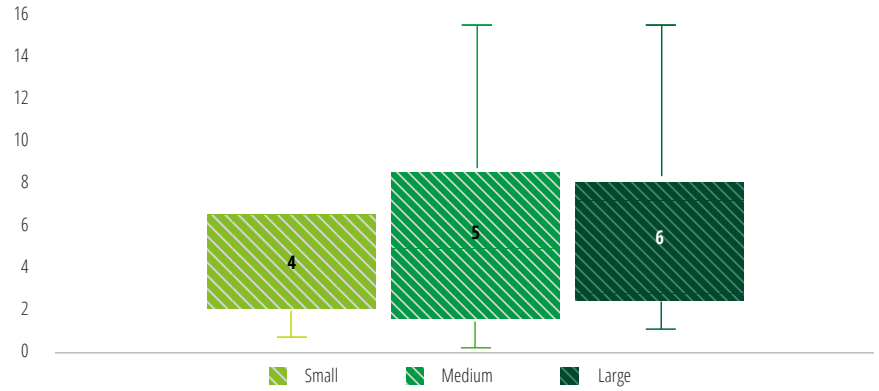
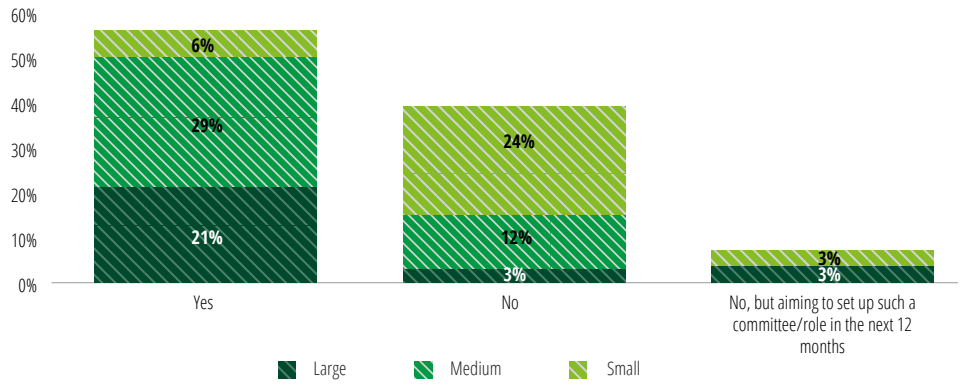


Figure 26. Insurance companies with model risk committee or similar role that is responsible for approving the use of models



*With outliers excluded

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Model risk management implementation challenges and improvements

Around 44% of insurers indicated that model identification and discovery is the most significant challenge regarding the implementation of model risk management within the organization.

Going forward, there are many areas where insurers indicate that they intend to enhance their model risk management framework within the next years. More than 40% of insurers intend to enhance their model risk management framework in the areas of model risk governance, model lifecycle management, standardization of processes, model monitoring and model inventory.

Figure 27. Significant challenges in implementing the model risk management framework

