



# DEVELOPING AN EARLY WARNING SIGNAL SOLUTION FOR LOAN PORTFOLIO COMPANIES



# INTRODUCTION



Banks in India are reeling from the overhang of bad loans on their books across both the public and private sector. After a prolonged period of stress, which saw the gross non-performing assets (GNPA) of scheduled commercial banks rising to 11.5% in March 2018, the banking sector saw the GNPA coming down marginally to 10.8% in September 2018. The banking stability indicator (BSI) worsened between September 2016 and March 2017 due to deterioration in asset quality and profitability. However, it has shown slight improvement in September 2018 due to improved asset quality even though profitability has eroded.

Irrespective of the marginal decline in the GNPA as mentioned above, the rising trend of NPA and loan related fraud in the past few years has been a matter of intense regulatory debate. Further, in addition to rising NPA, the banking sector also observed a delay in detecting and reporting such frauds to the regulators. Due to such occurrences, the banking sector has been under pressure to adopt technology driven proactive measure to tackle the menace of NPA and loan frauds.

The adoption of INDAS 109 will put further pressure on banks to very quickly adopt such proactive measures else the impairment methodology prescribed in INDAS will seriously impact the bottom-lines of most banks.

The concept presented in this paper prescribe a framework and a solution that banks can use to design and implement proactive measures aimed at improving asset quality and tackle NPA and loan frauds.

## Public vs. Private: Exposure to Bad Loans

Trends for Indian banks over the years have shown steady indications that private sector banks are in a comparatively more stable position when compared to their public-sector counterparts in terms of NPAs.

The public-sector banks in India accounted for nearly half of all bad loans. The top 10 banks, ranked by NPA, account for nearly 70 percent of all bad loans.

## Prevalence of Loan Frauds

Indian financial services sector has been hit by some high profile loan fraud cases recently. However, this is not an exception and this phenomenon has been gaining momentum at an alarming rate in the last five years, both in terms of value and volume as seen in Table A below.

**Table A**

	2012	2017	Percentage Increase
Volume of Loan Fraud <sup>1</sup>	4235	5064	19.6%
Value of Loan Fraud <sup>2</sup>	INR 9,750 Crore	INR 16,770 Crore	72%

(Source: RBI's Financial Stability report 2017)

The share of loan frauds in advances portfolio was 86 percent in 2016-2017 (in terms of value), signaling a systemic failure in managing the advances portfolio by public sector unit (PSU) banks.

<sup>1</sup> Above the cut-off of Rs 100,000

<sup>2</sup> This does not include the PNB and other recent loan frauds reported in the media

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## INTRODUCTION

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### Proactive Governance Mechanisms Put in Place by the Regulators

Over the last two decades, regulators in India have adopted several measures to curb bad loans as seen in the table below.

**Table B**

Regulatory Initiative	Details
<b>Corporate Debt Restructuring</b>	This scheme is designed for lenders to voluntarily restructure the debt of their companies where the banks accept a moratorium on interests of the portfolio and extended period for principal repayments.
<b>Strategic Debt Restructuring</b>	This scheme is used by lenders to convert their debt into equity in order to take control of the distressed companies and sell their stake to realize value.
<b>Prudential Norms on Income Recognition, Asset Classification (IRAC) and Provisioning Pertaining to Advances</b>	The objective of IRAC norms is for banks to ensure adequate levels of provisioning on assets and to have a transparent approach in classification of assets in the books and records of the lenders
<b>Scheme for Sustainable Structuring of Stressed Assets (S4A)</b>	The framework under S4A scheme is used to convert large project debt into sustainable and unsustainable components with the latter then being converted into equity to sell to a new owner.
<b>Insolvency and Bankruptcy Code (IBC) 2016</b>	The IBC outlines separate insolvency resolution processes for individuals, companies and partnership firms. The objective of the code is to resolve the cases in a timely manner within 180 days (extendable up to 270 days).
<b>RBI Guidelines on Early Warning Signals (EWS)</b>	The objective of EWS is to identify the risks associated with a potential fraudulent account at a nascent stage, which can help the lenders take preventive action on an account to be declared a fraud.

These measures, though highly commendable, have been reactive in nature with the objective of recovering bad loans or minimizing exposure. With the exception of the RBI guideline on Early Warning Signals (EWS) issued in 2016, there has been little focus on proactively monitoring loan portfolios to predict potentially delinquent accounts.

### Urgent Need to strengthen Governance Frameworks

Although there are many factors that have contributed to the NPA situation, the predominate problem has spread due to gaps in proactive governance in the Indian banking sector. The banks need to urgently adopt technology enabled monitoring mechanisms to effectively combat the prevalence of loan frauds and identify stress in their loan portfolio before its too late.

