

SAS® Credit Lifecycle Management

AI/ML Embedded credit management platform to manage entire credit lifecycle



End-to-end Credit Lifecycle Management Framework

Credit facilities are the livelihood of the banking sector. With inefficient management of the credit lifecycle, the competitiveness of any lender reduces significantly. However, managing this involves a myriad set of decisions to make, policies to set and teams to collaborate.

Amongst the many, the main areas that requires utmost attention are:

- Real-time credit origination
- Customer limit & price offerings, including up-sell / cross-sell opportunities
- Early warning system for delinquency and default
- Credit monitoring and understanding
- Collections and recovery management system.

During the ongoing COVID-19 scenario, managing these areas efficiently and dynamically will be the differentiator. Both, revenue increase and cost reduction heavily depend on the effectiveness of how the credit lifecycle is being managed.

As a trusted partner to many financial institutions, SAS can help in these areas to complete the digital transformation and support establishing an effective Credit Lifecycle Management.



Figure 1: SAS Framework for Credit Lifecycle Management

What is SAS® Credit Lifecycle Management (SAS® CLM)?

SAS, as a leader of business analytics and enterprise solutions, provides cutting-edge technologies to automate the entire credit workflow and bring analytics to the specific credit management tasks. SAS®CLM framework utilizes advanced SAS machine learning and artificial intelligence algorithms, modeling laboratory environment, real-time decisioning engine, data analysis, visualization and reporting platform, best practice business methodologies and much more.

Which business areas are covered?

SAS® Credit Lifecycle Management covers the full customer journey, starting from the first step in with his application until the debt is fully paid back or collected in the default case. The overall credit lifecycle can be broken down into 5 main steps and corresponding SAS modules, summarized at Figure 1 above: loan origination, new products offering, proactive early warning system, credit monitoring and effective collections management.

Which experience has SAS had?

SAS® Credit Lifecycle Management has already been implemented in number of global systemically important banks as an entire framework, as well as in many regional banks for specific credit lifecycle purposes. Both - used technologies and developed methodology, have proved their value and demonstrated great results and high return on investments.

What are the main differentiators of SAS® Credit Lifecycle Management?

AI/ML embedded model development environment

SAS Model Studio enables data scientists to use multiple embedded advanced AI/ML techniques easily by drag and drop them in the interface. Modelers can apply pre-build model templates and nodes with incorporated methodology. Solution compares the performance of different models automatically and chooses the champion model for further application. Fully visualized development tool with algorithms for auto-explanation and interpretability.

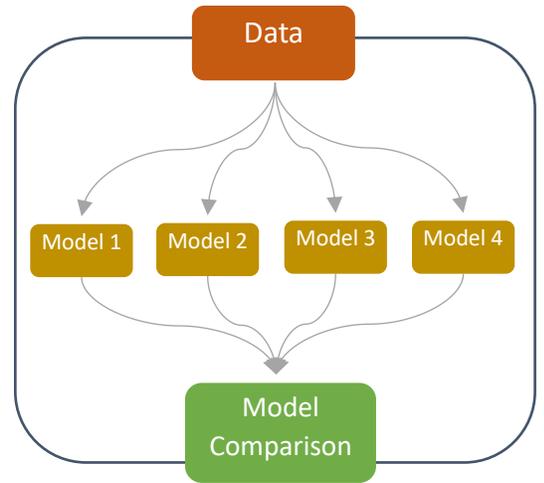
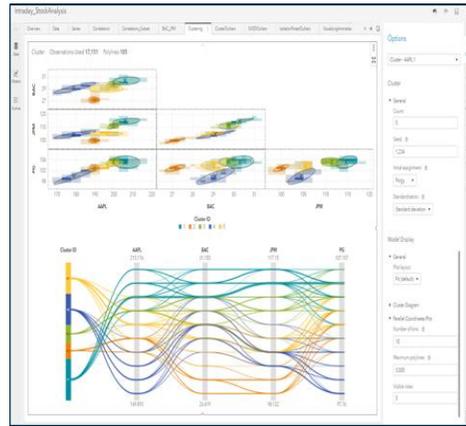


Figure 2: SAS Visual Data Mining & Machine Learning environment

Intelligent Decisioning Engine

SAS® decisioning engine combines business rules management, data queries processing, different model (SAS, Python, R) execution and workflow governance to automate and make decisions both in batch mode and in real-time. SAS® CLM can onboard any decisioning strategy, including basic lending strategy and collections strategy, which are part of the content already and a good starting point.