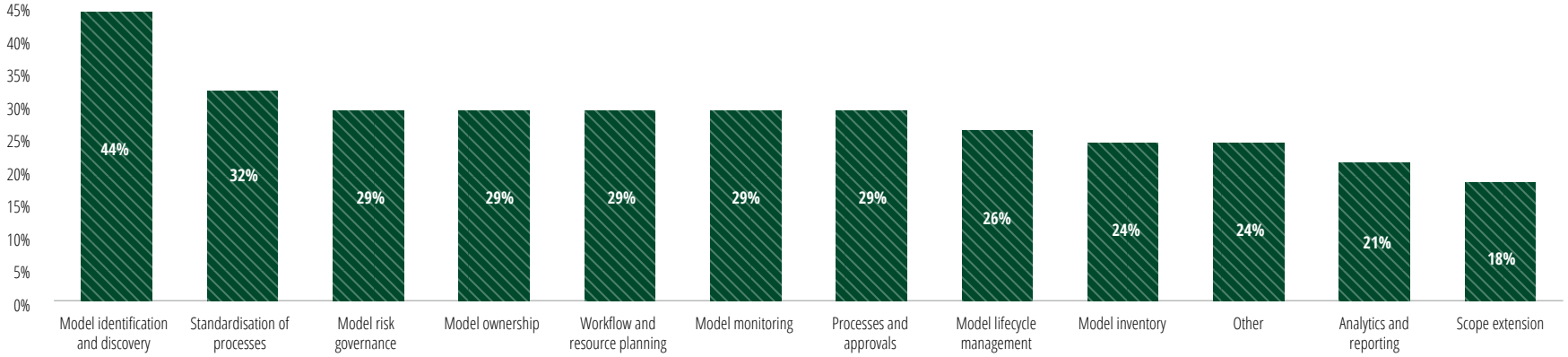
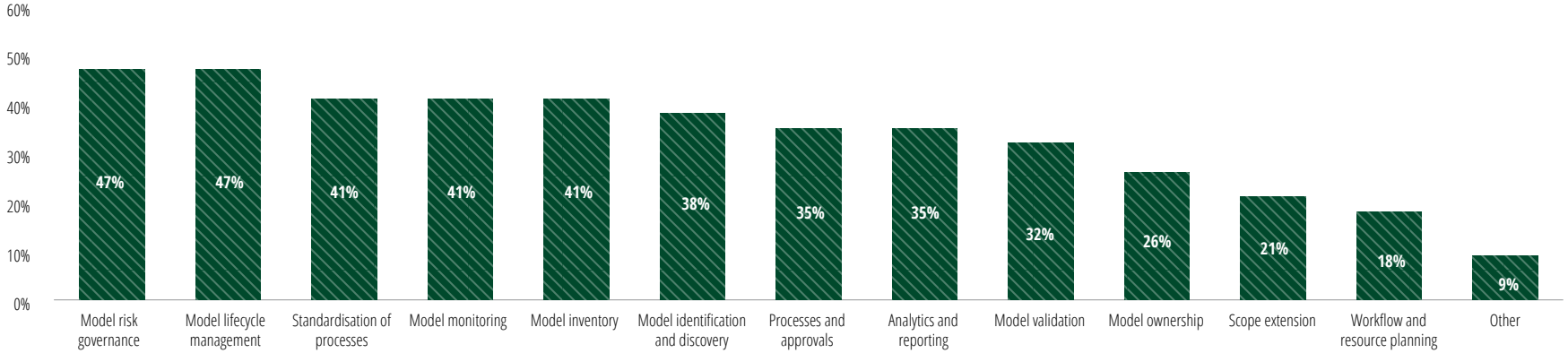


Figure 28. Intended improvement areas for model risk management



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This part of the survey only considers the 53% of insurers that have identified use of AI and/or ML modelling techniques in their organisation.

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53% of the participants responded that they are aware that artificial intelligence (AI) or machine learning (ML) models are used in their organization. 57% stated that at least some of these models with AI/ML techniques are included in the model inventory, and 52% of the model definitions include the AI/ML technique based models

Risk categories in the proposed EU AI act

The EU AI Act is a proposed legislation developed by the European Union (EU) to regulate the development and use of artificial intelligence (AI). The goal of the act is to establish a common framework for AI regulation across the EU, to ensure that AI is developed and used in a way that is ethical, safe, and transparent. The new rules establish obligations for providers and users depending on the level of risk from artificial intelligence. This AI Act follows a risk-based approach that distinguishes between AI systems posing different levels of risk:

