

# Dynamic Credit Risk Monitoring



## Mosaik's Early Warning Platform

*Credit risk refers to the potential for loss due to failure of a borrower to make a payment when it is due. The risk is mainly for the lender and it can include complete or partial loss of principal, loss of interest, and disruption of cash flow.*

*Mosaik's approach to dynamic credit scoring, through the application of data analytics and machine learning/AI models, allows the lender to better analyse the risk of their borrowers in near real-time, and apply appropriate strategies in marketing, pricing, underwriting on one end of the spectrum, and enables better decision-making in bad debt write-offs on the other.*

### Introduction to Credit Risk Management

Credit risk, in its simplest definition, is the risk arising from the potential that the principal borrower of a loan instrument will fail to meet its obligations in accordance with the agreed terms when the lender provided capital to the borrower. The goal of credit risk management, undertaken by the bank, is to maximise the lender's risk-adjusted rate of return by maintaining credit risk exposures within acceptable parameters.

From the lender's perspective, it is imperative that they need to manage the credit risk inherent in the entire portfolio as well as the risk in individual borrowers' credit. Further, in recent years, the global financial crisis – and the credit crunch that followed – put credit risk management into the regulatory spotlight. As a result, regulators began to demand more transparency - they want to know that a lender has thorough knowledge of customers and their associated credit risk.

To comply with the more stringent regulatory requirements and absorb the higher capital costs for credit risk, many lenders are overhauling their approaches to credit risk. However, in the current environment, lenders undertake assessments of a borrower's credit risk based on two primary inputs – the lender's history with the borrower and credit ratings (probability of default) that are internally assessed and bench marked, where available, against ratings provided by agencies such as S&P and Moody's.

Lenders who view this as strictly a compliance exercise are being short-sighted. Better credit risk management also presents an opportunity to greatly improve overall performance and secure a competitive advantage.

### Drawbacks to Current Approaches to Credit Risk Monitoring



**Timeliness** – In spite of the dynamic nature of global markets that impact the borrower's ability to repay debt on a continuous basis, these internal ratings are not as frequent as they should be. Typically these are undertaken annually or bi-annually. This results in the inability of the lender to be able to make credit risk decisions in real-time. Evaluating any interim changes in economic conditions places a dependency on both external and internal information (data), the timely availability of which is not systematically available.



**Disparate systems** – in today's world, there is no shortage of data available for credit risk decision-making, however the challenge faced by lenders is that the data available is not consolidated to enable efficient decisions. In order to undertake detailed analytics over the behaviour of borrowers and their accounts, lenders need to be able to assess correlations between data points available across a range of systems.

Further, one of the biggest challenges that lenders face is in understanding the relevance of the abundance of data available to them, categorising them in such a way that enables the lender to be able to generate outputs and derive insights.

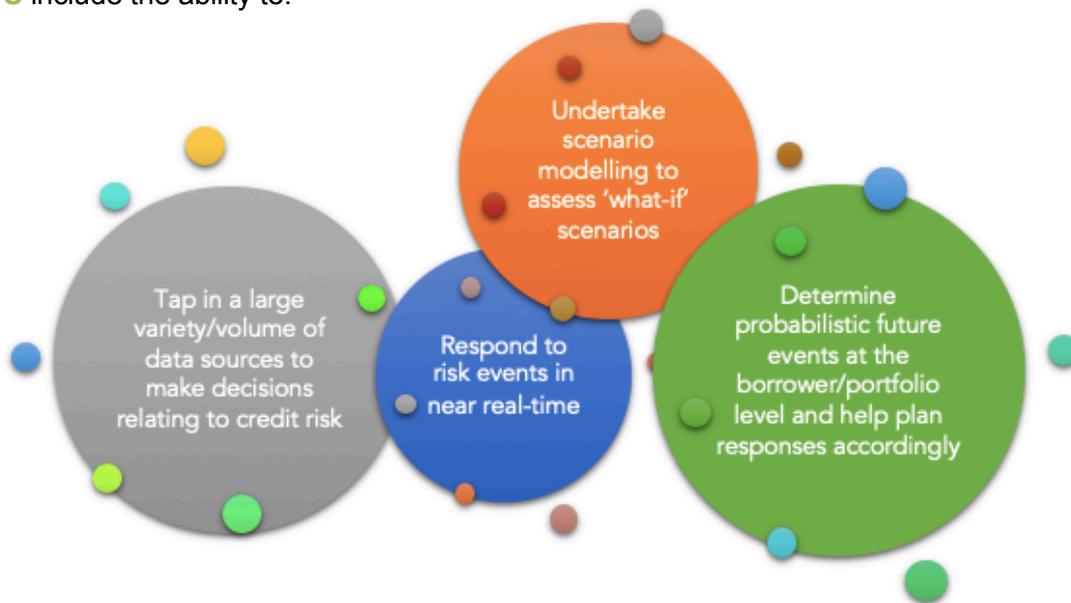


## The Mosaik ADVANTAGE

*The Mosaik Early Warning Platform (EWP) uses a combination of external, lender-provided and borrower-provided data to undertake analytics on an event-based timeframe, allowing the lender to identify, assess and respond to risk events in near real-time.*