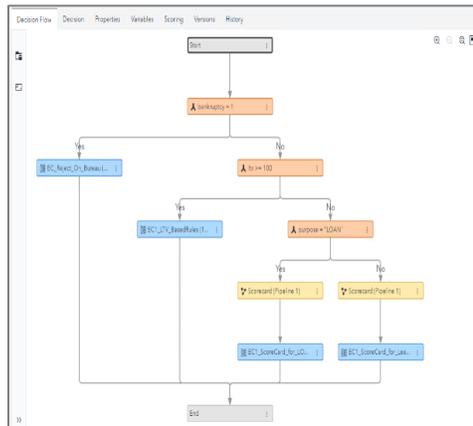


Figure 3: Intelligent Decision Flow

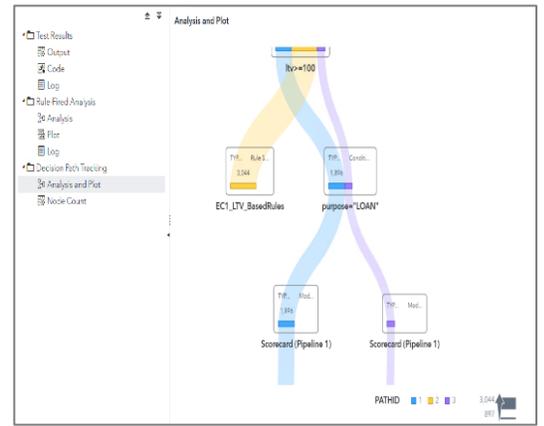


Figure 4: Track the paths taken in decisions

Model Management

As predictive models are integral part of the credit management, keeping them fit is a critical task. SAS provides automated model backtesting and monitoring capabilities to check the health of the model on a schedule. You can be alerted and notified, if there is a threshold breach against any performance statistic.

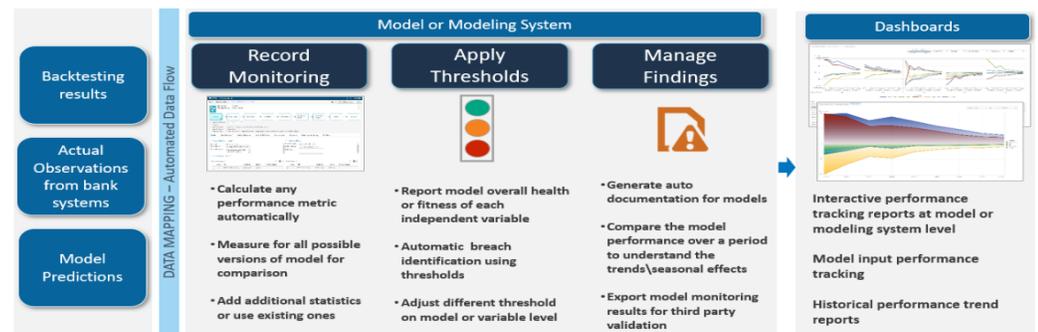


Figure 5: Automated Model Monitoring Framework

Risk Data and Model Templates

SAS® CLM includes Banking Content with a predefined data model, which caters for regulatory and business models like application / behavioral scores, PD / LGD / EAD models, collections scores etc. For these models there are prebuilt templates available as a part of Framework too.

Dashboards & Reports

SAS reporting layer provides a scalable, in-memory engine along with an extremely easy-to-use interface. The combination of interactive data exploration, dashboards, and analytics helps business users to find valuable insights without coding or the need for advanced data scientist skills.

Easy Extension

All the core components – the modeling solution, model monitoring tool, decisioning engine, reporting and dashboarding layer, can be further utilized in other business areas such as marketing and next best action determination, customer journey analytics, campaign management etc.

What is the lifecycle of a credit in SAS® CLM Framework?

Credit Origination

SAS provides the decisioning system for credit facility granting process. Connectors to internal organisations' systems can be set-up to bring the application request from branch, online bank or ATM in and also to external services – to import and verify data from bureaus or fraud/deny lists. Processing all inputs with rules and scoring models in seconds lead to automated and efficient near real-time decisioning that can stimulate your growth strategy and reduce operating expenses.