Figure 29. Insurers that analyzed the impact of the proposed EU AI act

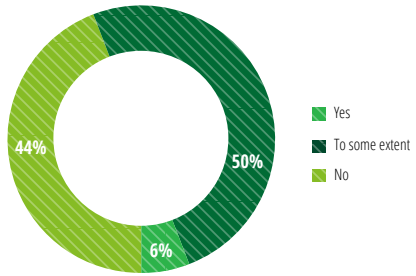
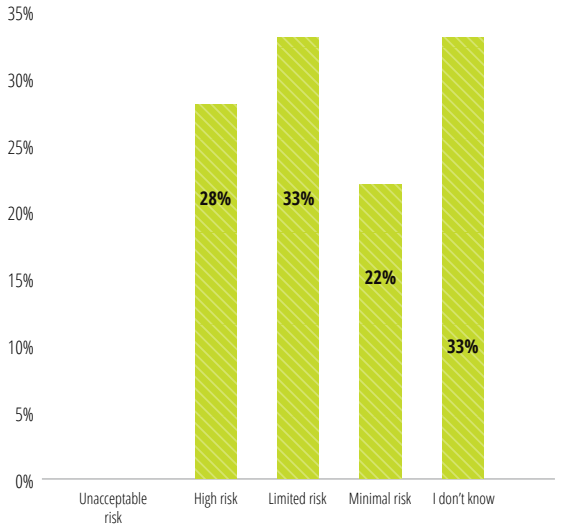


Figure 30. Risk of AI system



Almost three out of five insurers have analysed the impact of the proposed EU AI Act on their AI/ML models. 28% of the insurers using AI/ML techniques assessed that their organisation uses high risk AI/ML technique based models. **No insurers have indicated the use of models with unacceptable risk.**

Unacceptable risk: Use cases that pose an unacceptable risk to people's safety, rights, or livelihoods, such as AI systems designed to manipulate individuals or systems, or enable social scoring.

High Risk: Use cases that have the potential to cause harm but can be managed with appropriate safeguards, such as AI systems used in critical infrastructure or for biometric identification.

Limited risk: Use cases that have a lower risk of harm and don't require specific regulatory oversight, such as chatbots or recommendation systems used in e-commerce.

Low or minimal risk: Use cases that have little or no potential for harm, such as standard AI applications in spam filters or voice assistants

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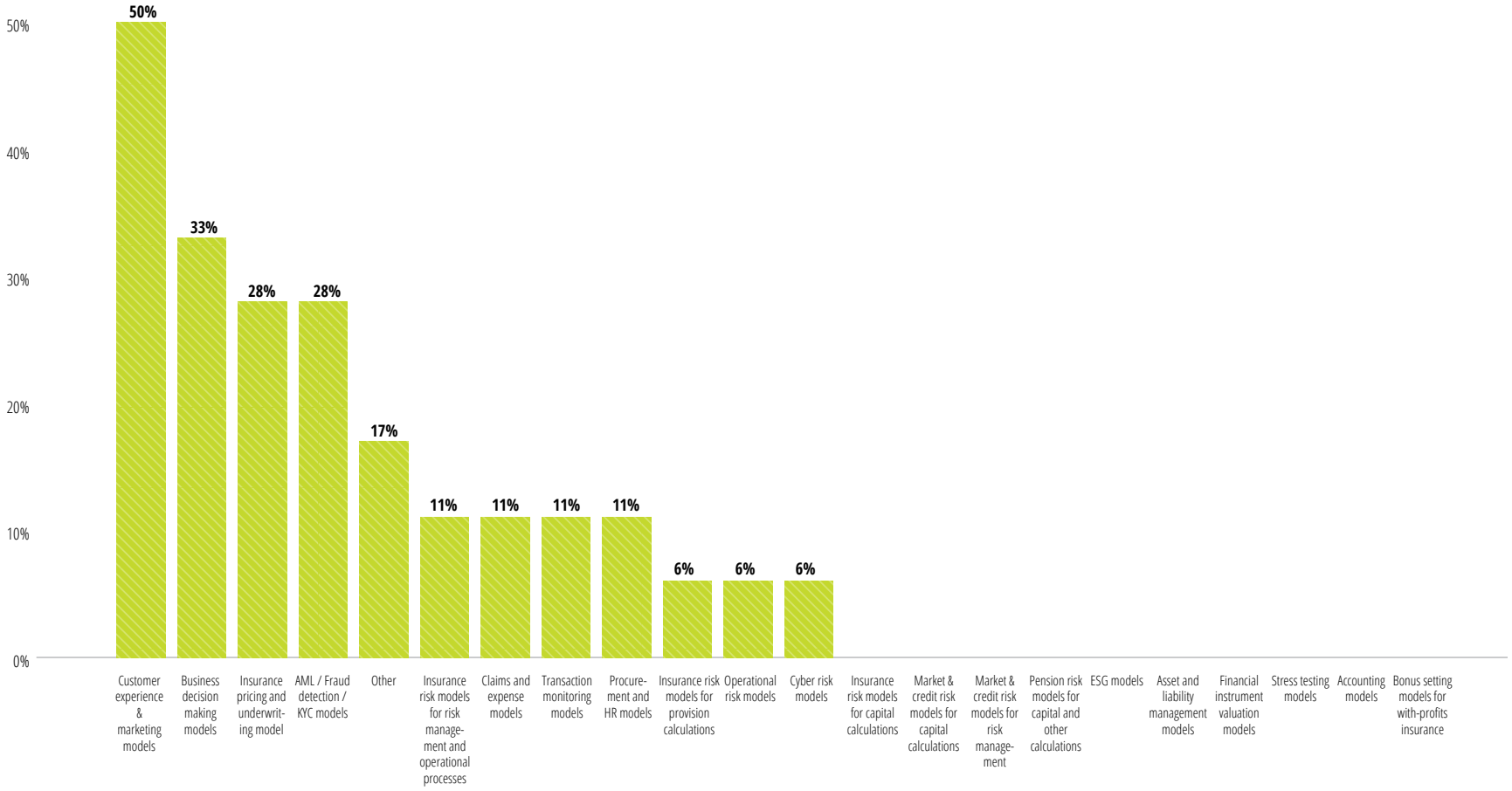
AI/ML modelling techniques in use

