STANDARD OF ACTUARIAL PRACTICE (SAP 5)

Insurer Enterprise Risk Models, including Enterprise Risk Management Programs with regards to IAIS Insurance Core Principles

Approved by the General Assembly of the Czech Society of Actuaries (electronic voting) on 10 December 2025.

The ČSpA adopts standards from the supranational actuarial associations of which it is a full member, the Actuarial Association of Europe and the International Actuarial Association. SAP 5 is an adoption of ISAP 5 and ISAP 6 approved on 1 December 2018. This standard has been released as a bilingual document. If there is a conflict, the Czech version takes precedence over the English version.

Table of content

Note: Text in this SAP which is written in standard font, is localized from ISAP 5, whereas text written in *italic* is localized from ISAP 6.

Introduction

This Standard of Actuarial Practice (SAP) provides guidance to actuaries when performing actuarial services involving the use of enterprise risk models for insurers.

It also provides guidance to actuaries who provide actuarial services involving enterprise risk management (ERM) programs that address insurer risks and are within the scope of regulations consistent with two of the Insurance Core Principles (ICP 8 and ICP 16) of the International Association of Insurance Supervisors (IAIS). Regulation of financial services businesses has evolved rapidly in the years following the Global Financial Crisis in 2008. While the most radical changes have been applied to banks, insurers have also been subject to enhanced scrutiny. An important component of this higher level of regulation is the assessment of ERM programs.

ERM programs include processes undertaken by insurers to identify, assess, measure, control, mitigate, monitor and communicate on risks in respect of the insurance enterprise. These programs have come to be seen by insurance supervisors globally as a critical activity of insurers. The IAIS has recognized the importance of ERM programs in two of the Insurance Core Principles (ICPs): ICP 8 Risk Management and Internal Controls and ICP 16 Enterprise Risk Management for Solvency Purposes. These ICPs are intended to encourage insurance supervisors around the world to incorporate the concepts expressed therein into the regulation of insurers. According to ICP 8 and ICP 16, an insurer's management is responsible for establishing and operating frameworks to manage the risks to which the insurer is exposed, recognising that the intrinsic nature of insurance is to share or to manage risk.

Depending on the level of sophistication, insurers' approaches to risk management may range from simple consideration of the adequacy of current financial resources to integrated holistic consideration and management of a wide range of risks. ICP 8 and ICP 16 encourage a supervisory-led minimum standard for these activities. Insurers, their stakeholders and supervisors all therefore have a strong interest in the reliable operation and transparent governance by insurers of an effective risk management system. The risk management system envisaged by ICP 8 and ICP 16 includes the identification and measurement of risks, a risk management policy including an explicit Asset and Liability Management (ALM) policy, investment policy and underwriting risk policy, the development and maintenance of a risk tolerance framework, and the Own Risk and Solvency Assessment (ORSA).

Actuaries play a principal role in assuring financial soundness of insurers, and their approach often includes the use of enterprise risk models. Specifically, the central importance of enterprise risk models to insurance business management is clearly demonstrated in two of the Insurance Core Principles (ICP) published by the IAIS for assessment and supervision purposes: ICP 16 – Enterprise Risk Management for Solvency Purposes and ICP 17 – Capital Adequacy.

Increasingly, boards and senior managers of insurers rely on enterprise risk modelling for both regulatory and management decision-making purposes. As a result, insurers, their stakeholders, and other interested parties have a strong interest in the reliable operation and transparent governance of the use of enterprise risk models. As employees or advisors, actuaries play an important role in advising insurers and others on the development or selection of the appropriate models and the related testing, validation, and interpretation of the outcomes.

Many actuaries perform actuarial services in connection with ERM programs, including acting as an employee of an insurer, as an independent professional, as part of an external audit team or as a supervisor of insurers. In some jurisdictions, actuaries are called upon to give a professional opinion regarding the ERM program to the supervisor.

This SAP addresses ERM programs that often involve stress testing, scenario testing and other modelling techniques. Some terms, such as risk appetite, risk tolerance or risk limit, are used both in this SAP and in ICP 8 and ICP 16. When such terms are referenced without definition in this SAP or in the associated Glossary, they are intended to have the meaning in the context with which they are used in ICP 8 and ICP 16.