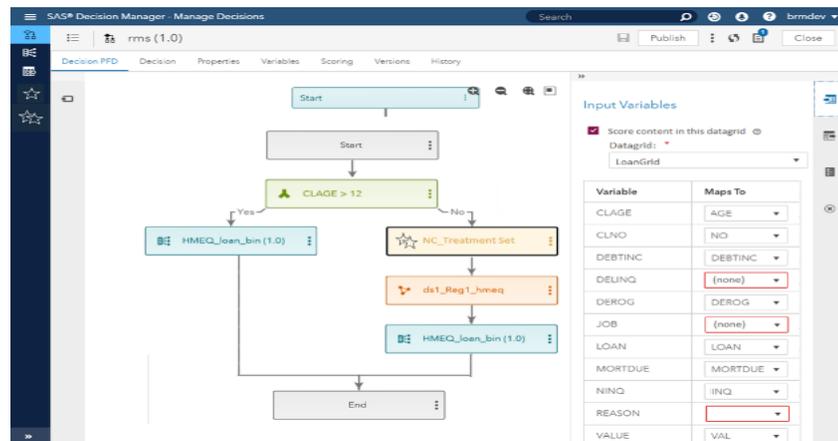


Figure 6: Illustrative example of Credit Origination Flow

Limit & Price / Products Offering

SAS allows using **optimization** algorithms to allocate optimal limits to facilities and price to loans. We have RAROC based pricing engine that incorporates PD, income estimation, propensity to buy, price sensitivity models and calculates customer's lifetime value. Based on these, a decision is being made on which limit and price would maximize the profit for specific customer.

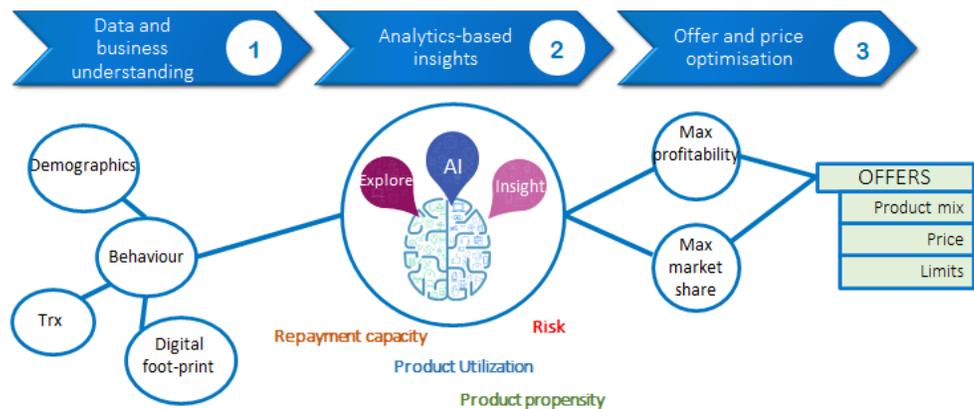


Figure 7: Illustrative price and offer optimization

Credit Monitoring

After credit disbursement, SAS will provide toolsets to monitoring performance dashboards, manage limits and collaterals, update customer's riskiness (behavioral score), create regulatory models (PD/LGD, ECL) and customer's possible up-/cross-sells from the relevant product lines.

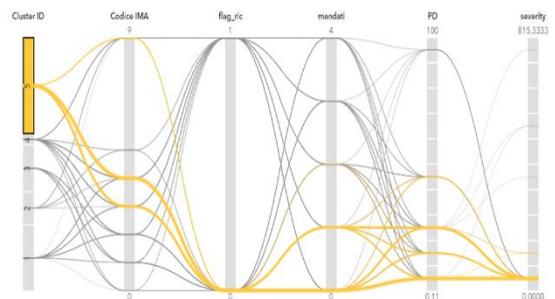


Figure 8: Trends of some monitoring metrics

Early Warning System (EWS)

As IFRS9 mandates, forward looking provision calculation and timely management of the delinquencies have a great impact on the overall bank profitability. SAS offers a sound EWS system, which gathers internal and external info (online news, social media, articles, court filings) from multiple sources. Using the collected data and text analytics rules, SAS reveals facts about the market sentiment, hidden customer nets (buyer-supplier, employee-employer etc.), worked-out signals and much more. This alerts together with the proactive financial ratios calculation and internally obtained signals enables to update client's risk status early enough to act and safeguard the portfolio.