*Further, the EWP uses models in machine learning and artificial intelligence to allow the lender to be able to determine probable future events and takes a preventive approach to managing credit risk, as opposed to the current approach that is very reactive.*

Key **BENEFITS** include the ability to:



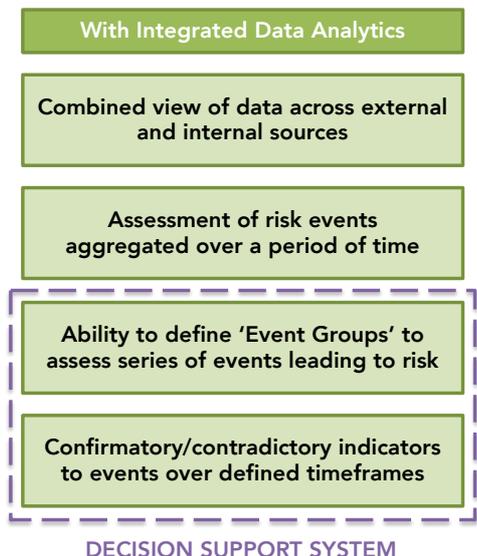
The problem (is) too much information...being inundated with conflicting versions of increasingly complex events...The glut of information (is) dulling awareness, not aiding it.

- Jerry Mander, on information overload

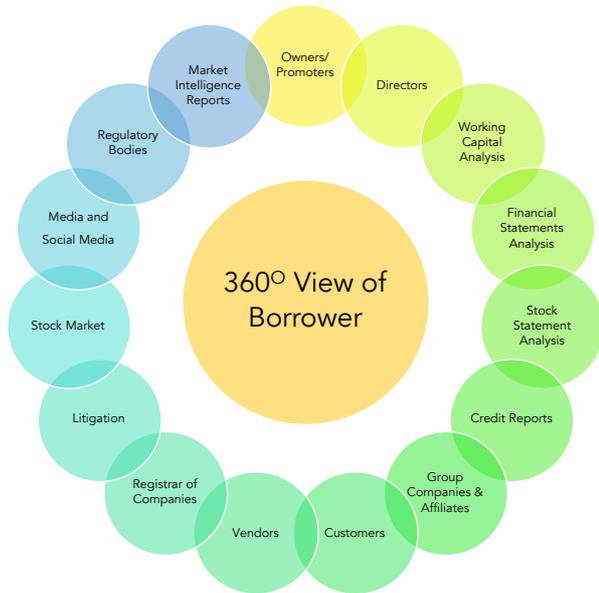
### The Role of **Data** in Credit Risk Management

In order to make credit decisions in real-time, the underlying data that drives the analytical procedures which help in generating borrower-related red flags need to be made available to the lender as relevant events occur.

One of the core benefits of the Mosaik platform is the ability to tap into a wide range of data sources (both public and non-public) in near real-time that helps in generating the required outputs. Implementing the Mosaik EWP into the lender's infrastructure allows the platform to undertake **integrated analytical procedures** (deriving insights from a combination of externally available data with the lender's transactional data), which is not available through the assessment done by traditional rating agencies.



DECISION SUPPORT SYSTEM



The Mosaik EWP taps into a wide range of data sources, both public and non-public, at regular frequencies to undertake analytical procedures.

The platform takes a 360° view of the borrower's ecosystem, including lead indicators emerging from media and transactional data, correlates these events over a period of time (the temporal view of the borrower's red flags) and integrates this with red flags in financial analysis to provide a holistic view of the borrower's risk level. In isolation, financial analytics done over the borrower's financial statements, tend to be lag indicators of risk, wherein more often than not, there are few options available at that stage for the lender to minimise risk.