Section 1 General

1.1 Purpose

This SAP provides guidance to actuaries when performing actuarial services involving enterprise risk models *and ERM programs that are within the scope of regulations consistent with two of the ICPs of the International Association of Insurance Supervisors, namely Risk Management and Internal Controls (ICP 8) and Enterprise Risk Management for Solvency Purposes (ICP 16).* It is expected to help increase public confidence in the ERM work provided by actuaries by giving intended users confidence that:

- Actuarial services are carried out professionally and with due care;
- The results are relevant to their needs, are presented clearly and understandably, and are complete; and
- The assumptions and methodology (including, but not limited to, models and modelling techniques) used are disclosed appropriately.

1.2 Scope

This standard applies to actuaries when performing actuarial services involving the selection, modification, development, and use of enterprise risk models, including stress tests and scenario tests, to assess solvency, assess capital adequacy, and produce risk metrics for ERM programs of insurers. *That includes also activities in the development, implementation, maintenance or review of some or all of the components of ERM programs, including ORSA, that are within the scope of regulations consistent with ICP 8 and ICP 16. This SAP applies to an actuary only to the extent of the actuary's responsibility and involvement [in such activities].*

1.3 Relationship to SAP 1

Compliance with SAP 1 is a prerequisite to compliance with this SAP References to "this SAP" in SAP 1 should be interpreted as applying equally to this SAP 5.

1.4 Defined terms

This SAP uses various terms whose specific meanings are defined in the Glossary. These terms are highlighted in the text with an underscore and in blue, which is a hyperlink to the definition (e.g actuary).

1.5 Cross-References

When this SAP refers to the content of another document, the reference relates to the referenced document as it is effective on the adoption date as shown on the cover page of this SAP. The referenced document may be amended, restated, revoked, or replaced after the adoption date. In such a case, the actuary should consider the extent the modification is applicable and appropriate to the guidance in this SAP.

1.6 Effective Date

This SAP is effective for all certified members of ČSpA. This SAP is effective for actuarial services performed after xx xxxxx 2026.

Section 2 Appropriate practices

2.1 Understanding of Risk and Uncertainty and of Insurer's Risk Management System and ERM Framework

2.1.1 The actuary should have, or obtain, sufficient understanding of the nature of risk and uncertainty in relation to the subject of the work. In performing services related to risk assessment, the actuary should consider, or may rely on others who have appropriately considered, the following:

a. Information about the financial strength, risk profile, business management, and risk environment of the insurer that is relevant to the assignment;
b. Information about the insurer's own risk management framework and approach, including its attitude to the assumption of risk as relevant to the assignment; and
c. The relationship between the insurer's financial strength, risk profile, business management, and risk environment as identified in point a. above and the insurer's risk management framework and approach as identified in point b. above. If, in the actuary's professional judgment, a significant inconsistency exists, then that inconsistency should be reflected in the risk assessment and disclosed.

[ISAP 5, paragraph 2.1]

2.1.2 The actuary should have sufficient understanding of the risk management system and ERM framework of the insurer and should consider whether the risk management elements required by regulations consistent with ICP 8 and ICP 16 are in place, including risk management policies, risk tolerance statements, an ORSA, and the insurer's assessment of its regulatory capital requirements.

[ISAP 6, paragraph 2.1]

2.2 Proportionality

In applying SAP 1 paragraph 1.5.2., the actuary should also consider proportionality in respect of the nature, scale and complexity of the underlying risks.

2.3 Assumptions setting

2.3.1 When choosing or advising on the choice of assumptions for inclusion in the insurer enterprise risk model, in addition to following SAP 1 paragraphs 2.7. Assumptions and Methodology Set by Actuary and 2.8 Prescribed Assumptions and Methodology (other than those stipulated by legislation), the actuary should consider factors including, but not limited to, the following:

a. Internal policies, likely management actions, and experience with past history of management actions;
b. Contractual requirements, policy wording, and past experience;
c. Factors outside of management control, such as policyholder behaviour, taxation, regulatory requirements, and reserving requirements; and
d. Risk mitigation techniques, such as reinsurance and hedging, and any limitations to these techniques.

The actuary's assumptions should normally reflect the actual situation as of the valuation date, modified for any known or expected future changes.

2.3.2 When constructing or advising on the construction of insurer enterprise risk models, the actuary should be satisfied that the assumptions are reasonable by obtaining and reviewing information from appropriate sources, such as:

a. Management of the insurer being modelled;
b. Knowledgeable persons at the insurer;

c. The insurer's business plan and, if available, the most recent assessment of how the insurer will function under severely adverse scenarios;
d. External industry experts;
e. Requirements of law; and
f. Other subject matter experts.

