



Rule-Based Evaluation and Monitoring of Creditworthiness

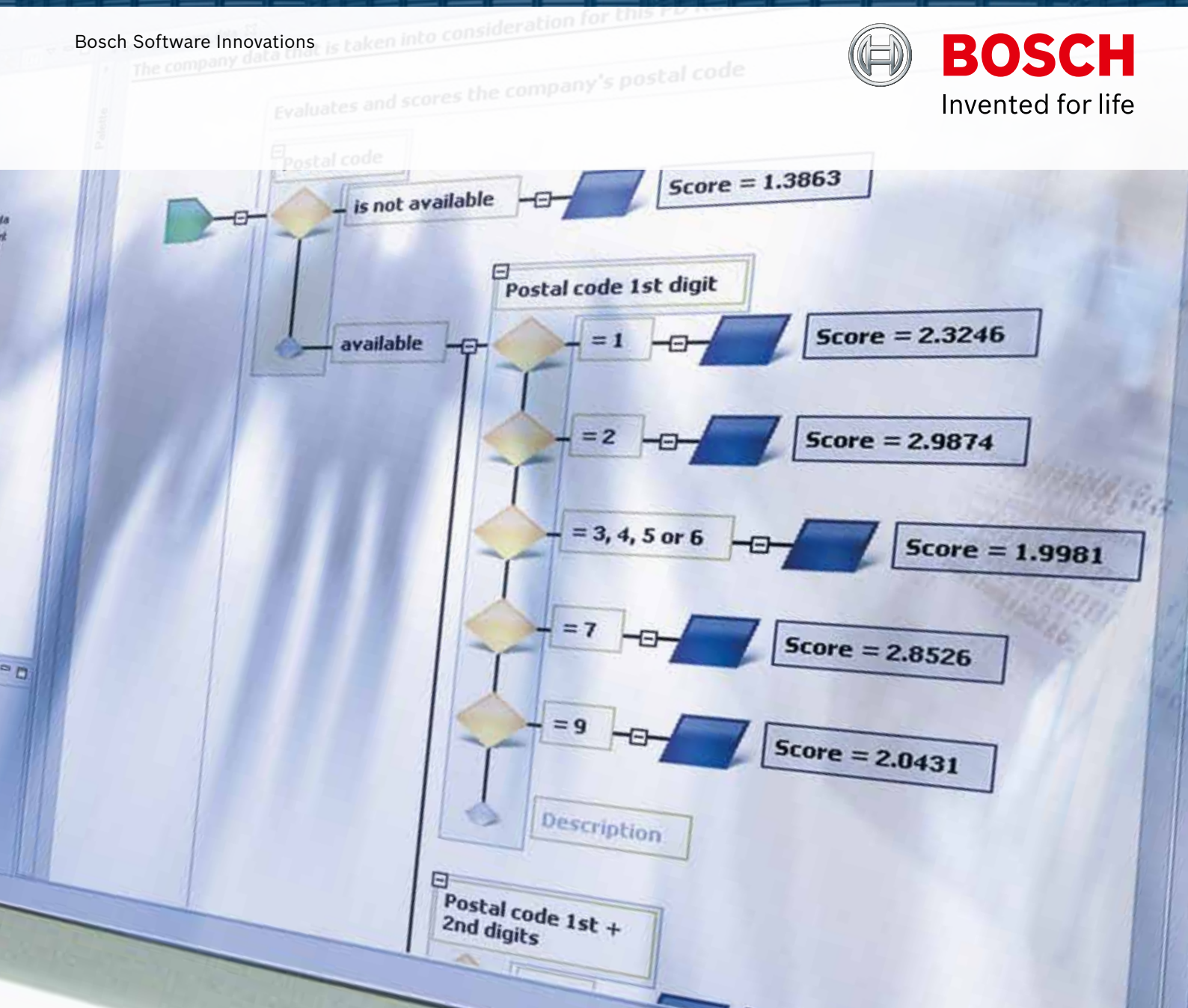
Credit Management for Corporations

Bosch Software Innovations



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Evaluating **Customer Creditworthiness** and Promptly Identifying **Risks**

The goal of modern credit management is to evaluate customers' creditworthiness as precisely as possible and provide early warning of credit defaults. This requires software solutions which provide comprehensive support for the demands and core processes of credit and receivables management.

