ProMETIS:

Prometeia Model Evaluation and Testing Intelligent Suite

Value Proposition

Enterprise Risk Management - Credit Risk Competence Line
ABI – Supervision, Risk & Profitability 2025
Milan, 11/06/2025

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2. Our idea
    i. Generative AI-based validation assistant
    ii. Technical insights
3. Service Model
4. Video Demo
5. Conclusions & Next Developments

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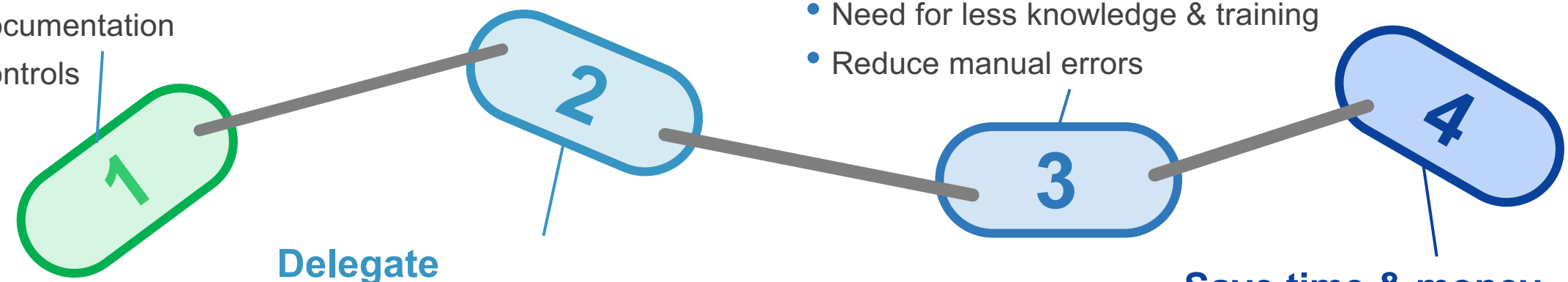
Market Needs & Trends in the financial industry

Automate

- Processes
- Data checks & manipulation
- Documentation
- Controls



Delegate

- Routine tasks
- Low added value tasks

Standardize

- Need for harmonization and less subjectivity
- Need for less knowledge & training
- Reduce manual errors

Save time & money

- Increase productivity
- Save time & money

Young **quants have now strong preferences** for Big Tech, Startups and ML in general, rather than the traditional banking sector. Moreover, **they are not keen to work on repetitive and boring tasks**. **Difficulties in finding skilled people** will become more and more **crucial for the banking sector**.

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Prometeia GenAI Tool in a nutshell

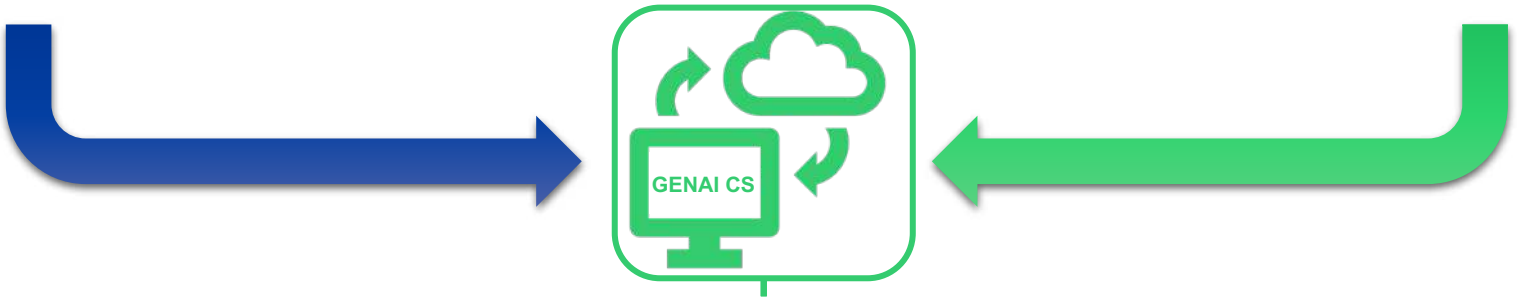
Intuition behind the development of the tool and potential users

Business needs

We are well **aware of the amount of resources banks need to invest in the process of validating** credit risk models. What if we could **cut these cost by 40% or even by 50%** thanks to the capabilities of Generative AI?