Participants that indicated use of AI/ML modelling techniques, mainly use such models for customer experience and marketing, business decision, insurance pricing and underwriting, and AML and fraud detection models. Less then 20% uses models with AI/ML techniques for other reasons, e.g., claims and expenses, procurement and HR or cyber risk models.

Figure 31. Use of AI /ML models in the organisation



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General thought on MRM frameworks and how they can govern AI/ML models

Almost three out of four insurers include models with AI/ML techniques in the scope of their model risk management framework, and 94% of insurers who responded consider that they have an adequate framework to govern these models at least to some extent. Only 19% agree with this statement entirely.

Two out of five respondents have developed additional model risk management processes and procedures to address the unique characteristics of models with AI/ML techniques.

Figure 32. AI/ML models in scope of the MRM framework

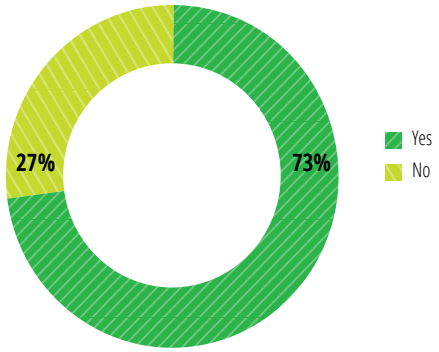


Figure 33. The MRM framework is adequate to govern AI/ML models

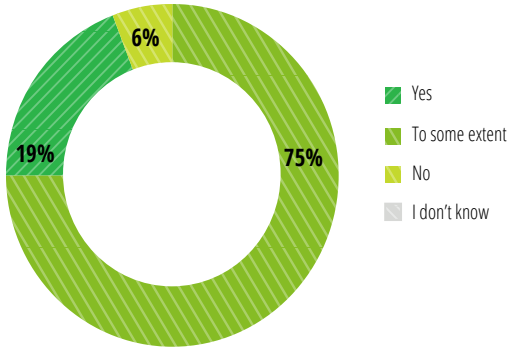
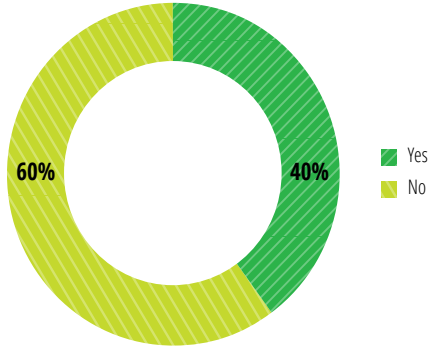


Figure 34. Additional processes to address unique characteristics of AI/ML models



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Significant challenges of using AI/ML models

Insurers with AI/ML modelling techniques face various challenges stemming from the use of these models. Approximately two third of the insurers find challenges related to transparency and explainability and almost half of them experience difficulties in the area of fairness, and skills and capabilities. Insurers are least concerned about the adoption of these models.