The evaluation of customers' creditworthiness within a process-oriented IT application brings a succession of benefits, which ensures more confidence and promptness in managing requirements:

- ▶ Integration of internal and external data for the risk analysis and customer evaluation
- ▶ Central storage and immediate availability of all information e.g., customer scoring/ credit limits
- ▶ Business rules for the flexible implementation of enterprise-specific credit policies and processes
- ▶ An early warning system to recognize trends and promptly initiate countermeasures
- ▶ Simulation tools to analyse the effects of modifications to the risk models

Credit Management Platform:

A Flexible and Comprehensive Solution for Credit and Receivables Management

The Credit Management Platform from Bosch Software Innovations supports all process steps in operational and strategic credit management, from the collection and import of customer data from internal and external data sources, through risk analysis and creditworthiness evaluation, all the way to calculation, approval and subsequent monitoring of credit limits. The software can be accessed via the Internet using a Software-as-a-Service model (SaaS), or integrated into the company's infrastructure.

1 Data Collection and Importation	2 Credit Evaluation & Risk Analysis	3 Credit and Limit Decisions	4 Credit File Administration
Operational Credit Management Process			
<ul style="list-style-type: none"> ▶ Internal Data (Payment Behavior, Collateral, Accounting Data) ▶ External Data (Credit Reports, Financial Data, Market Data) 	<ul style="list-style-type: none"> ▶ Exposure Calculation ▶ Credit Scoring and Rating ▶ Qualitative and Quantitative Risk Analysis ▶ Balance Sheet Analysis 	<ul style="list-style-type: none"> ▶ Manual and Semi-automated Credit Decisions ▶ Calculation and Approval of Credit Limits and Terms 	<ul style="list-style-type: none"> ▶ Administration and Export of Credit Files ▶ Reminders and Notifications ▶ Worklist and Search Functionalities
5 Monitoring and Early Warning System			
6 Simulations and Impact Analyses			
7 Process Management and Monitoring			
8 Risk Control and Management			

The Credit Management Platform supports the operational and analytical credit management process

Bosch Software Innovations Credit Management Platform

This End-to-End Software Solution Supports All Operational and Analytical Core Processes in Credit Management

1 Data Collection and Import

Comprehensive and up-to-date information about a firm's customers is the fundamental precondition for successful credit management. The Credit Management Platform provides data entry screens for credit managers to collect all necessary customer data such as master data, financials, and credit limit requests. In addition, data may be imported from any number of internal sources (such as ERP systems and accounting systems) or external sources (such as credit bureaus, credit insurance companies and rating agencies). All data are stored in a central database, providing flexible access at all times.

2 Risk Analysis and Determination of Creditworthiness

Scoring models may be freely defined for the analysis of creditworthiness, and limit determination. The rule models are created via a graphical rule editor, and may be flexibly altered at any time. As output, scores or ratings may be assigned, and a maximum credit line set.

3 Credit and Limit Decisions

Any approval processes may be implemented, for example, to require the approval of a superior before changing a credit limit. The process logic is modeled graphically using a workflow model, and can be modified at any time.

4 Reporting and Administration

All input data and output values (e.g., credit limits) are centrally stored and maintained in an electronic credit file. Credit files may be exported as documents (e.g., as PDF or Word files) if required, for example, for a written approval process. For all credit files, time periods for resubmission may be defined. The credit files are then provided to the credit analyst for reevaluation via role and user-specific work lists.

5 Monitoring and Early Warning System

The customer base can be continually monitored, using freely definable business rules that define the criteria by which work list entries are generated. Thus, for example, an alert can be generated when a debtor exceeds a certain percentage of available credit limit.

6 Simulation and Impact Analysis

Rule models for customer scoring and creditworthiness assessment can be simulated using historic data before they are taken into production. In this way, the effects of changes to the model (for example, in weighting) on the results of creditworthiness evaluations (for example, the distribution by risk rating class or the aggregated credit limit) may be analyzed.

7 Process Management and Monitoring

The credit management process is also subject to constant process optimization in order to make the most efficient use of available resources. To this end, process monitoring provides useful data such as average idle times and processing times, which can be used to define escalation mechanisms and optimize processes.