| INSTID | Customer Type | Product Type | Region | Nominal Value | Occupation Type | Monthly Trend Costs | Monthly Trend Revenues | Customer Seniority | Status | Warning | Predictive Indicator | Predicted Risk Level |
|--------|---------------|--------------------|---------|---------------|-----------------|---------------------------|-----------------------------|--------------------|---------------------|---------|----------------------|----------------------|
| 18441 | Retail | Loans | Emilia | €9.350 | Self-Employed | Expenses Strongly Down... | Salary Upgrade | | Potential | | 14.32% | Medium Risk |
| 20836 | Retail | Loans | Puglia | €6.974 | Employee | Expenses Dangerous Da... | Salary Upgrade | | Potential | | 15.93% | Medium Risk |
| 20990 | Retail | Mortgage | Trentin | €42.908 | Employee | Expenses Downgrade | Salary Upgrade | | Potential | | 7.84% | Medium Risk |
| 21910 | Retail | Mortgage | Toscana | €15.582 | Employee | Expenses Strongly Down... | Salary Strongly Downgrade | | Under Investigation | | 12.94% | Medium Risk |
| 22471 | Retail | Mortgage | Lombard | €45.213 | Self-Employed | Expenses Dangerous Da... | Salary Upgrade | | Potential | | 7.23% | Low Risk |
| 22871 | Retail | Loans | Campani | €9.159 | Self-Employed | Expenses Strongly Down... | Salary Upgrade | | Under Investigation | | 13.23% | Medium Risk |
| 23325 | Retail | Loans | Lombard | €14.500 | Self-Employed | Expenses Dangerous Da... | Salary Upgrade | | Potential | | 6.75% | Low Risk |
| 23654 | Retail | Mortgage | Umbria | €6.656 | Employee | Expenses Downgrade | Salary Strongly Upgrade | | Potential | | 6.95% | Low Risk |
| 24084 | Retail | Loans | Emilia | €26.728 | Employee | Expenses Dangerous Da... | Salary Upgrade | | Potential | | 15.84% | Medium Risk |
| 24663 | Retail | Mortgage | Umbria | €54.312 | Employee | Expenses Dangerous Da... | Under Investigation Down... | | Under Investigation | | 21.48% | High Risk |
| 25212 | Retail | Loans | Lazio | €4.264 | Self-Employed | Expenses Downgrade | Salary Upgrade | | Under Investigation | | 19.64% | High Risk |
| 25245 | Retail | Mortgage | Campani | €95.356 | Self-Employed | Expenses Dangerous Da... | Salary Strongly Upgrade | | Potential | | 8.60% | Medium Risk |
| 26537 | Retail | Loans | Veneto | €24.678 | Employee | Expenses Strongly Down... | Salary Upgrade | | Potential | | 8.51% | Low Risk |
| 26606 | Retail | Mortgage | Lombard | €28.070 | Self-Employed | Expenses Downgrade | Salary Upgrade | | Potential | | 9.14% | Medium Risk |
| 26691 | Retail | Loans | Sicilia | €2.234 | Employee | Expenses Strongly Down... | Salary Upgrade | | Potential | | 9.50% | Medium Risk |
| 27263 | Retail | Mortgage | Campani | €50.128 | Employee | Expenses Downgrade | Salary Downgrade | | Under Investigation | | 6.55% | Low Risk |
| 27388 | Retail | Mortgage and Loans | Veneto | €78.479 | Employee | Expenses Strongly Down... | Salary Downgrade | | Under Investigation | | 4.65% | Low Risk |
| 27749 | Retail | Mortgage | Puglia | €18.203 | Employee | Expenses Strongly Down... | Salary Upgrade | | Potential | | 6.62% | Low Risk |
| 27799 | Retail | Loans | Lazio | €2.716 | Self-Employed | Expenses Dangerous Da... | Salary Strongly Upgrade | | Potential | | 8.94% | Medium Risk |
| 29472 | Retail | Mortgage | Campani | €32.040 | Employee | Expenses Strongly Down... | Salary Strongly Downgrade | | Under Investigation | | 14.66% | Medium Risk |
| 29573 | Retail | Mortgage | Veneto | €12.574 | Self-Employed | Expenses Dangerous Da... | Salary Upgrade | | Potential | | 7.84% | Medium Risk |
| 29589 | Retail | Loans | Sicilia | €1.209 | Self-Employed | Expenses Strongly Down... | Salary Upgrade | | Potential | | 10.41% | Medium Risk |
| 30100 | Retail | Mortgage | Lazio | €35.058 | Self-Employed | Expenses Dangerous Da... | Salary Upgrade | | Potential | | 38.84% | High Risk |

