

$$\text{Capital requirement (K)} = [\text{LGD} \times N \left[\frac{1}{1 - \text{PD}} - 1 \right] + \text{PD} \times \text{LGD}] \times \text{EAD}$$
$$\text{Risk-weighted assets (RWA)} = K \times 12.5$$

Credit Risk Management in Real Estate Financing

Credit Risk Rating Models Visually Implemented

Bosch Software Innovations



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Success Story – as of December 2008

Project Goals:

- ▶ Consolidate Basel II PD and LGD Calculation Models
- ▶ Central scalable and efficiently maintainable Rating Application

Credit Risk Management for Commercial Real Estate Financing

Deutsche Genossenschafts-Hypothekenbank AG (DG HYP) is the banking specialist for commercial real estate financing within the DZ Bank Group. DG HYP is currently deploying a leading-edge credit risk rating application that is also slated for adoption by the Federation of Volksbanken and Raiffeisenbanken.

The rating project will allow DG HYP to consolidate the technical landscape for its Basel II PD and LGD calculation models.

The objectives, in a nutshell:

- ▶ Methodical enhancements, within a short time-to-market
- ▶ One central system for all internal Rating Models (for Basel II A-IRBA)
- ▶ Providing the models in the form of a service available to Volksbanken and Raiffeisenbanken
- ▶ High performance of mathematically complex cash flow models

Bosch Software Innovations spoke with the director of the Credit Risk Controlling department, Dr. Stefan Krohnsnest, about the current state of their credit risk rating application, and asked him what he sees in store for the future.

DG HYP Implements Credit Risk Rating Platform for Commercial Real Estate Financing

In this interview Dr. Stefan Krohnsnest explains, how DG HYP Bank has migrated its credit risk rating models for PD and LGD calculation on a new technological basis. The director of credit controlling speaks about his experiences and how DG HYP Bank is profiting from the results.

Bosch Software Innovations:

Where is DG HYP today?

Dr. Stefan Krohnsnest:

As the DZ Bank Group's in-house specialist for financing commercial properties and municipal projects, we are deploying a modern rating application, which is successively replacing our previous IT centric rating systems. We're not revamping the rating model itself, since that's long been approved by the German Federal Financial Supervisory Authority. Rather, our new rating application will consolidate our existing heterogeneous technical infrastructure.

As one of the largest private mortgage banks in Germany, we have to be positioned in such a way that we can keep up with the big players, despite our limited personnel resources. That's why it's vitally important that we have an integrated platform for all 15 rating models, so our employees get all of the support they need. It's also crucial that we can continue to rapidly and reliably develop and refine these models further. And Bosch Software Innovations' Credit Risk Rating Platform empowers us to do all of these things.

Thus far, we've implemented about half of the 15 rating models. Four models for commercial real estate financing have been operational since September 2008, and three models for PD and LGD calculation for private clients and small and medium-size companies have been operational since November 2008. In the commercial sector, ratings are generated for contractors, developers, housing companies, and real estate investors. On the retail side, we calculate current default probabilities and loss severity for 192,000 loans. These calculations are executed by the application using batch processes. Depending on the results, the new ratings are saved, or the re-rated client is forwarded to the work list of the credit analyst responsible for it.

Implementation of Business Rules and Workflows

Our new application provides us with an advanced system

that has been created on the standard platform at very little additional expenditure. Not just the rating models are executed on this platform, but the governance rules (Fig. 1) as well – for example, the use of the “dual control principle” – and the user interface with input boxes for the credit risk experts. The integration of the application into the bank's systems landscape was carried out by Bosch Software Innovations – just like the other project phases, from conceptualization all the way through to going live.

Cash Flow-Based Rating Model

With the aid of a market model and a Monte Carlo simulation, market developments, the leasing situation, and the development of rental income are calculated for a real estate portfolio over several years, and PDs estimated.

PD Calculation Based on Monte Carlo Simulations

As all the rating models are running on the existing Bosch Software Innovations' platform, multiple project segments can run in parallel. At the moment, several phases are at different stages: I'm especially excited about the performance of the two cash flow models we're currently testing. Once implementation is complete, we'll have an advanced system that can quickly and reliably execute our complex Monte Carlo simulations for PD estimations. We're especially looking forward to finding out the calculation time for our larger portfolios. As the application is infinitely scalable, we can also map and evaluate very large portfolios.