8 Risk Control and Management

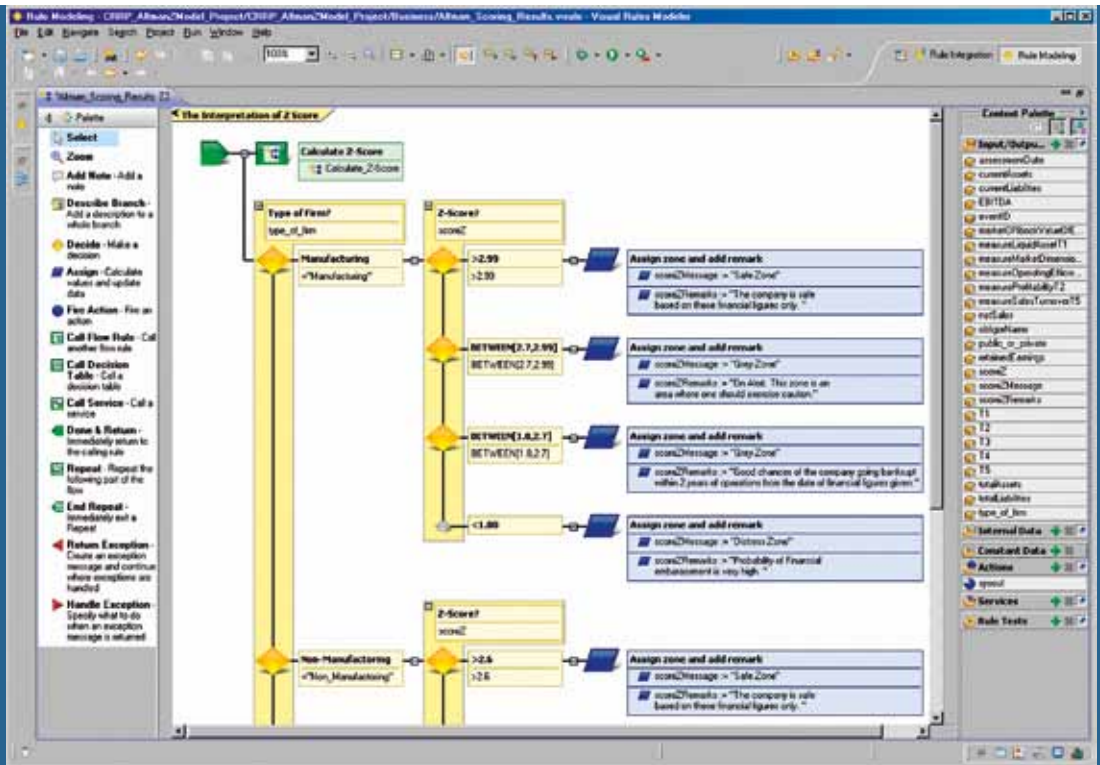
Using the reporting environment, individual client data may be aggregated on a portfolio level. On the basis of this data, a wide variety of analyses may be performed, providing comprehensive information regarding risk distribution within the portfolio, risk concentrations, or trend analyses, among other areas. This information, in turn, can be used to chart possible courses of action such as for portfolio optimization.

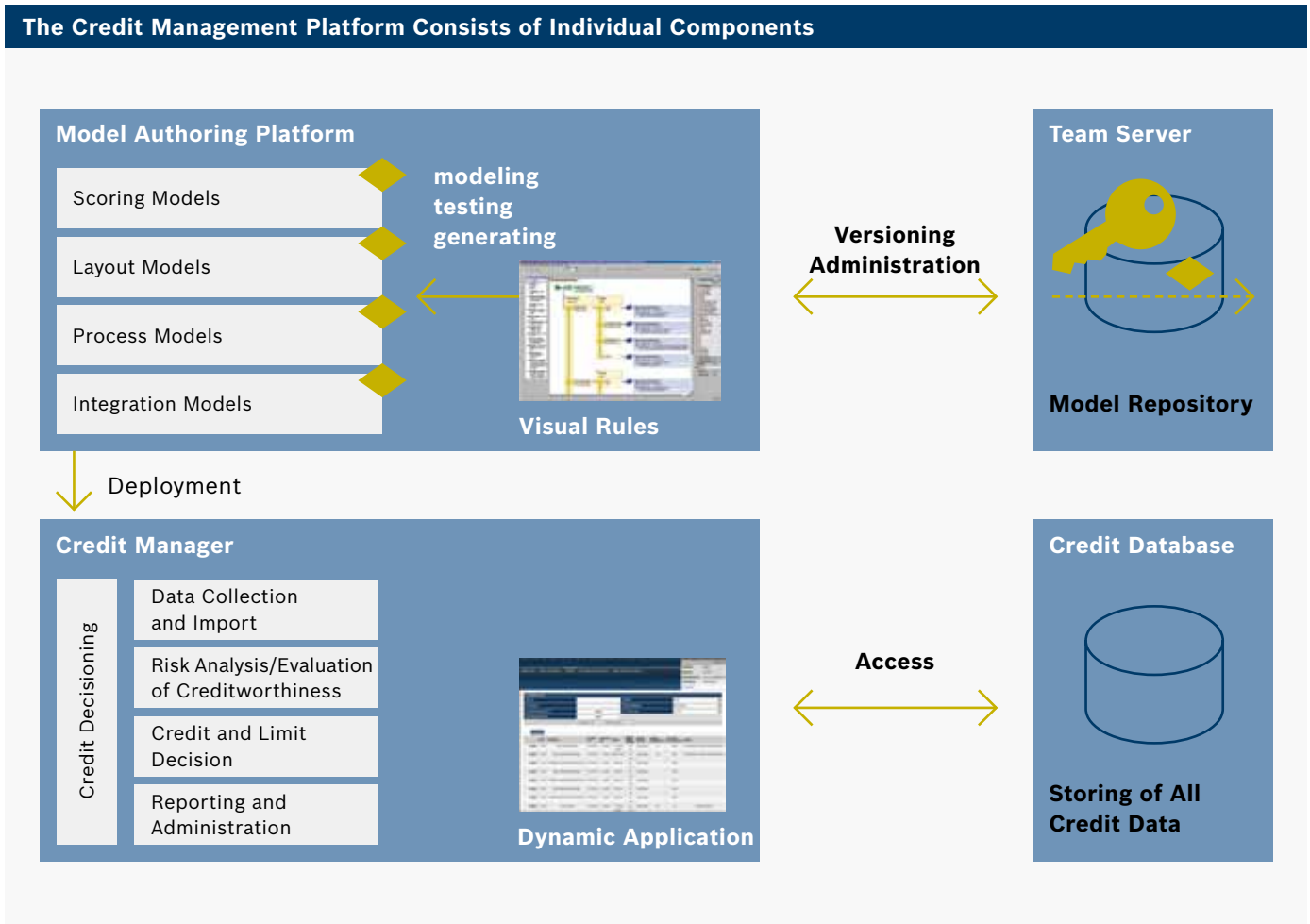
The Technological Underpinnings: Rule Models Provide High Traceability and Flexibility for Decision and Process Logic

