Azenes' Validation Cube
for solvency models
A holistic approach to ensure clarity and completeness in model validations
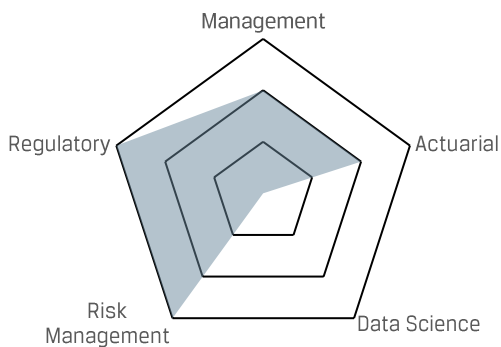
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Introduction

The level of sophistication of internal solvency models has increased during the past decades. In the same way has the level on how much companies, stakeholders and regulators rely on them increased. For a responsible and meaningful usage of solvency models and their results, it is essential to validate them properly on a regular basis.

Azenes' Validation Cube provides a holistic framework to validate internal solvency models of (re)insurance companies. Within this framework not only the model itself but also its usage and its embedding into the business are considered and evaluated.

Azenes' rating for this article

Relevance

Implementation

		low							high
Complexity	low			■					high
Duration	short term				■				long term
Impact	financial						■		operational

Azenes' articles are classified by a rating scheme. The upper part shows the relevance of the topic for different areas, the lower part provides a rating on factors which are relevant for the implementation of the covered topic.

1   What are internal solvency models, why it is essential to validate them and why the latter can be a challenge

What are internal solvency models
Within solvency frameworks, such as the Swiss Solvency Test (SST) in Switzerland and Solvency II (SII) in the European Union (EU), a standard model is provided by the regulatory authority as a standard method to measure the risk bearing capacity of an (re)insurance company. These standard models are of a general nature in order to be as widely applicable as possible. This is especially beneficial for smaller to medium sized companies, as they might not have the resources and data required to implement their own solvency model. However, due to the general nature of a standard model, they might not be suitable to measure the risk bearing capacity for larger (re)insurance companies or non-standard business set-ups and products. In such cases, it makes sense and often is required by the regulator to use a full or partial internal solvency model, in the following referred to as «internal model».

Why it is essential to validate internal models
While the usage of an internal model for the official solvency reporting requires the approval of the regulator[1], any (re)insurance company may develop an internal model and use it for internal steering or within their own risk and solvency assessment (ORSA). In all cases model validation[2] is crucial and may be required by the regulator in order to check its adequacy for the intended purpose(s).[3] A thorough validation provides a good understanding about the current state of the internal model and can help to identify important points to improve. These aspects are especially relevant for upper management who incorporate model results into their strategic decision making. It is of essence to know if the model is (still) fit for purpose and what it may or may not (yet) be able to quantify.

Common challenges encountered within internal model validations
Despite guidelines established by the industry and regulators, there is the risk of finding oneself in front of a tangled web of questions and aspects to be considered while implementing and performing a model validation. Based on our experience, most often this is due to the following reasons:

- **Losing sight** within the vast amount of relational links. Between many modules of a model, its usage and its embedding into the business there exist some sort of

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[1] See Art. 50a ISO; Art. 112 et. seq. Directive 2009/138/EC.

[2] According to the Cambridge Dictionary, to validate something means "*to make something officially acceptable or approved, especially after examining it*" or "*to prove that something is correct*", see https://dictionary.cambridge.org/de/worterbuch/englisch/validate.

[3] For example, regulations to be considered for the usage of internal models within Switzerland are Margin nos. 116, 150 et. seq. Finma Circular 2017/03; and within the SII framework Art. 44 ,124 Directive 2009/138/EC.

relational links – one part either directly or indirectly influencing the other. It can be a challenge to slice and dice the validation into pieces which can be evaluated on a standalone basis while at the same time not neglecting the existing relational links and ensuring a complete coverage.

- What is **material**, what is **substantial** and what is **minor**? During the assessment as well as in the prioritization of findings, it is crucial to know what is important and what criteria define the level of importance. Usually this cannot only be quantified with numbers and it thus makes sense to distinguish between what is material (defined by some quantitative threshold) and what is substantial (defined by what is important for the stakeholders; can be both of a quantitative as well as qualitative nature). What remains can be considered to be of minor importance. It is important to note that there is no clear definition of substantiality and materiality. Both terms strongly depend on the purpose of the model, its validation and the (re)insurance company itself.
- **Missing data**. It is always great to have an additional external dataset which can be used as a point of reference. However, in many cases this is not available and therefore other methods need to be used to perform some sort of back testing.

While the last point usually remains an industry wide issue and the second point very much depends on the individual company, Azenes' Validation Cube provides a framework to overcome the described challenge in the first point. The structural approach and holistic view ensure both clarity and completeness within an internal solvency model validation. Therefore, Azenes' Validation Cube acts as a guide along the validation process.