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# A&M's EARLY WARNING SIGNAL (EWS) SOLUTION

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In the wake of recent fraudulent activity identified in the banking sector and the ballooning numbers of NPAs, the regulator, RBI, was prompted to develop what is now referred to as Early Warning Signals (EWS) as it noticed a delay in the detection and reporting of these frauds. The overall objective of the EWS framework is to prevent and detect these offenses, to provide timely reporting to regulators and to initiate staff accountability proceedings thereby ensuring that the operations and risk-taking ability of the banks is not impacted.

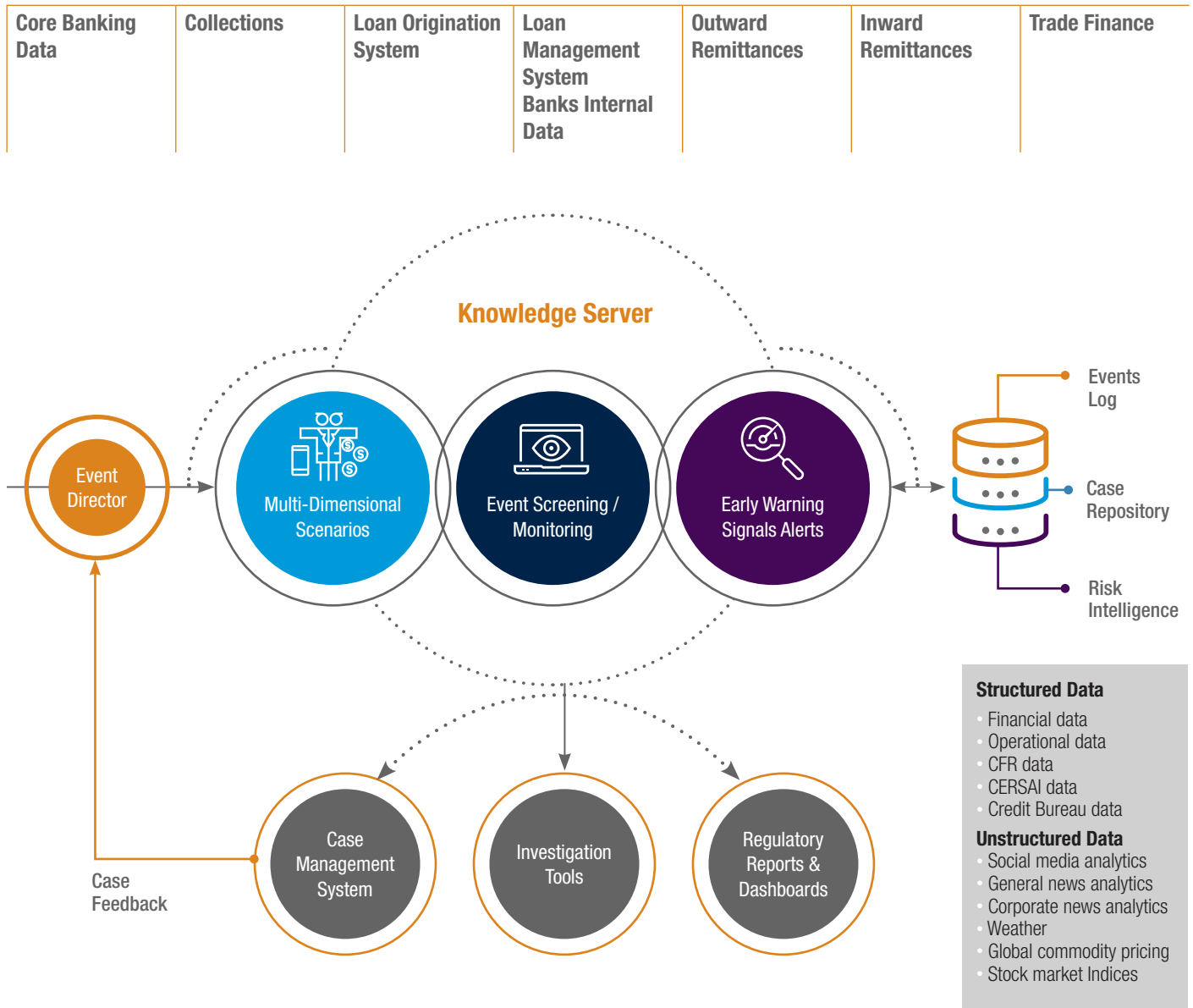


**Alvarez & Marsal (A&M) is a leading global professional services firm with more than three decades of expertise in working on stressed assets across multiple sectors.** A&M has worked extensively with large businesses in stressed situations with an objective to perform business and financial turnarounds. Drawing on our core DNA of business restructuring, A&M has designed a sophisticated EWS solution that leverages refined technology, including analytics powered by artificial intelligence (AI) and machine learning, to help banks identify potentially delinquent accounts that have a likelihood of defaulting within six to nine months. A&M's EWS solution will help financial institutions make improved and informed decisions about their loan portfolio and assist them in establishing a comprehensive framework around stressed assets. Our three-pronged solution also has built-in features that will prompt signals or triggers whenever there is a possibility of an account becoming delinquent or declared as fraud.