Who is interested?

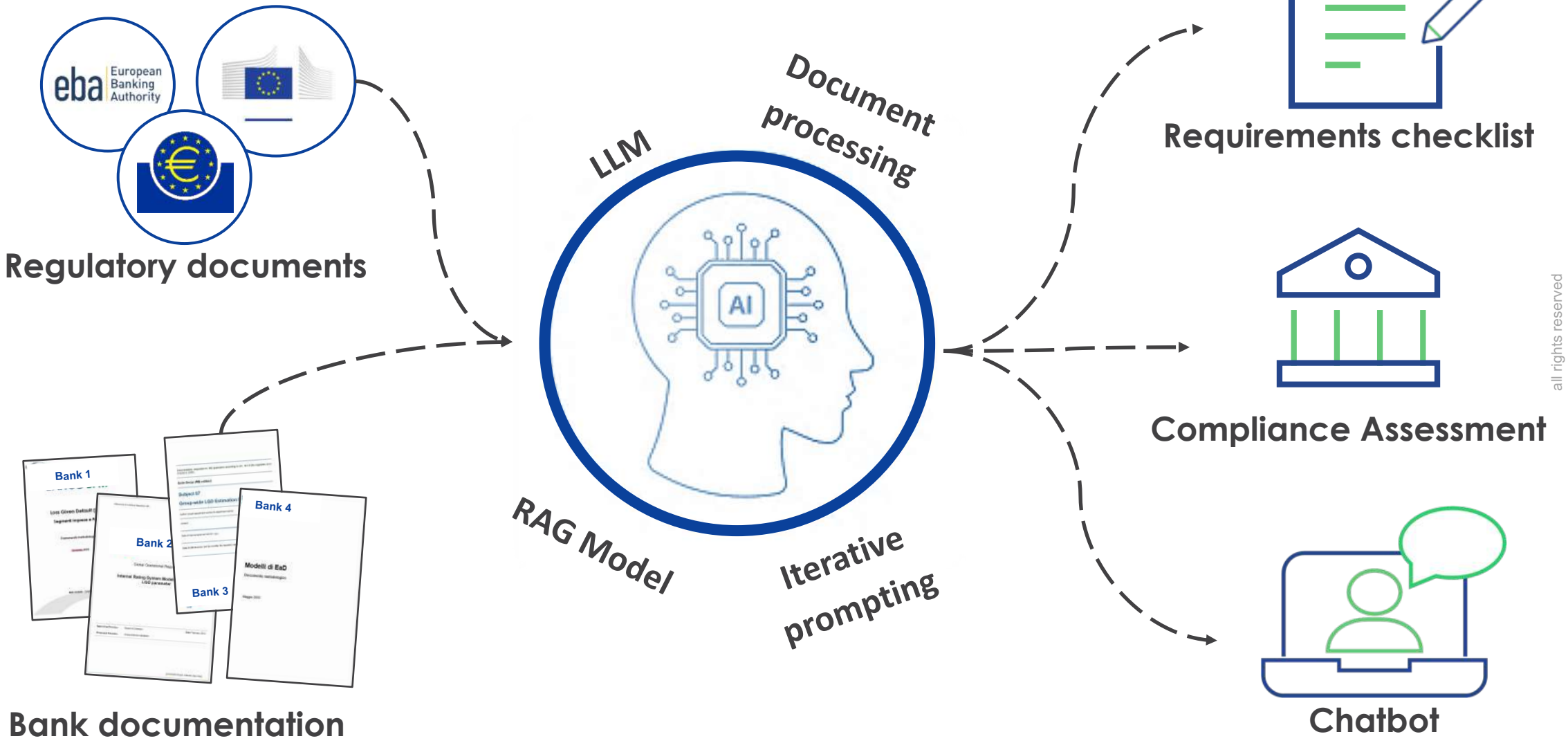
Development teams, Internal Validation, Audit and Compliance might benefit. They should verify the compliance of new models (MMC or new IRB applications), as well as of models already developed and implemented.