Figure 8: Early Warning System output – individuals, classified in categories with high, low & medium risk

SAS Early Warning System leverages on Visual Text Analytics tool, which allows to set-up the text rules in a handy interface. Being applied to unstructured data - articles, news, social media or other texts, rules extract facts and assess their degree of influence on the final risk status. You can extract:

- Adverse media coverage for corporate clients like fraud news, legal announcements, board changes etc.
- Market sentiment against certain market risk factors like currency and interest rate forecasts, financial health of a certain sector or geography
- Relationship diagram from a supplier-vendor, associate entities, news-sources etc.

| # | Matched String | Matched Label | Matched Text |
|---|---|----------------------|---|
| 1 | Rostelecom PJSC (MOEX: RTKM, RTKMP; OTCQX: ROSVY), Russia's national telecommunications operator, today announces that the Company was assigned an AA(RU) credit rating with a stable outlook by the Analytical Credit Rating Agency (ACRA) | org cra rating | Rostelecom ACRA AA |
| 2 | Rostelecom PJSC (MOEX: RTKM, RTKMP; OTCQX: ROSVY), Russia's national telecommunications operator, today announces that the Company was assigned an AA(RU) credit rating with a stable outlook by the Analytical Credit Rating Agency (ACRA) | cra org rating | ACRA Rostelecom PJSC AA |
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| 6 | Rostelecom PJSC (MOEX: RTKM, RTKMP; OTCQX: ROSVY), Russia's national telecommunications operator, today announces that the Company was assigned an AA(RU) credit rating with a stable outlook by the Analytical Credit Rating Agency | rating cra org | AA Analytical Credit Rating Agency Rostelecom |
| 7 | Rostelecom PJSC (MOEX: RTKM, RTKMP; OTCQX: ROSVY), Russia's national telecommunications operator, today announces that the Company was assigned an AA(RU) credit rating with a stable outlook by the Analytical Credit Rating Agency | org cra rating | Rostelecom Analytical Credit Rating Agency AA(RU) |

Figure 9: Text analytics rules, realized for facts extraction

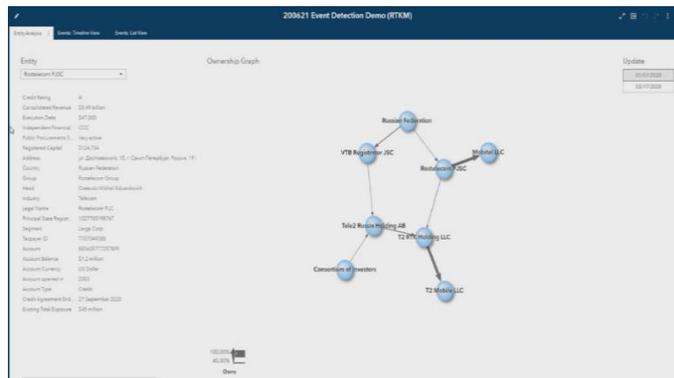


Figure 10: Entity relationship (supplier-vendor company) diagram, revealed through transaction history

Collections Management

SAS® CLM offers a collections framework, that minimizes costs, related to the collections channels, and maximizes the recovery amount with predictive models and intelligent decisions. Using all data, generated by SAS® CLM (behavioral scores, EWS scores, limits utilization), the bank can build and apply collections strategies to reach the financial excellence.