EWS solutions can help in early detection of potential frauds or the slippage of an account into delinquency. EWS can also help bankers perform real-time monitoring of loan accounts and identify them as Red-Flagged Accounts (RFAs) based on insights from historical fraud instances and current industry scenarios. The EWS solution must be centralized in such a way that whenever there is an occurrence or indication of fraud it will generate alerts that the credit monitoring teams can act on in a timely manner and initiate remedial actions.

# A&M's EARLY WARNING SIGNAL (EWS) SOLUTION

**Figure 1** Technical Architecture of the EWS System



An effective EWS solution can help financial institutions establish a more stringent credit monitoring program and stronger risk management controls. This can help financial institutions lower their loan-loss ratios by 10-20 percent. The key results achieved by a robust EWS framework will, include:

- Increased governance by banks due to the increased visibility around borrower state of affairs;
- Minimized likelihood of loan defaults through taking preventive measures;
- Minimized exposure at default;
- Increased profitability due to lower provisioning required; and
- Higher return on capital.

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# A&M's EWS SOLUTION

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The deployment of A&M's EWS solution consists of four phases:

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## 1 Data Integration

The first step in deploying the EWS solution is integrating multiple data sources. A&M's data source integration works with three data source categories: 1) internal data sources, 2) external data sources pertaining to the borrowers and 3) data obtained through market intelligence.

The data input into the EWS system comes from multiple quantitative and qualitative sources which could be internal or external in nature. Internal data sources include the payment history and borrower's profile of the customer. External data sources include data from market intelligence, borrower submitted data on paper, credit bureaus, rating agencies and macroeconomic factors like commodity pricing, weather, etc.

One of the biggest challenges at this stage of deployment is to digitize various kinds of non-electronic data which can then be analyzed. For example, qualitative data like market intelligence may come in the form of verbal input from sources within the company or from the market. Further, most of the borrower related data like stock reports, quarterly financial statements, etc. may be available on paper through monthly submissions. A&M is able to overcome this problem by digitizing non-electronic data at the A&M Processing Hub, creating and storing it in a data warehouse.

The A&M Processing Hub captures data through market intelligence and through financial reports submitted by borrowers. The A&M team analyzes industry trends, various media reports and macroeconomic factors. The A&M Processing Hub validates the authenticity of all the information before digitizing it and feeding it to the data warehouse. This approach differentiates us from the rest of the market because our EWS solution is comprised of strictly, well-curated information at a centralized level.

# A&M's EWS SOLUTION

**Figure 2** Key Data Sources and Variables

Financial	Banking	Operational Data	Behavioral	Macroeconomic
<ul style="list-style-type: none"> <li>• Adverse financial ratios</li> <li>• Declining cash flow</li> <li>• Poor sales and profit</li> <li>• Adverse audit reports</li> <li>• Poor working capital situation</li> <li>• Inventory pile-up</li> <li>• Receivables pile-up</li> <li>• Low interest and debt coverage ratio</li> </ul>	<ul style="list-style-type: none"> <li>• Poor payment record</li> <li>• Check bounces</li> <li>• Over exposure</li> <li>• Central Fraud Repository (CFR) data</li> <li>• CERSAI data</li> <li>• Public defaulter list</li> <li>• Frequent extension of payment dates</li> <li>• Poor credit score</li> <li>• Increase in debt</li> <li>• Transfer of loan proceeds to other banks</li> </ul>	<ul style="list-style-type: none"> <li>• Declining capacity utilization</li> <li>• Loss of customers</li> <li>• Disputes with suppliers</li> <li>• Labor unrest</li> <li>• Project delays</li> <li>• Payment delays to supplier</li> <li>• Regulatory violations</li> <li>• Competitive threats</li> <li>• Management/owner disputes</li> <li>• Obsolescence threat</li> </ul>	<ul style="list-style-type: none"> <li>• Negative media reporting</li> <li>• Negative analysts report</li> <li>• Lawsuits filed against the company</li> <li>• Past fraudulent behavior</li> <li>• Delay in payment obligations</li> <li>• Evading communications with banks</li> <li>• Pending court cases</li> </ul>	<ul style="list-style-type: none"> <li>• Poor payment record</li> <li>• Check bounces</li> <li>• Over exposure</li> <li>• Past frauds (CFR data)</li> <li>• CERSAI data</li> <li>• Public defaulter list</li> <li>• Frequent extension of payment dates</li> <li>• Poor credit score</li> <li>• Increase in debt</li> <li>• Transfer of loan proceeds to other banks</li> </ul>
<b>Source:</b>				
<ul style="list-style-type: none"> <li>• Certified borrower submission</li> <li>• Specialized data agencies</li> <li>• ROC</li> </ul>	<ul style="list-style-type: none"> <li>• Core banking system</li> <li>• Credit Bureaus</li> <li>• RBI databases (CFR, CERSAI, SEBI)</li> </ul>	<ul style="list-style-type: none"> <li>• ROC Filings</li> <li>• Industry data bases</li> <li>• Independent market intelligence gathering</li> <li>• Industry experts</li> </ul>	<ul style="list-style-type: none"> <li>• Media</li> <li>• Public databases</li> <li>• Market Intelligence</li> </ul>	<ul style="list-style-type: none"> <li>• Specialized databases</li> <li>• Industry experts</li> <li>• Commodity price indices</li> </ul>