Once the migration of the ratings history was complete, the entire database was available for a portfolio test. Almost 100% of the results of this test were correct on the first attempt.

Bosch Software Innovations:

How did you evaluate loans before installing the new rating application?

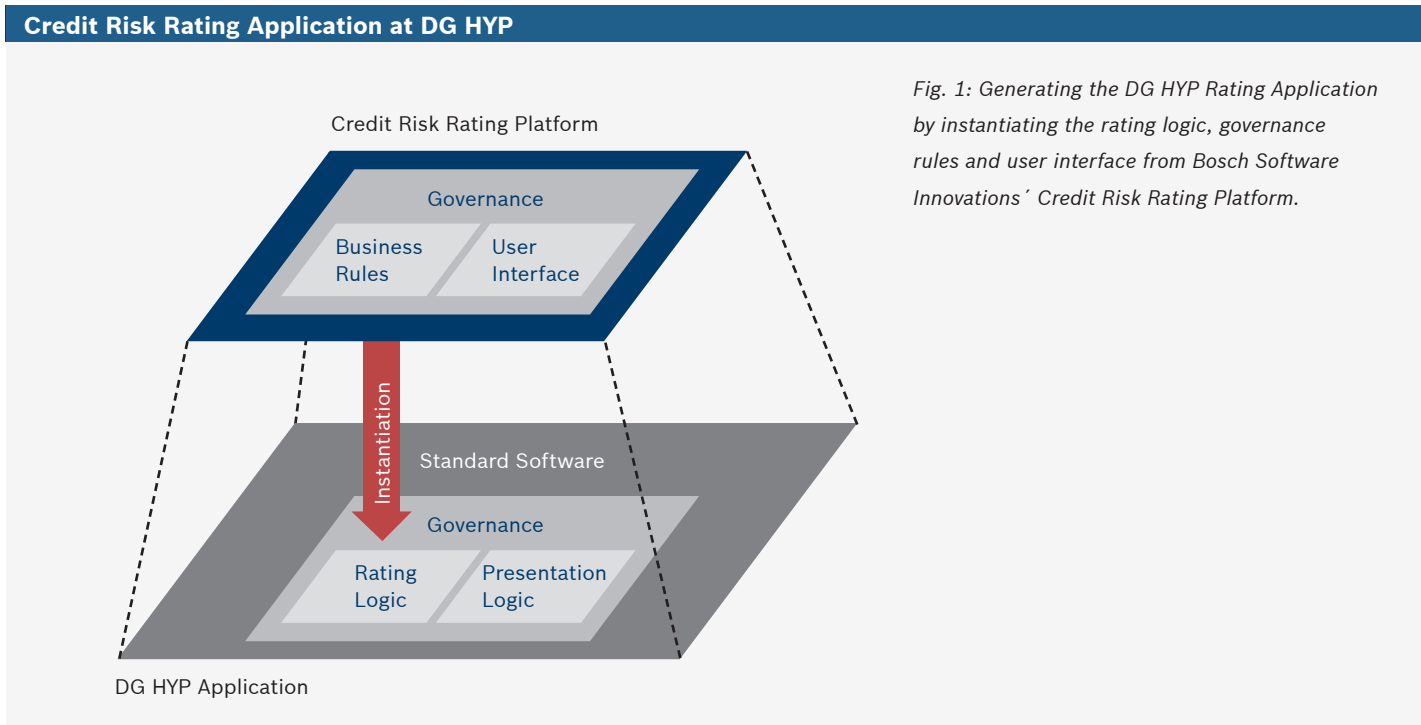


Fig. 1: Generating the DG HYP Rating Application by instantiating the rating logic, governance rules and user interface from Bosch Software Innovations' Credit Risk Rating Platform.