Bank	Model	Article	Requirement	Assessment	Compliance
D-SIB 1	PD Corporate	1	A	Answer A	✓
D-SIB 1	PD Corporate	1	B	Answer B	✗
D-SIB 1	LGD Individuals	2	C	Answer C	✓
D-SIB 1	LGD Individuals	3	D	Answer D	✗

How does the tool work? 1|2

Graphical intuition



Extraction of regulatory requirements

Illustrative example

Article

Art. 156 EBA/GL/2017/16 on PD/LGD estimation

Institutions should define the maximum period of the recovery process for a given type of exposures from the moment of default that reflects the expected period of time observed on the closed recovery processes during which the institution realises the vast majority of the recoveries, without taking into account the outlier observations with significantly longer recovery processes. […] should be specified in a way that ensures sufficient data for the estimation of the recoveries within this period for the incomplete recovery processes. The length […] may be different for different types of exposures. The specification […] should be clearly documented and supported by evidence of the observed recovery patterns, and should be coherent with the nature of the transactions and the type of exposures. […] should not prevent institutions from taking recovery actions where necessary, even with regard to exposures which remain in default for a period of time longer than the maximum period of the recovery process […].

Requirements

1. Institutions must define the MRP for a given type of exposures from the moment of default. This period should **reflect** the expected **time** observed on closed recovery processes **during which the institution realizes the vast majority of recoveries**, **excluding outlier observations** with significantly longer recovery processes.
2. The MRP should be specified in a way that **ensures** there is **sufficient data for the estimation of recoveries** within this period for incomplete recoveries.
3. The length of the MRP may vary for different types of exposures. The specified MRP should be **coherent with the nature of the transactions and the type of exposures**, and its specification should be clearly **documented** and **supported** by **empirical evidence**
4. The specification of MRP for the purpose of calculating the long-run average LGD should **not prevent institutions from taking necessary recovery actions**, even for exposures that remain in default for a period longer than the specified maximum period.

Context

The 'Target Paragraph' is **part of the EBA GLs on Probability of Default (PD) and Loss Given Default (LGD) estimation**, which are key parameters in the **calculation of risk-weighted assets** under the **Internal Ratings-Based (IRB)** approach of the Capital Requirements Regulation (CRR).

The 'Target Paragraph' provides guidance on how to define the **maximum period of the recovery process, a key factor in estimating and calibrating LGD**

It is **applicable to all institutions** that are required to **calculate PD and LGD under the IRB approach of the CRR**

Compliance assessment

Illustrative example

Requirements & Context

1. Institutions must define the MRP for a given type of exposures from the moment of default. This period should **reflect** the expected **time** observed on closed recovery processes **during which the institution realizes the vast majority of recoveries**, **excluding outlier observations** with significantly longer recovery processes.
2. The MRP should be specified in a way that **ensures** there is **sufficient data for the estimation of recoveries** within this period for incomplete recoveries.
3. The length of the MRP may vary for different types of exposures. The specified MRP should be **coherent with the nature of the transactions and the type of exposures**, and its specification should be clearly **documented** and **supported** by **empirical evidence**
4. The specification of MRP for the purpose of calculating the long-run average LGD should **not prevent institutions from taking necessary recovery actions**, even for exposures that remain in default for a period longer than the specified maximum period.