2.3.3 When probability distributions are incorporated into a model, the actuary should be satisfied that the assumed distributions and correlations are appropriate relative to historical information and anticipated future changes, and should also consider the possibility of plausible extreme values. In this regard, for each risk factor, the actuary should provide an explanation of the differences between the incidence of actual extreme events included in the historical data and the potential incidence of extreme events in the enterprise risk model. The various probability distributions and correlations should recognize the possibility of simultaneous extreme values from multiple risk factors.

2.4 Identification, Assessment and Management of Insurer Risks for an ERM Program

2.4.1 An actuary who is responsible for, or significantly involved in, identifying insurer risks should consider factors including, but not limited to, the following:

a. The strategic objectives of the enterprise;
b. The processes for collecting information and whether the staff have adequate qualifications, training and experience to understand and identify the risks;
c. Whether the risk identification process is sufficient to identify current and emerging risks that are reasonably foreseeable, relevant, and material including risks that directly or indirectly impact the financial condition and other objectives of the insurer (e.g. reputational risk);
d. The risks specifically referred to in regulations consistent with ICP 8 and ICP 16;
e. The time frame over which the risks may emerge and may impact the insurer;
f. The risks that may arise from reasonably foreseeable changes in the business of the insurer (operations, markets, products) and from business conduct;
g. Whether underlying risks within financial structures that have limited transparency have been sufficiently identified (e.g. off-balance sheet exposures, complex asset or reinsurance structures);
h. Whether the reasonably foreseeable causes of insurer risks and their consequences have been sufficiently identified;
i. Risks arising or increasing as a consequence of risk management activities (e.g. credit risk arising from the transfer of risk);
j. The impact that an insurer's culture, governance structure and remuneration systems may have on the ability and willingness of the management and staff to identify and manage risks, and whether culture, governance structure or remuneration generates, magnifies or mitigates risks; and
k. Input regarding the identification of risks from management, other knowledgeable persons within the insurer, other subject matter experts and supervisors

2.4.2 An actuary who is responsible for, or significantly involved in, assessing the probability and impact of the insurer's risks should consider factors including, but not limited to, the following:

a. The qualitative assessment of risks in addition to, or instead of, assessing them quantitatively;
b. Risk correlations, risk aggregations and tail risks (e.g. catastrophe and pandemic risks, and complex outsourcing risks);
c. The appropriateness of the risk modelling, stress testing, reverse stress testing and scenario testing that are applied;
d. The extent to which the risk models that measure the probability and impact of risks provide results that are consistent with information expressed by market prices for the risks concerned or related risks;
e. The consistency among the various valuation methodologies underlying the ERM program;

f. *The operation and effectiveness of the processes and mechanisms used to address risk control and risk mitigation;*
g. *The appropriateness of the assumptions regarding future actions taken by management and by external parties, taking into account prior experiences in the industry with similar actions;*
h. *Input regarding probability and impact from management, other knowledgeable persons within the insurer, other subject matter experts and supervisors; and*
i. *Consistency of risk assessments over time.*

2.4.3 *An actuary who is responsible for, or significantly involved in, implementing or maintaining risk management controls, mitigation, monitoring or communication and reporting of the insurer's risks should consider factors including, but not limited to, the following:*

a. *The insurer's risk management policies and risk appetite and tolerance statements;*
b. *The relationship between the insurer's financial strength and risk profile, and the insurer's risk management system;*
c. *Any significant inconsistency in the evaluation of the insurer's risk tolerances and risk limits;*
d. *The extent to which the results of the risk models used to measure the economic costs and benefits of risk mitigation are consistent with information expressed by market prices for the risks concerned or related risks;*
e. *The operation and effectiveness of the processes and mechanisms used to address risk control and risk mitigation;*
f. *The appropriateness of the assumptions regarding future actions taken by management and by external parties, taking into account prior experiences in the industry with similar actions;*
g. *The culture within the insurer to commit to, and implement, risk mitigation actions when needed;*
h. *The impact of reasonably foreseeable future adverse circumstances on the availability and effectiveness of future risk mitigation practices;*
i. *The existence and effectiveness of feedback loops in the risk management process; and*
j. *How the nature and relative importance of risks may change over time.*