Dr. Stefan Krohnsnest:

We had a myriad of systems in place before – driven by the rapid implementation of the Basel II standards. They included applications delivered and serviced by third-party providers, as well as solutions in SAP and assorted Microsoft Excel and Access-based applications. The cost of maintaining all of them was considerable, to say nothing of the support issues and lack of user-friendliness of such a plethora of systems. In a technical sense, our rating models are fully developed. We've constructed them using a

broad data foundation, based on both proprietary DG HYP data and additional data from the Federation of Cooperative Banks. These models are fully compliant with Basel II and have been approved by the German Federal Financial Supervisory Authority.

Our challenge now is to implement the integrated rating system in such a way that its technical performance reaches the same high performance as the underlying modeling. Bosch Software Innovations provides us with a state-of-the-art platform which is fundamental to our success.

Rating Application at DG HYP

The screenshot displays the DG HYP Rating Application web interface. The browser window shows the URL <http://immvimp01.innovations.de:8082/dghyp-ratingplattform/?wicketinterface=15:111>. The interface includes a navigation menu with options: 'Arbeitsvorrat', 'Rating durchführen', 'Suchen', 'Berechtigungsverwaltung', and 'Rating Modell Verwaltung'. A sidebar on the right shows 'Allgemeine Informationen' with fields for Benutzer (admin), Mandant (DG HYP), Application (1.4.1), Model Plattform (1.0.17), and Umgebung (Entwicklung). The main content area shows a 'Bestehendes Rating mit ID 186081 und laufender Nummer 1 geladen' and a form for 'Allgemein' and 'Qualitative Daten'.

Fig. 2: DG HYP's rating application used by credit analysts

Bosch Software Innovations:

What effect is the new rating application already having on your business processes? How is the platform helping you meet new challenges?

Dr. Stefan Krohnsnest:

There are noticeably fewer help requests for support in the credit risk controlling department. With our new application, we scrutinize all newly entered data through a plausibility check (Fig. 2), thus removing a major potential source of error. The system also lets us maintain a clear division of responsibilities. The workflows for carrying out the ratings themselves are clearly organized and implemented. The question of which tool should be used for a given task simply doesn't come up any more!

The reduced workload for analysts can be illustrated using a re-rating procedure as an example. To re-rate a client, the characteristic values from the previous year are used as a basis. If necessary, the analyst will update or supplement this data, then perform the calculation. That's the same procedure as before. However, we previously had problems whenever an existing customer moved to a different segment – for example, when a housing contractor becomes a real estate investor, which happens frequently. In cases like that, all data for the investor rating would have to be re-entered, as data wasn't transferable between rating models. Today, the analyst just assigns the client to a new segment within the rating application and can immediately rate him with the relevant model. It's a great improvement from the past procedure.

Bosch Software Innovations:

What was the decisive factor in choosing to partner with Bosch Software Innovations?

Dr. Stefan Krohnsnest:

We were able to get to know the project personnel ahead of time. The people from Bosch Software Innovations impressed us with their business and technical expertise. We had no doubt that they would make sure our needs were met 100%.

Of course, we looked at other firms, too. What we especially liked about the platform from Bosch Software Innovations was its “visual programming” (Fig. 3). This makes it possible for us to enhance our own models. If we'd chosen a comparable individual solution, we would have had to approach the service provider for each and every modification – which, in the age of Basel II, would be happening all the time.

With the Bosch Software Innovations' platform, we can modify our risk models ourselves. This year, for example, our costs for recalibrating certain models were relatively large. We don't have the necessary resources to do that over and over again. In the medium term, quality would suffer, or we'd be faced with unreasonable costs for external consultants.

Last but not least, it was also important that the future system would allow us to work closely with the Federation of Cooperative Banks, specifically so that our models would be available to other members for commercial real estate financing. Security considerations alone would have made such a service on the basis of Microsoft Excel impossible. So it was clear that the new system would have to permit