The 'Target Paragraph' is **part of the EBA GLs on PD and LGD estimation** (…) under the **Internal Ratings-Based (IRB)** approach (…). The 'Target Paragraph' provides guidance on how to define the **maximum period of the recovery process, a key factor in estimating and calibrating LGD…**

"Chunks" from bank's LGD model document

[…] Maximum Recovery Period thresholds are determined based on the analysis of the recovery profiles of the practices included in the individual clusters. A cumulative recovery rate curve is in fact estimated for each cluster based on the process detailed below.
[…] Several alternative approaches were tested in order to assess both the conservativeness of MRP estimates and their discriminatory ability in terms of comparing secured and unsecured exposures.
[…] Maximum Recovery Period corresponds to the vintage from which the marginal RR value is permanently below 1%, with a cap placed at the 99th percentile of the cumulative RR curve.

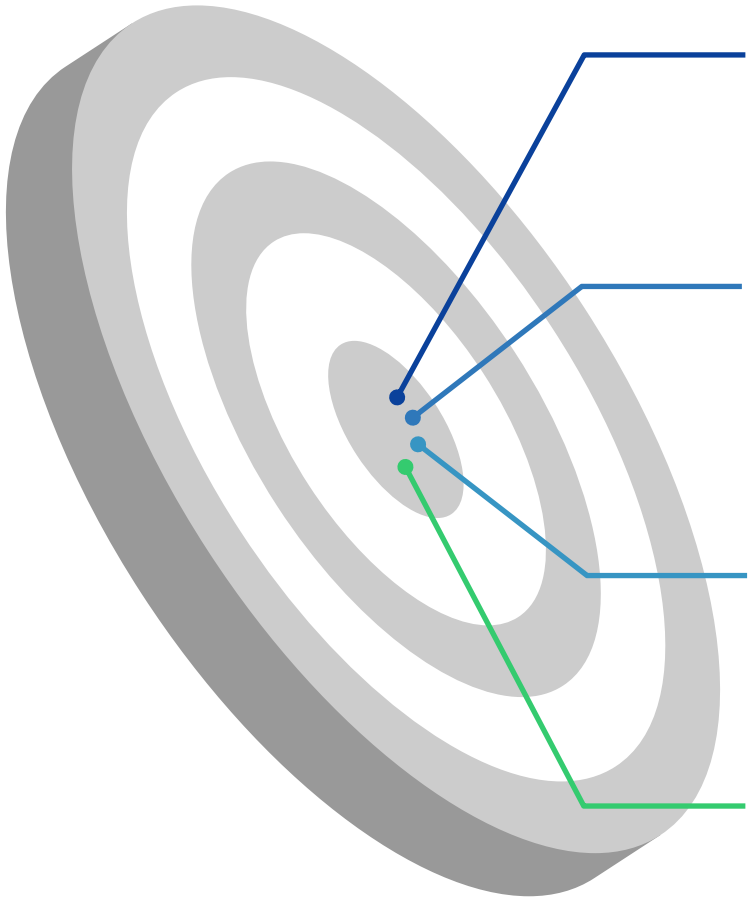
Synthetic outcome: compliance and best practice

The bank has made substantial progress in meeting the regulatory requirement by implementing **sensitivity analysis**, including **massively disposed positions**, and documenting the **methodology** and **evidence**. To fully satisfy the regulatory requirement, the bank needs to address the following:

1. **Exclusion of Outlier Observations** : There is no explicit mention of excluding outlier observations with significantly longer recovery processes.
2. **Coherence with Exposure Types**: Provide detailed evidence that the MRP is coherent with the nature of the transactions and the type of exposures.

Purpose of the solution

Most relevant expected benefits



Improve efficiency and boost productivity

Save time for higher value-added tasks

Standardize and automate the validation process

Data privacy guarantee

The automatization of the model validation process can **enable also less experience professionals to obtain valid results** and may give the possibility to experienced validators of **achieving comparable results in a significantly lower elapse.**

The **time/resources saved** thanks to the validation tool can be **reinvested in higher value-added tasks**, such as deep-dive analysis of the banks' models or refinement of the validation methodologies.