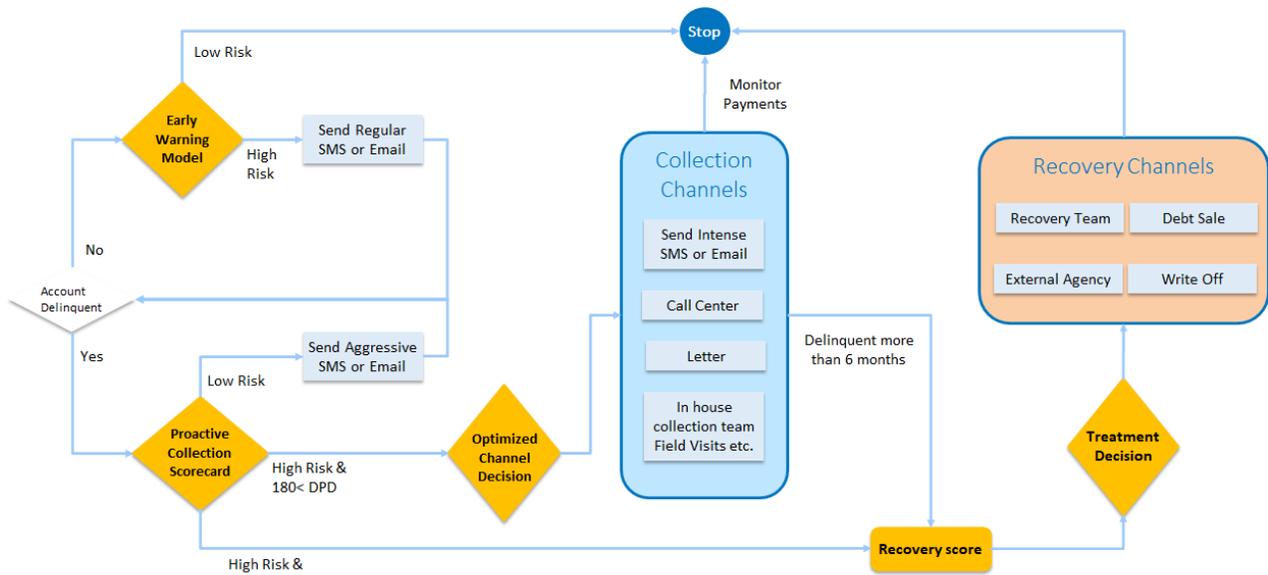


Figure 11: SAS Collections Framework, models and rules to decide an optimal treatment

SAS® CLM has visualization toolset, that helps to explore the data through various interactive graphs and drill-down tables. Collections Management framework utilizes that to full extent. You can investigate how big recovery treatment a bank will receive, following different policies. A bank can analyze simultaneously the champion and challenger collections strategies, compare returns/costs visually to choose the best one.

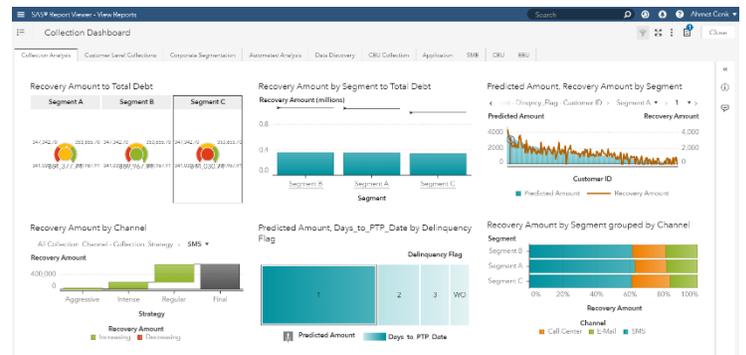
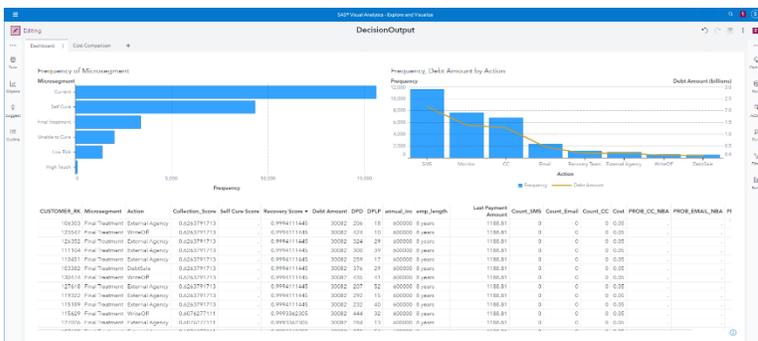
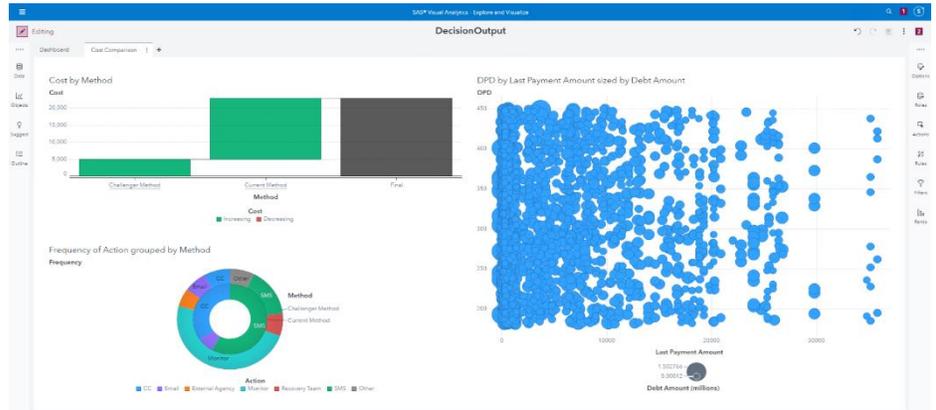