Traditional IT applications are often too rigid to meet the needs of credit management and cannot meet the requirements for increasing complexity, transparency and flexibility. The Credit Management Platform uniquely meets these requirements because it is based on the Visual Rules rule technology, the world leader in its class. Visual Rules uses a graphical modeling environment to implement and maintain all relevant logic modules of the application – rules for risk scoring in order to

evaluate creditworthiness, rules for approval workflows, even rules for defining the web-based end-user interfaces. This allows the credit or risk management department to independently define and update the relevant business rules. All rules are traceable and can be modified at any time. Every process step is documented and logged. This provides a high degree of security for any internal or external audit.

Data is processed using defined rules to evaluate the creditworthiness of business partners and clients. In this example, the rule model determines the probability of insolvency of a company.





Model Authoring Platform for Model Administrators

Administrators create and maintain business rules in the Model Authoring Platform. With these business rules scorings and ratings are executed, credit decisions are automated, user interfaces are defined, processes are managed, and external/internal data sources, such as information from credit bureaus, are integrated. Of particular importance is the intuitive approach to representing business logic: the graphical representation of the logic components corresponds to human thought patterns and requires no programming knowledge. Thus, all primary logic components of the Credit Management Platform can be independently expanded and adapted by administrators.

Team Server Model Repository – Simultaneous Access to Models by Multiple Model Administrators

The rule models are stored and managed in a central repository (the Team Server) where they may be accessed and modified by multiple model administrators simultaneously. All changes are recorded, so it is always clear who made what change and when.

Credit Manager: **Operational Customer Evaluation and Risk Analysis**

The Credit Manager gives end-users (e.g., credit analysts) a user-friendly Web-based application for the operational credit management process, including limit calculation and monitoring. The underlying business rules and workflows are based on the models defined in the Model Authoring Platform. Credit analysts have direct access to customer data via the credit files and can manage transactions using work lists.

In addition to the operational credit management process, support is also provided for analytical credit management. To this end, modified rule models can be simulated, for example, by applying them to historic data. Reports then compare the actual data to simulated results, making it possible to analyze the impact of the changes to the rule models at a portfolio level, or on the distribution of the automatically or manually generated credit decisions. Stress tests can also be carried out in the Credit Manager. In this case, the

models themselves are not changed, but different input data are used and the effects evaluated.

Credit Database: **Reliable Data Management for Internal and External Information**

All internal and external input and output data are stored in an auditable data base. In addition, an unlimited number of revisions may be stored for a single credit file in order to record its complete history. This makes it possible to trace who entered which data when, and what decisions were taken.