Through the Generative AI "automatic" compliance analysis, a good share of the **model validator job can be standardized**. This can **improve the homogeneity** of the validation outcome for **different models** even if performed by **professionals with various backgrounds/experience levels.**

The solution proposed by Prometeia guarantees that **the security of the data and documents fed as input to the tool will be preserved**, as the data will be stored in **European servers** which guarantee full **complicance with the EU regulation on data privacy**.

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Just a call to ChatGPT?

Value added from Prometeia's technical expertise

…our tool is **much more than a simple call to ChatGPT!**
Even when ignoring **data security** concerns, obtaining a **comparable output** by **uploading methodological documents to ChatGPT would require substantial effort** (and patience). The **added value** of our solution stems from **two main elements**:

Model validation expertise

At Prometeia, our **deep expertise** in **developing and validating credit risk models**—gained by **supporting** numerous **leading financial institutions** as well as the **ECB** in the **model inspection** phase — has greatly aided us in developing the tool, particularly in **training the LLM**, refining **prompts**, and **assessing the output quality**.

Tool architecture

Invoking the Large Language Model (**LLM**) is **just one component** behind the tool's functionality. We developed a **robust infrastructure** which **enables the LLM** to perform the compliance assessment effectively. Such Infrastructure **doesn't merely facilitate the LLM's** operation; it rather integrates a **suite of state-of-the-art techniques** which are highlighted in the following slide.

Most relevant features

1 Document ingestion

The tool ingests and processes the documents ensuring that all relevant information is captured in a format suitable for analysis. The techniques applied operate by understanding the documents' semantic/structural hierarchy

2 Semantic text splitting

Documents are semantically split into "text chunks", which are defined to be synthetic while also including enough information to be self-contained. These chunks serve as the input for the LLM.

3 Custom RAG Model

Each chunk is "embedded" into a numeric vector based on semantic criteria, which then allows the tool to retrieve the relevant parts from the documentation (Retrieval-Augmented Generation model).

4 Contextual retrieval

Chunks are enriched with a context before embedding to help the model understand the meaning of chunks (from regulation or bank documents) and improve the RAG retrieving accuracy.

5 Iterative prompt refinement

The LLM is guided through the assessment process with multiple prompts. At each step, prompts are refined and enriched with information extracted from previous step output.

6 Call to LLM

The tool "asks" to a Large Language Model (e.g. GPT from OpenAI) to read the text selected by the RAG Model and to formulate the regulatory requirements checklist as well as the compliance assessment.

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Core Service – key principles and features