2.5 Enterprise Level Risk Management

2.5.1 *An actuary who is responsible for, or significantly involved in, performing an aggregate risk assessment of the insurer should, in addition to assessing the elements as addressed in section 2.4 above, consider factors including, but not limited to, the following*

a. *The financial strength, risk profile, business management, governance structure and risk environment of the insurer;*
b. *Whether the risk management processes are suitably aligned with the insurer's objectives and strategy, regarding aggregate risk taking and regarding each major risk category, as reflected by the risk appetite, risk tolerance and risk limits;*
c. *The interdependence of risks relating to the insurer's assets and liabilities, noting that correlation of risks between different asset classes, products and business lines may not be linear, and may change under stressed conditions;*
d. *Off-balance sheet exposures that may revert to the insurer in times of difficulty; and*
e. *Diversification benefits that result from aggregation of risks.*

2.5.2 *An actuary who is responsible for, or significantly involved in, developing, implementing, maintaining or reviewing the insurer's ERM framework should, in addition to assessing the elements as addressed in section 2.5.1 above, consider factors including, but not limited to, the following:*

a. *The engagement of the Board in assessing, setting, monitoring and reviewing the insurer's risk appetite and risk profile, and whether the interests of policyholders and other relevant stakeholders are considered appropriately within those processes;*
b. *The adequacy of the risk management resources and capabilities within the insurer for the current and expected risk profile and risk management strategies;*

c. *The quality, extent and effectiveness of independence, challenge and monitoring reflected in the framework;*
d. *The extent and results of recent reviews and audits of control effectiveness, and management's response to the findings;*
e. *The management of potential conflicts of interest;*
f. *The extent to which risk management and risk assessments are used in the decision-making practices of the insurer;*
g. *The effectiveness of risk communication channels within the insurer, including risk escalation processes, and with its supervisors;*
h. *The effectiveness and timeliness of the reporting of, and response to, incidences and breaches related to the operation of the ERM framework within the insurer;*
i. *The operational quality and effectiveness of key ERM framework related policies, processes and mechanisms, including, but not limited to, outsourcing management, business continuity management (including pandemic response management), whistle blowing policies, fraud and privacy risk management, model risk management and business conduct risk management;*
j. *The extent to which the ERM framework is adaptive to changes to the insurer and to its environment;*
k. *The extent that the ERM framework complies with regulatory requirements and guidelines applicable to it;*
l. *The adequacy of the insurer's ORSA; and*
m. *Contingency plans to restore the insurer's financial strength and viability in severe adverse circumstances.*

2.5.3 In applying sections 2.5.1 and 2.5.2, if the insurer is part of a group, the actuary should consider factors including, but not limited to, the following:

a. *The risks and benefits of belonging to a group structure, recognizing potential limits on fungibility of capital and on transfer of assets between separate legal entities;*
b. *Reasonably foreseeable changes in the group structure which could impact the capital and solvency of the insurer and its ability to continue in business;*
c. *Risk modelling, stress testing, reverse stress testing and scenario testing should include changes in the group structure and in the support that the insurer receives from other members of the group;*
d. *Assumptions that may be suitable for a self-standing insurer may not be suitable when the insurer is part of a larger group;*
e. *Imposition of risk management controls and tolerance limits by group management;*
f. *Differences in legal and regulatory requirements between jurisdictions; and*
g. *Contagion effect of adverse circumstances in other members of the group which could impact the capital and solvency of the insurer.*

2.6 Stress Testing and Scenario Testing

2.6.1 In relation to stress tests or scenario tests, the actuary should disclose:

a. The significant assumptions used in the stress test or the scenario test, including the actions assumed to be taken by management; and

b. Any known limitations of the stress test or the scenario test and include an assessment of the potential impact of these limitations on results.

2.7 Assessing Consistency Among Models

Multiple models and multiple stress tests or scenario tests are often developed for different purposes for the same insurer (e.g., accounting requirements, regulatory valuation, or risk evaluation to determine capital needs).

Where practical, the actuary should assess the reasons for and the impact of using multiple models and multiple stress tests or scenario tests and provide an explanation of any material differences in results.