2   Azenes' Validation Cube

Azenes' Validation Cube is displayed in **Figure 1**. It consists of three validation categories (shown with different colors), which cover in a structured manner all items of an internal model which need to be validated. The three validation categories are:

- **model definition** covers everything that directly defines the model and its usage;
- **model run** refers to the validation, which has to be done for each model run; and
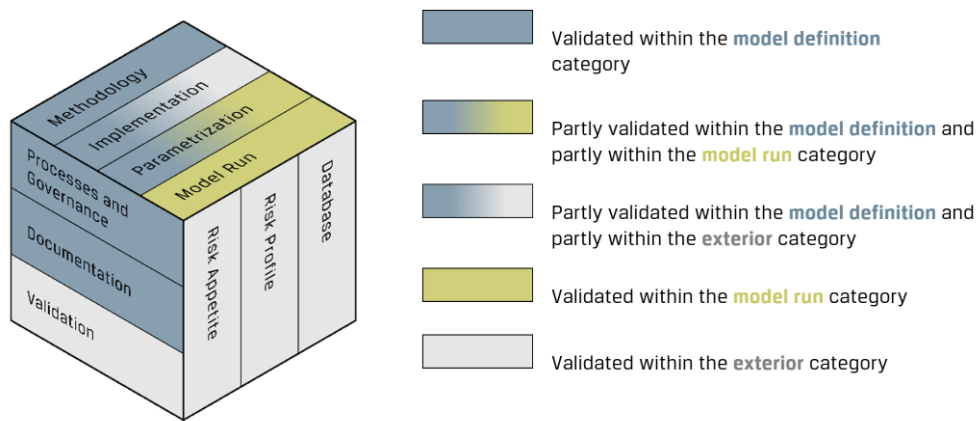- **exterior** contains those validation items that are indirectly related to an internal model.

Figure 1 Azenes' Validation Cube for internal solvency models.

For some items of a model validation these three categories cannot be clearly distinguished, such as for the item «parameterization». Some parameters of an internal model may be considered as part of the methodology hence changing them corresponds to a change in the **model definition** (i. e. model change), which can be subject to regulatory or internal approval. Others will be updated for every model run, according to the rules described by the methodology governance, while the defined model itself remains unchanged. The decision regarding which type of copula should be used may be part of the methodology while the parameters of the copula may be estimated in every **model run**. Thus, the item «parametrization» belongs either to the validation category **model definition** or **model run**. This clearly shows the classification is not unique and needs to be done on a model specific basis.

Based on these validation categories, it is possible to structure all items of an internal model which need to be validated: While **risk appetite**, **risk profile** and **database** themselves are not validated per se, they represent the foundations for assessing the appropriateness of the model. A model and its modules are built on the available data, and the model's design and purpose must be consistent with the company's risk profile and risk appetite. In order to build an internal model, it is necessary to choose an appropriate **methodology**, **implement** it and **parametrize** the corresponding parameters for every **model run**. Moreover, all these items have to be embedded in well-defined **processes and governance** and must be **documented** as well as **validated[4]**.

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[4] As all items have to be validated, this includes the validation process itself as well.

3   Key benefits of Azenes' Validation Cube

What makes Azenes' Validation Cube such a powerful tool for model validations is its structural approach which takes into consideration and leaves room for the ambiguity that exists. As previously shown, it is not always straightforward what item belongs to which validation category. This needs to be decided on a case-by-case basis. Azenes' Validation Cube framework provides clarity by showing where this ambiguity exists and thus facilitates the handling thereof.

Furthermore, this framework provides a holistic approach as it covers all items of a solvency model which need to be validated. The framework starts with the core – the model itself – and extends to its usage and how it is embedded into the (re)insurance company. Thus, by proper and complete application of Azenes' Validation Cube the risk of missing to validate one part of the model is reduced.

Lastly, this framework has been applied by Azenes AG on multiple projects helping clients to achieve their goals, such as the regulatory approval of a model. It has been continuously refined and has proven its effectiveness throughout its application, whether for a complete model validation or a specific subset thereof.

4   What to keep in mind for your next internal model validation

Azenes' Validation Cube acts as a guide and provides a structural and holistic approach to perform a solvency model validation. It is essential to clarify what is material and what is substantial at the beginning of the validation process. As mentioned in section 1, having not clearly specified what is important and how the latter is defined, performing a validation can become a challenge.

Having clarified this will provide on one hand a common understanding of what matters, and on the other it will help to prioritize findings and results of the validation process.

5   About us

Azenes AG is a boutique firm for actuarial consulting covering property and casualty, health and accident (re)insurance. We combine in-depth mathematical expertise and rigorous procedures with know-how and creative thinking. This enables us to develop far-sighted and practical solutions for our clients.

Azenes supports its clients with model validations as well as the development thereof. We offer a wide range of support for regulatory requirements to ensure compliance with current regulations while simultaneously getting the insights needed to efficiently steer their businesses and be prepared for the future.

Azenes AG was founded in 2011 in Zug. It is a subsidiary of Siolag Holding AG and a sister company of Volada AG.