Figure 12: SAS Collections Framework, dashboard samples

FREQUENTLY ASKED QUESTIONS ABOUT SAS® CREDIT LIFECYCLE MANAGEMENT

How Artificial Intelligence and Machine Learning algorithms are being used for the credit lifecycle?

SAS is the leader in business analytics, and we want to bring analytics into life for our partners to generate meaningful insights from the data. In this respect, we use unconventional algorithms such as gradient boosting, random forest, neural network for predictive modeling and data mining. We also use intelligence in decisioning by executing strategies with a predefined logic and incorporated analytical models. We build a dynamic decisioning environment, where all information can be consumed, metrics are calculated and timely decisions are taken.

What is the return on investment for SAS® CLM?

CLM framework has a high return on investments because (i) proactive and analytical-driven decisions increase revenue immediately (ii) and all the underlying tools are re-useable for several business areas. In a recent exercise, where a prototype was developed for an international bank, return on investment proved to be 10x through operational costs reduction by 25% and 30% increase in good customers win rates. Demonstrated results were verified against the market and proved by a respective, global consulting firm.

Does SAS® CLM cover entire portfolio?

Yes. SAS® CLM is a modular solution, that can be used for both retail and commercial portfolios as well as a subset of credit lifecycle, such as only for credit decisioning.

Do I have to implement it end-to-end for all lifecycle steps and for all portfolios?

No. SAS® CLM is a modular solution. You can start with a specific use case, such as only collections, only early warning signals or only scorecard development. The rest can be implemented later, based on the additional requirements. What is more, you are not being charged for the entire suite but only for the scope, that is required.

I am using open source (or other vendor's) solutions for decisioning, modeling etc., how will SAS® CLM integrate with the existing systems?

SAS can integrate with your third-party systems in two different levels, you can integrate them at process level through REST API technology or at data level to receive input/output data from another system. Data integration is the best observed practice, and SAS has extensive capabilities for data access, manipulation and storage. SAS can access to any type of data and aggregate them for the consumption. SAS can provide consultancy services to customize the framework and implement it on your existing architecture.

Do we need to ask IT teams to create a new policy, change parameters or execute a scenario on a historical portfolio data?

By design, entire SAS solution's objective is to minimize the dependency of business users on vendor/SAS and internal IT. Running what-if scenarios (such as changing policy thresholds, testing different cut-off points for scores etc.) is a part of business-as-usual, especially during the current economic and regulatory uncertainties, thus, it should be owned and available for modification by business users. Without asking IT teams to duplicate, archive, back up or restore an environment, business users can run these scenarios on any – current/historical/sub- portfolio.

What kind of model and model management capabilities does SAS® CLM have?

SAS® CLM comes with a model management platform that is designed to keep your models fit through continuous and automated monitoring. It is very powerful and method-agnostic, enables you to have a variety of methods, including linear\non-linear regression models, decision trees etc. Whatever methodology you might have used for model development, monitoring and calibration, it can be automated. You can even have champion-challenger model suggestions automatically from the system.

Can SAS® CLM make calculations and decisions in real time?

Yes. Solutions within the framework can run in several modes - once, scheduled manually for ad-hoc exercise, regularly on a scheduled basis and in real-time, based on some events\data triggering execution.

Whom should I contact, if I have further questions?

Please reach your SAS contacts or visit us as www.sas.com for country-specific contacts.