2.8 Own Risk and Solvency Assessment

2.8.1 The actuary responsible for, or significantly involved in, developing, implementing, maintaining or reviewing an ORSA for an insurer, should consider, in addition to the items in sections 2.4 and 2.5 above, factors including, but not limited to, the following:

- *a. The time horizon considered by the ORSA;*
- *b. Whether the qualitative and quantitative risk assessments and the financial projections used in the ORSA are appropriate for their intended purpose;*
- *c. Any changes to the insurer's risk profile and risk appetite since the previous ORSA;*
- *d. The various accounting bases of the insurer;*
- *e. Reasonably foreseeable changes in the external environment;*
- *f. Allowance for new business, and for the run-off of existing and new business;*
- *g. Access to new capital in times of financial stress;*
- *h. Differences between the insurer's regulatory capital requirements and the insurer's own assessment of its capital needs;*
- *i. The quality and adequacy of the insurer's capital resources in relation to quality and adequacy criteria established by the supervisor;*
- *j. The degree of severity reflected in the risk modelling, stress testing, reverse stress testing and scenario testing; and*
- *k. The circumstances that may trigger an ORSA to be performed at a time other than during the regular review schedule.*

Section 3 Communication

3.1 Disclosures

In addition to complying with SAP 1 Section 3. Communication, the actuary should disclose:

3.1.1 Any significant inconsistency that exists between the insurer's financial strength, risk profile, business management, and risk environment as identified in point 2.1.1.a and the insurer's own risk management framework and approach as identified in 2.1.1.b (2.1.1.c)

3.1.2 An explanation of the differences between experience data and potential extreme adverse values in the risk model (2.3.3);

3.1.3 An explanation of the differences between the experience data and the incidence of multiple extreme events in the enterprise risk model (2.3.3);

3.1.4 The significant assumptions used in the stress test or scenario test, including the actions assumed to be taken by management (2.6.1.a)

3.1.5 Any known limitations of the stress tests or scenario tests and an assessment of the potential impact of these limitations on results (2.6.1.b);

3.1.6 An appropriate explanation of any material differences in results if multiple models and multiple stress tests and scenario tests are used by the insurer (2.7);

3.1.7 Where risk management elements required by regulations consistent with ICP 8 and ICP 16 are not in place (2.1.2);

3.1.8 Where risk exposures cannot be, or are not, reliably or meaningfully identified or quantified (2.4.1, 2.4.2, 2.5.1, 2.5.2);

3.1.9 Where the selected assumptions or risk scenarios adopted give rise to ranges of outcomes or frequencies that are materially less severe or frequent than indicated by historic risk experience, known and expected future changes or reasonably foreseeable potential extreme adverse events (2.4.2, 2.5.1); and

3.1.10 Any significant inconsistency that exists between the insurer's financial strength and risk profile, and the insurer's risk management system (2.4.3).

GLOSSARY OF DEFINED TERMS

ACTUARIA

Glossary of defined terms

Defined terms are indicated in SAP5 in blue text with a blue underline (e.g. defined term).

Actuary – An individual member of one of the member associations of the IAA.

Actuarial services – Services based upon actuarial considerations provided to intended users that may include the rendering of advice, recommendations, findings, or opinions.

Adoption date – Date on which this SAP was adopted as the final document by the ČSpA General assembly.

Data – All kind of quantitative and qualitative information.

Enterprise risk models – Those models that are developed to comprehensively and consistently evaluate the risks of an organization. Examples include internal models as specified by the International Association of Insurance Supervisors (IAIS), and capital models

IAA – The International Actuarial Association

Intended user – Any legal or natural person (usually including the principal) whom the actuary intends to use the output of the actuarial services at the time the actuary performs those services.

Law – Applicable acts, statutes, regulations, or any other binding authority (such as accounting standards and any regulatory guidance that is effectively binding).

Model – A simplified representation of relationships among organizations or events using statistical, financial, economic, or mathematical concepts. A model has a specification and uses assumptions, data, and methodologies to produce results that are intended to provide useful information on that system.

Opinion – An opinion expressed by an actuary and intended by that actuary to be relied upon by the intended users.

Professional Judgment – The judgement of the actuary based on actuarial training and experience.

Reverse stress test – A process for identifying events or scenarios that would lead to a predetermined adverse outcome for an organization.

Scenario test – A process for assessing the impact of one possible event or several simultaneously or sequentially occurring possible events on an organization's financial position.

Standard SAP 1 - Standard of Actuarial Practice 1 (SAP 1) - General Actuarial Practice, approved by the ČSpA General Assembly on 8 December 2015.

Stress test – A process for measuring the impact of adverse changes in one or relatively few factors affecting an organization's financial position.

Valuation date – The effective date of the analysis by the actuary. It usually precedes the report date.

Work – All actuarial activities performed by an actuary related to actuarial services. It usually includes acquisition of knowledge of the circumstances of the assignment; obtaining sufficient and reliable data; selection of assumptions and methodology, calculations, and examination of the reasonableness of their result; use of other persons' work; formulation of opinion and advice; documentation; reporting; and all other communication.