A significant percentage of insurers not (yet) using AI/ML techniques agree that transparency and explainability and the lack of skills and capabilities might be one of the biggest challenge for them.

43% of the insurers have no policies around the use of generative AI and Large Language Models

Figure 35. Policies around the use of generative AI and Large Language Models

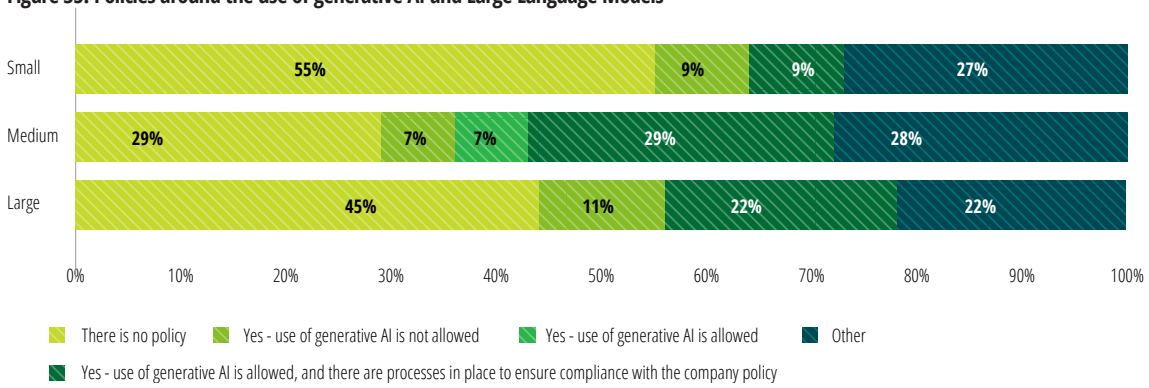
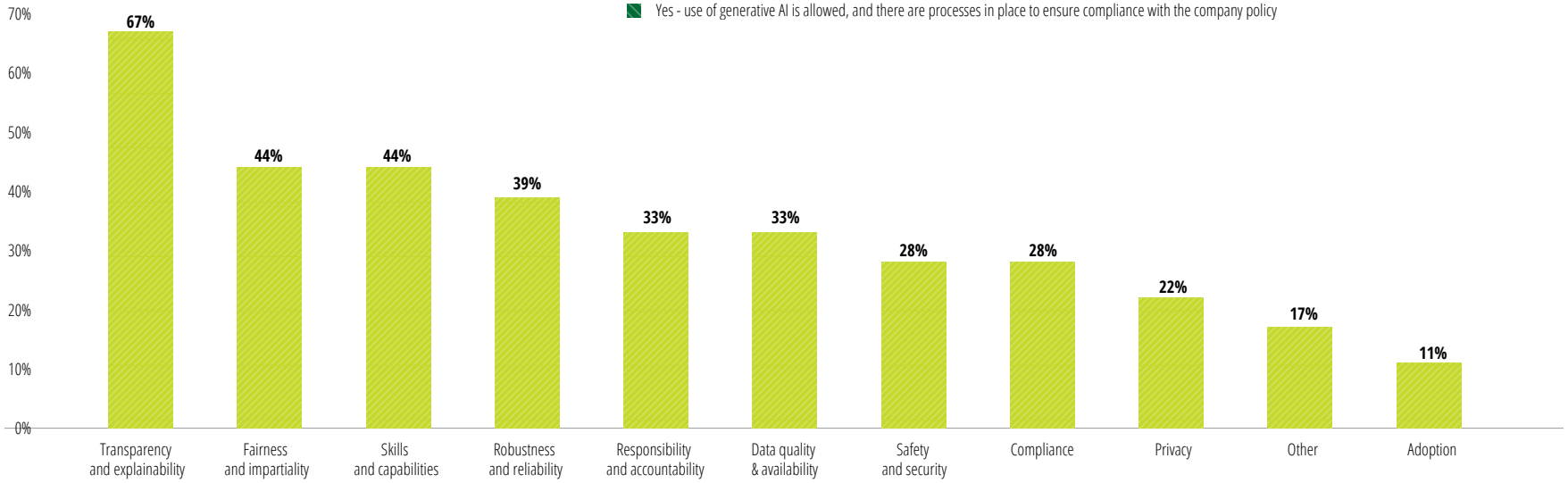