## Examples of Alerts Generated from Multitude of Data Source Types

### Example 1

Transactional Data Analysis → Substantial Related Party Transaction (**High Risk** alert based on volume)

Then, look for corresponding indicators and alerts generated from other sources, as follows:

Lawsuits relating to TP at Tribunals/Commissions

New shell companies in borrower's ecosystem

Significant increase in trade transaction with new customers and vendors

Operational Risk  
in Borrower's  
Ecosystem

Increase in  
Borrower's  
Account Score

### Example 2

Litigation Events relating to Borrower → Possible Fraud relating to Procurement (**Medium Risk** alert)  
or

Allegations in News Media

Then, look for corresponding indicators and alerts generated from other sources, as follows:

Undisclosed relationships in borrower's ecosystem

Ecosystem concentration risk

Delays in timely execution of contracts/orders

Risk relating to  
Governance &  
Integrity of  
Borrower

Increase in  
Borrower's  
Account Score



## How the Mosaik EWP assesses borrowers

### Intuitive Set up of EWP at Lender

Define portfolio of entities to be monitored, and organise them into clusters based on geography, industry or inherent risks

Determine the relevance and impact of analytics required for each cluster of entities, including associated data sources and their frequencies

Select from a range of outputs for each alert, and workflows to mitigate risks arising from alerts

### Data Collation and Transformation

Public data sources  
Non-public/Lender data  
Borrower-provided data

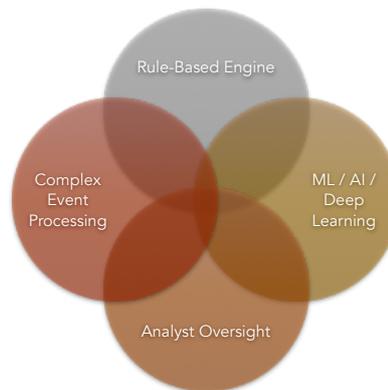


Data transformation, normalisation, followed by pre-analytics and ingestion into Mosaik's Datamart for utilisation by Mosaik's Analytics Engine

### Mosaik's Analytics Engine

Mosaik's EWP incorporates advanced proprietary and industry standard analytical algorithms to identify indicators of risk by analysing contemporaneous, temporal and time-displaced synthesis of varied type of data.

Mosaik has embedded a rule-based analytical engine with predictive analytical algorithms. Mosaik's key differentiator is its ability to interpret the occurrence of a series of red flags events that are correlated (complex events), and provide recommendations on activities to be undertaken by the lender to mitigate associated risks. Further, the analytical engine uses a series of machine learning and artificial intelligence models to assess similarities in red flags across borrowers to provide early indicators of risk events at the borrower.



### Analytical Outputs

Each alert generated by the system is categorised based on the Mosaik Risk Framework, and a risk level is assigned, based on a number of factors including the reliability and credibility of the source of alert on one hand, and the impact of the alert. These alerts are portrayed on the EWP application in the form of alerts summary dashboards, timeline view and ecosystem analytics. Further, combinations of alerts result in the risk rating of the borrower itself based on the account score methodology.

*"The most effective way of preventing frauds in loan accounts is for banks to have a robust appraisal and an effective credit monitoring mechanism during the entire life-cycle of the loan account. Any weakness that may have escaped attention at the appraisal stage can often be mitigated in case the post disbursement monitoring remains effective."*

*"The tracking of EWS in loan accounts should not be seen as an additional task but must be integrated with the credit monitoring process in the bank so that it becomes a continuous activity and also acts as a trigger for any possible credit impairment in the loan accounts, given the interplay between credit risks and fraud risks."*