SaaS Multi-tenant

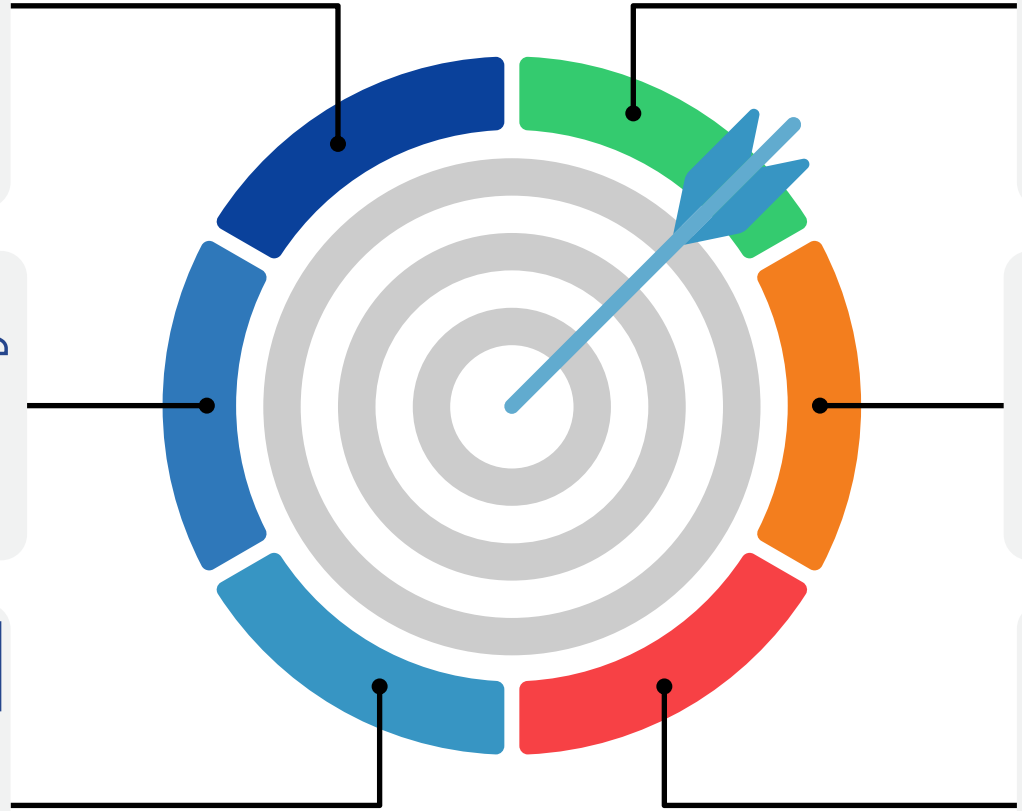
The service is a **24/7 available SaaS solution**, designed as a multi-tenant architecture. Guaranteed tenant isolation and data segregation.

Simplified User Experience

User-friendly web interface, with immediate and intuitive navigation flows, clear specifications and features access.

Chatbot & live support

Chatbot available to user within wen interface for a **dedicated support** within issues and troubles during application use



Data Security

Data stored on **EU cloud regions compliant** with Banking **regulations**. Cloud-native **encryption** applied at persistent data storage level.

Simplified Activation

Simple technical activation flow for a low start up time, simplified integration and federation of user identity and self -service data ingestion interface

Session History

Preserves all **relevant information** of a **user activity** performed, such as uploaded documents and assessments, to **better experience** and **higher** solution **value**

Core Services – Focus on Data & Privacy

Main principles

Resiliency

Cloud-native designed service architecture, leveraging hyperscale cloud provider (MSFT Azure) built-in high availability and resiliency features, well-architected practices, guaranteeing appropriate service uptimes

Application Security

Secure Code and Software Development practices, with tools and automated software development lifecycles framework.
Identity and access management based on standards cloud-provider native services and regular security testing performed (penetration, vulnerability scans)

Data Privacy

Training AI models or other services not based on customer data.
Tenant isolation and data encryption provided with cloud-native features.

Compliance

Privacy and clear data usage agreements.
Constant check and alignment with EU standards and regulations on AI usage and adoption.
Company Industry standards certification and compliance continuous program (ISO, SOC2, GDPR, CSA, …)