Figure 36. Significant challenges of using AI/ML models



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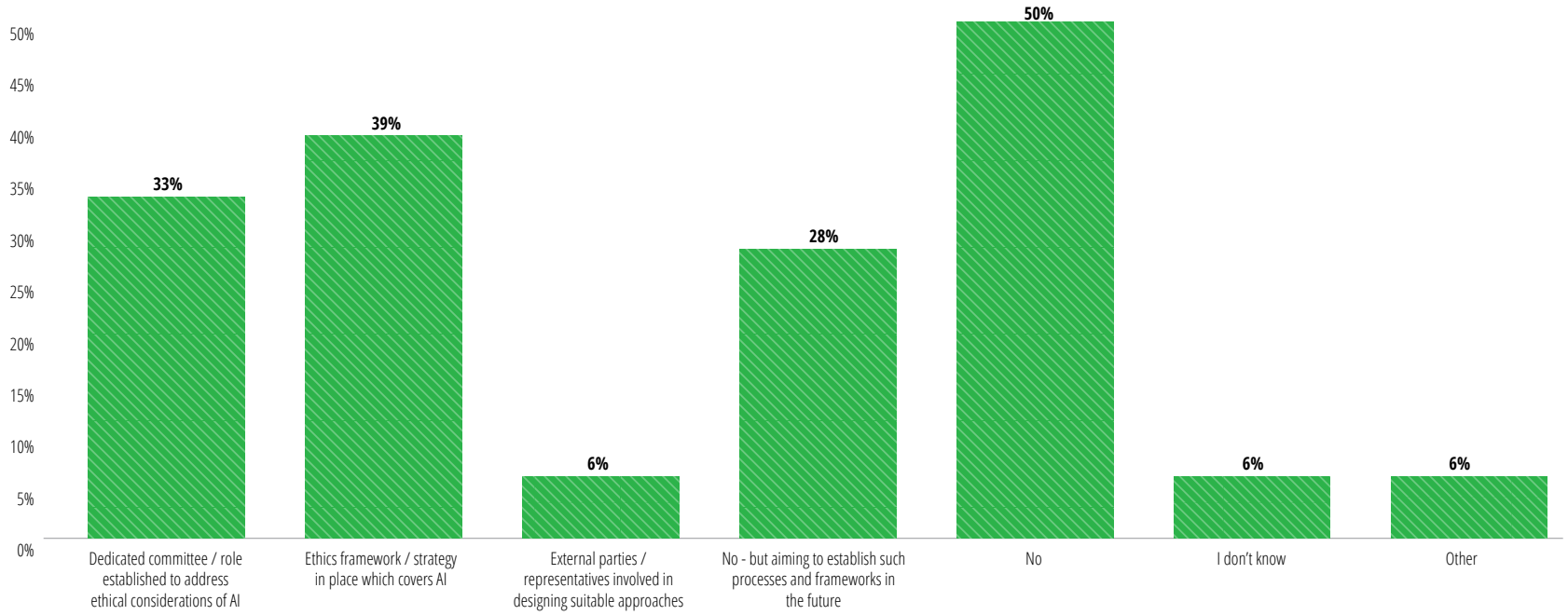
The emergence of AI techniques alongside traditional insurance risk models brings ethical complexities to the forefront. 86% percent of participating insurers have not established processes, methodologies, or tools to ensure the fairness of their AI/ML models. More than three out of five insurers agree that AI/ML is critical to their organisation's overall success in the next 5 years.