**Framework for dealing with Loan Frauds – RBI Guidelines of May 7, 2015**

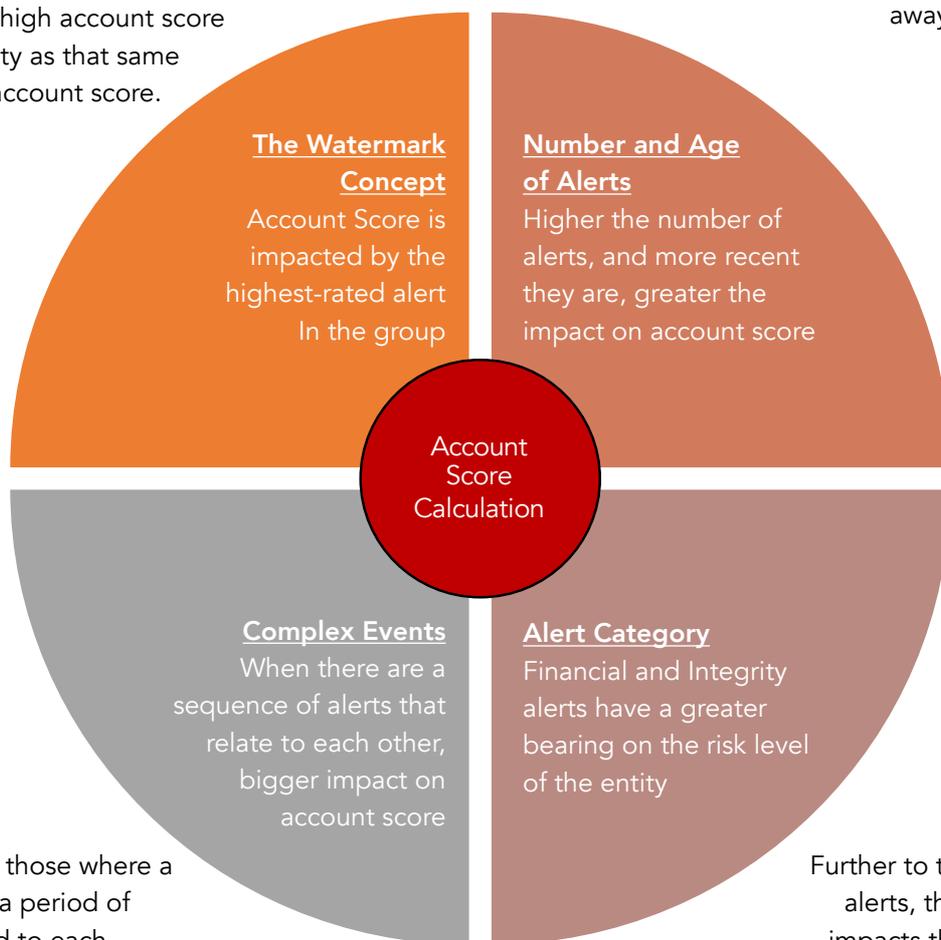


The **Mosaik Account Score** for a borrower provides an indication of the likelihood of payment delays and possibility of default of the account over a defined time horizon. It provides a risk level of the account (ranging from 0.0 to 1.0, with 1.0 being the highest risk) which is an estimate of the likelihood that a borrower will be unable to meet its debt obligations on time.

### Factors Impacting a Borrower's Account Score

Based on the Watermark Concept, the account score cannot be lower than the highest alert score. The incorporation of the highest alert score in the scale includes a dampening effect on the increase in account score in case the highest alert score is already high. This ensures that an alert score does not increase a high account score with as much intensity as that same alert does to a low account score.

For calculating the account score, each alert is normalised based on the age of the alert where the rate of decay is lower initially and accelerates once more time passes. Further, the account score will increase with each subsequent alert where the effect of more recent alerts will reduce as they occur further away from the initial event.



Complex events are those where a series of alerts over a period of time are inter-related to each other, and need to be treated as a group rather than in isolation, due to the cascading impact on the account. Alerts that belong to a complex event have higher risk associated with them, and thereby a greater weightage towards the account score.

Further to the age and number of alerts, the other key factor that impacts the account score is the category of the alert based on the Mosaik Risk Framework (see next section), where alerts relating to Financial Performance (rate of decay increases each quarter) and Governance & Integrity (rate of decay is lower than other categories such as Business Performance or Macro-Environment) have a direct impact on the risk



## Mosaik's Risk Framework

Each of the alerts generated by Mosaik's EWP is designated one of the following five categories, which are based on our assessment of areas of an entity's operations that impact their credit risk, which in turn is used to determine the probability of default (**Mosaik Account Score**) of the borrower.



Governance & Integrity

Financial Performance



Business Performance

Business Ecosystem



Macro-Environment

The EWP system allows lenders to define the list of rules (from Mosaik's rule library) that are considered to be relevant to their business, and allows for both thresholds as well as risk factors to be customised for each rule. Further, based on the numerous data points available, the business users can set up their own rules and assign them to the categories as above. Based on the execution of the rules as set up by the lender, the system provides the customised probability of default as per the thresholds and risk factors set up by the lender and determines the **Integrated Account Score** of the borrower.

Time matters most when decisions are irreversible. And yet many irreversible decisions must be made on the basis of incomplete information.

- Peter L. Bernstein (in *Against the Gods: The Remarkable Story of Risk*)

## Monitoring Red Flags in Mosaik's EWP



Collated data from a wide range of sources



is passed through the analytical engine



and assessed based on the criteria set up by the user



which generates a series of low, medium and high risk alerts



These alerts are assessed and risks are closed, mitigated or accepted



Assessment of entities in portfolio based on Account Score generated



Helps in making decisions relating to pricing strategies, marketing and disposal



IMPROVED PERFORMANCE



## About Mosaik Analytics Solutions

Mosaik is a derivative of the word Mosaic. Mosaic Theory is an analytical process that involves collecting and analysing information from a range of sources in order to determine the underlying value of a company.

Our core capabilities are built around the unspoken need for building trust in business – combining knowledge, background, skills and perspectives of a team of experienced global professionals

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Mosaik EWP is a product of Mosaik Analytics Solutions