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Next Developments

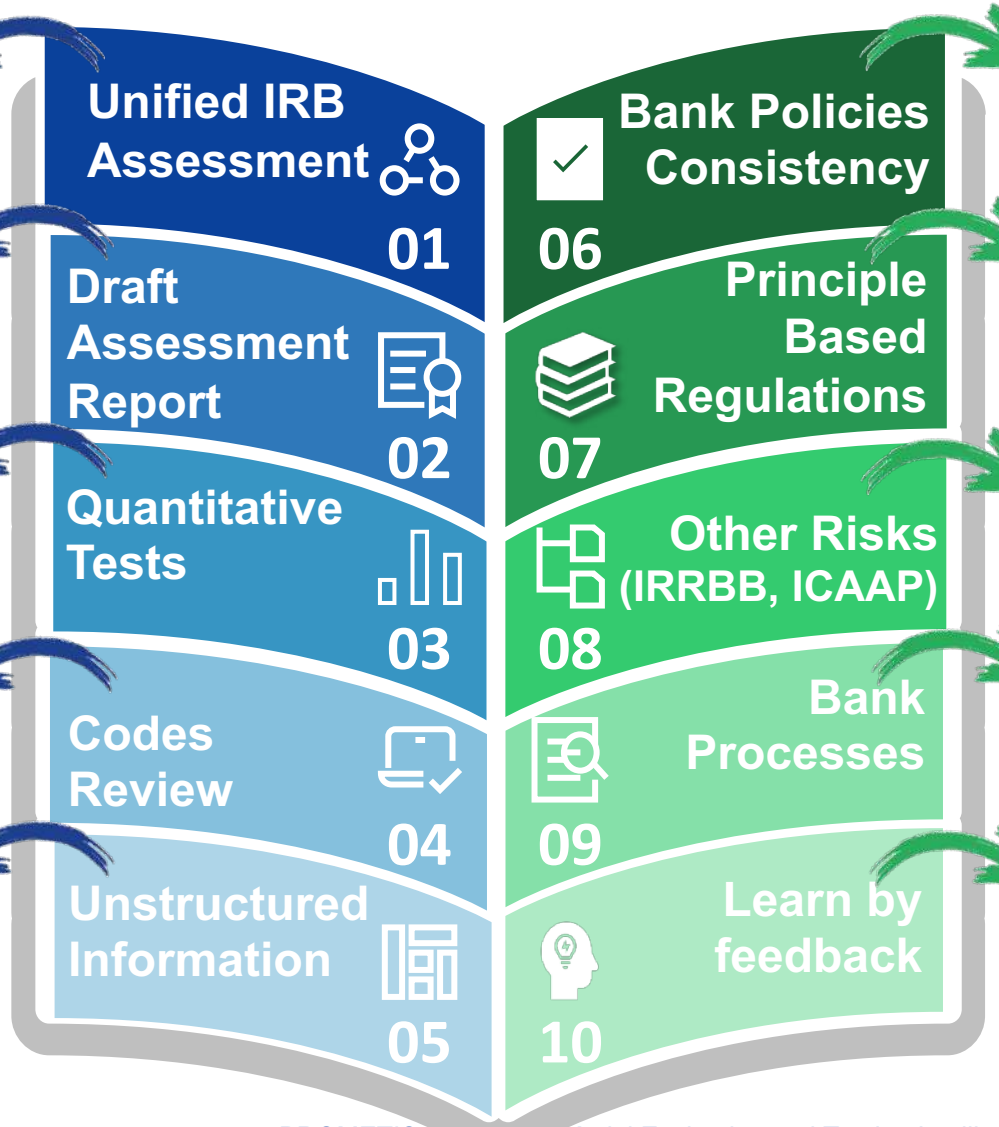
Detecting cross-reference among all relevant regulations on A-IRB models for a comprehensive overall assessment

Drafting of Assessment Report - including Findings - in line with the best practices of Internal Validation Functions and **ECB**

Interpretating and commenting the results of **quantitative tests** performed with other software reading **validation instructions**

Reading the codes used for model development to check its consistency with the documentation and deducing additional insights

Analyzing additional materials related to model development not in document or table format, like **emails and meeting minutes**



Verifying **alignment between bank internal policies and regulations,** as well as **between models and bank internal policies**

Providing benchmarks to **extract requirements for principle-based regulation** (like IFRS9) and other geographic regulatory frameworks

Extending the tool assessment capabilities (qualitative + quantitative) **to other risks** such as liquidity risk, IRRBB, and ICAAP

Assessing compliance of banking processes such as the calculation of Risk Weighted Assets or IFRS9 provisioning

Enabling the tool to learn through users' feedback, thereby adjusting responses and enhancing assessment quality

Confidentiality

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