Visual Programming of Rules for an Override

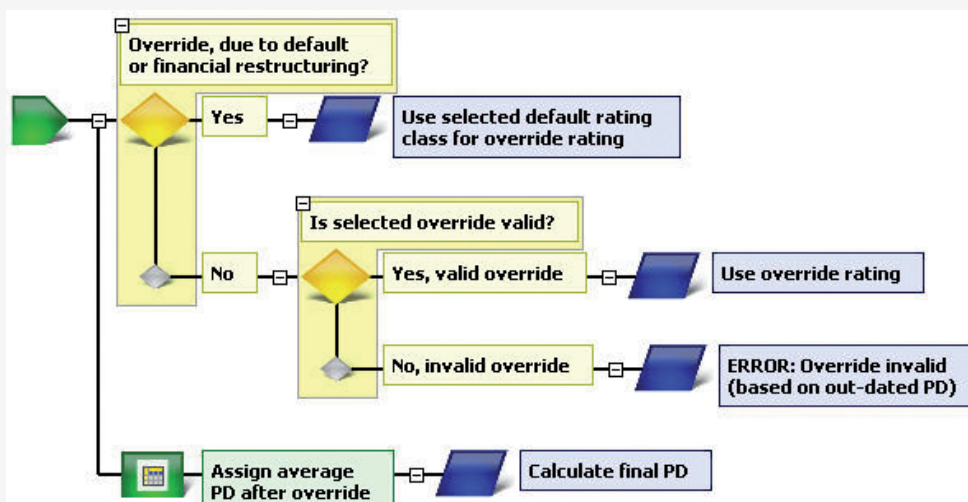


Fig. 3: “Visual Programming” of rules for handling an Override



“Once this project is complete, our rating system will function at an incomparably higher level.”

Dr. Stefan Krohnsnest, Head of Credit Risk Controlling, DG HYP

us to extend this offer to the Volksbanken and Raiffeisenbanken.

Bosch Software Innovations:

This service sounds interesting. Can you tell us more about this “rating-as-a-service”?

Dr. Stefan Krohnsnest:

There’s a clearly defined division of labor within the Federation of Cooperative Banks. Among other things, DG HYP has primary responsibility for the methodological development of the rating models for commercial real estate financing. In general, technical services are provided within the Federation through the computing centers. However, our special expertise in commercial real estate financing makes a different solution possible: the rating desk. In this model, DG HYP provides the service directly to the other banks. The most important prerequisites for this are Internet access, multi-tenant capability, and the implementation of expanded authorization structures, but flexible adaptability of the workflows is also important. Bosch Software Innovations’ rating platform makes all of this possible.

This way, we can carry out our mission within the Federation of Cooperative Banks. It’s not worthwhile for the computing centers to develop their own system – the cost per rating would be far too high. For us, offering this service just means an add-on to our existing system, and the value created by our methods is understood and appreciated within the cooperative financial services network.

Bosch Software Innovations:

How have the users responded to the new system?

Dr. Stefan Krohnsnest:

I went along on the training trip to the analysts in the local real estate centers. I’ve never had so much fun at the presentation of a new system. The new rating system was so well-received, I should have gift-wrapped it! The workflow for creating the ratings is simple but stringent, and the models deliver results that are logical and transparent. The users found it to be a quantum leap from the old Excel sheets. Our total training time for 80 employees was eight days. The trainees came from the market side, back office processing and control, and internal auditing departments. Once this project is complete, our rating system will function at a higher level, from every angle – technologically, methodologically, and procedurally. And on top of all that, Bosch Software Innovations succeeded in delivering the application user interface with the same look and feel we were already used to.

Bosch Software Innovations:

What was especially important to you and your coworkers?

Dr. Stefan Krohnsnest:

For us, as a credit risk controlling department, this project was a pleasant surprise – it was much leaner than many others in the past. Some of our rating models are extremely complex, and we were expecting to have to do a lot more hand-holding and explaining. The big surprise was how little time we had to spend sharing our expertise – but the results were always what we needed. As someone with responsibility for a business department, I personally find it especially important that any collaboration be based on mutual trust and reliability – and this is and has always been the case here.

About DG HYP

DG HYP is the specialist for commercial real estate finance in DZ BANK Group and a partner to the German cooperative banking sector. DG HYP's business divisions comprise Commercial Real Estate Finance and Local Authority Lending and Public Finance. DG HYP's commercial real estate business comprises its activities in the cooperative banking sector, acting as a product provider to the coop-

erative banks, as well as direct business with German real estate investors. DG HYP also acts as a syndicate partner in selected international markets.



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