Interface with Internal and External Data Sources

The Credit Management Platform can be linked to existing internal data sources and third-party systems, such as ERP systems and accounting systems, to permit a bidirectional exchange of data. In addition, external data providers, such as credit bureaus, credit insurance companies and rating agencies, can be connected to the platform.

Users receive the results of the Visual Rules credit assessment directly in their Web-based Credit Manager. If the model administrators modify the rules, the interface can adjust, for example, by displaying different or additional fields. This feature gives the corporation an extraordinary degree of flexibility without needing to involve the IT service provider.

The screenshot displays the Credit Management Platform web interface within a Windows Internet Explorer browser window. The browser address bar shows the URL: `http://localhost:8058/ating/ate/document/481`. The page title is "Credit Management Platform". The interface includes a navigation menu with options: "Worklist", "Customer Search", "Credit Check", "Reports", "Risk Models", and "Administration". The main content area is titled "CREDIT MANAGEMENT PLATFORM" and includes a user status bar: "Help | User: ratingmanager Client: Demo | Logout". Below this, there are tabs for "Customer", "Financial Statement", "D&B Report", "Accounts", "Risk Assessment" (which is active), and "Document Data". There are also "Print complete" and "Print one page" buttons. The "Risk Assessment" section is divided into three panels:

- Z-Score:** Shows a Score of 3.95, a Message of "Safe Zone", and a Remarks box containing the text: "The company is safe based on these financial figures only."
- IRM-Score:** Shows a Score of 3 and a PD (Probability of Default) of 0.018 %.
- D&B-Score:** Shows a Failure Score of 100 and a Recommended Credit Limit by D&B of 51,100,000.00.

The browser window also shows the system version: "Version: 1.8.0, CRP - 1.8.0, D&B - 1.8.1 Environment: Development" and the language set to "English".

Technology and Operations:

One Platform – Two Operating Models

The Credit Management Platform can be installed in the internal IT infrastructure or provided as a service (Software-as-a-Service, or SaaS). Offered in SaaS form, the Credit Management Platform uniquely combines the advantages of a standardized and cost-effective service operating model with the unlimited flexibility and agility of a rule-based application. In this way, clients can define their own rule models – for evaluating creditworthiness, for designing user interfaces, and for process management and system integration – yet implement them on a robust and standardized application with quality assurance.

A Software-as-a-Service model provides the following benefits:

Robust IT-Operations combined with...	... a high level of flexibility
Modern and sustainable software architecture	Clients can define and manage their own business rules for calculation models (e.g., customer evaluation, creditworthiness determination via scoring and rating models, limit calculation, etc.)
Low operating costs and complete cost control	Clients can define and manage their own business process models and control user interfaces (e.g., data entry screens, information and output displays)
Minimal system requirements for the client (Web browser)	Flexible, rule-based early warning system
Standardized connection with external data providers (e.g., credit bureaus, credit insurance companies)	Connection from within the rule models to the customer's specific legacy systems
Role-based deployment process with quality assurance	Comprehensive security management for administering users, roles, and groups
Standardized access interface (Remote API) to permit external initiation of credit processes	Multilingual and multi-client capable application

The Advantages of the Credit Management Platform at a Glance:

► Support for End-to-End Operational Credit and Receivables Management

The Credit Management Platform supports the entire process, from data collection and import, through risk analysis and limit calculation, to the approval process.

► Analytical Credit Management Provides Decisionmaking Aids

Changes to rule models, such as for customer scorings, are simulated before being implemented. Process data are recorded and provide the necessary information for implementing escalation mechanisms and process optimization. Simulation results and reports provide insight into the customer credit portfolio.

► Rule Technology for Maximum Flexibility and Agility

The solution is based on the Visual Rules rule technology. With this technology, model administrators within a business department can define and maintain the rules that define calculation models, data entry and display screens, and process models. The rule models can thus be organized entirely around an enterprise's credit policies.

► Independence from Internal and External IT Service Providers

The rules for customer evaluation, risk analysis and process management are defined by business experts within the enterprise, and can be modified or adapted at will. There is no dependence on release cycles of existing applications. This

not only results in a high level of independence from external service providers, but the firm's own IT department as well. This, in turn, makes for greater agility and flexibility.

► Software-as-a-Service: Dynamic Applications as a Service

Employing the Credit Management Platform as a service combines the advantages of standardization, reliability and cost-effectiveness with dynamism of unparalleled flexibility and the agility of a rule-based application.

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We provide our customers with the support they need to develop innovative business models that interconnect functions, services, and devices via the internet. Using Bosch Software Innovations' leading technologies, customers can increase the efficiency and flexibility of complex applications to gain a long-term competitive advantage.

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