Ethics and fairness of AI/ML model

More than half of the insurers that use AI/ML modelling techniques have not yet established processes, methodologies, or tools to address the ethical considerations of these models but majority of them aims to do so in the future.

The most common action taken to ensure fairness is to create an ethics framework or strategy that covers AI/ML applications. Having committees of external parties involved in addressing ethical considerations of AI or designing suitable approaches are not common amongst insurers.

Figure 37. Established processes, methodologies, or tools to ensure the fairness of AI/ML models



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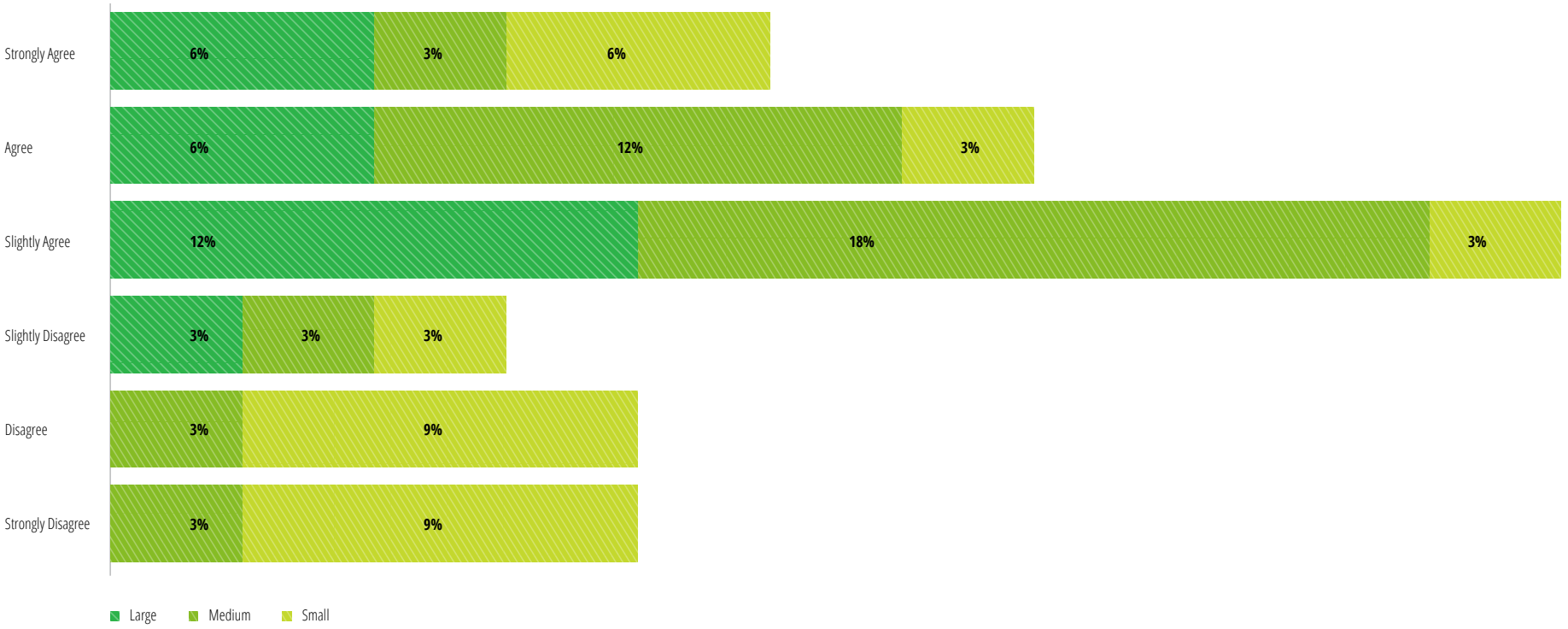
The role of AI/ML models in the future success of the organisation

Currently, more than three out of five insurers agree to some extent that AI/ML is critical to their organisation's overall success in the next 5 years.

Figure 38. AI/ML is critical to the organization's overall success in the next 5 years



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Special thanks to the subject matter experts mentioned above, but especially to the following people from Deloitte who have made this survey a success by administering the survey, assessing the results and creating this document:

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