## 2 EWS Trigger Modelling

Analyzing a single dimension of data does not reflect the complexity of the business world. For example, a perfectly healthy business may face a short-term cash crisis due to political or geographical reasons and hence miss their debt obligation. A single dimension trigger analysis based on a simple payment default could be erroneous. The picture may be very different if the trigger analysis is multi-dimensional. If the business has a healthy inventory turnover ratio and EBITDA, has a good track record of collecting receivables and has a good reputation amongst the customers and vendors, a single payment default may not result in the borrower being classified as potentially delinquent.

A critical success factor for effective EWS solution deployment is the choice of a set of triggers for the selected loan portfolio. An EWS solution that uses a standard set of triggers irrespective of the borrower profile is bound to underperform either in terms of hit rate or in terms of the timing of the trigger. With an objective to analyze multi-dimensional triggers that are customized for a portfolio, A&M's EWS solution leverages the recommendation of regulators, industry experts and draws upon its experience of turning around hundreds of ailing companies.

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## A&M's EWS SOLUTION

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The deployment of A&M's EWS solution consists of four phases (cont'd):



### 3 Risk Scoring with Predictive Analytics

At the heart of the A&M's EWS solution is our proprietary AI-powered algorithm that processes the various data variables and generates triggers.

Once the desired data is digitized and stored in a central data repository (data warehouse), A&M's proprietary advanced analytics algorithm calculates the probability of default of the selected portfolio. To estimate the role of disparate data variables in quantitative and qualitative form, they are parsed through purpose-driven AI models (neural networks for numbers and deep learning for text). These models parse the data and then estimate their individual role and contribution to a company's financial metrics and aggregate them to define the risk profile. These relationships get constantly re-weighted based on the addition of every new data point or data source.

The algorithm will work based on rules defining high risk and low risk provided by in-house A&M experts. For example, a significant inventory build-up over the last four quarters is more serious than unsubstantiated negative news. Further, cancellation of a mining license by the government for a mining business is a more severe signal than four quarters of increasing receivables.

Over time, as data and data sources increase, the AI model continues to learn from the behavior of the companies, updates data from all sources and recalculates the weights attached to different rule-based assumptions. This model can then be used to predict the levels of risk attached with different portfolio companies and be used to simulate what-if scenarios where certain variables for the future have been input.

Finally, based on the risk score, each account is assigned to a monitoring list with varying degrees of supervision intensity.



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## A&M's EWS SOLUTION

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The deployment of A&M's EWS solution consists of four phases (cont'd):



### 4 Risk Mitigation Planning

The primary reason for designing an EWS system is to minimize the Exposure at Default (EAD). This can only be achieved by way of a strong credit monitoring unit that is responsible for monitoring the account flagged by the EWS.

#### **Creation of Monitoring Watch Lists**

Depending on the risk scoring of each underlying account, A&M's EWS solution automatically profiles the account into various monitoring lists depending on the intensity of supervision effort required. These monitoring lists are determined by the degree of risk of an account and the intensity of risk mitigation action required. A&M suggest the creation of the following monitoring lists:

#### **Green List**

Accounts that are going through temporary and short-term issues. The business fundamentals are strong, and the business has the potential of bouncing back. The bank needs to simply monitor these accounts carefully and not take any drastic actions.

#### **Orange List**

Accounts that are showing sub-optimal performance, though the credit-worthiness is not impaired. The business may be facing alarming working capital stress, management disputes or other temporary issues which threaten the performance but not serious enough to cause a long-term impairment of the borrower's debt obligation. These are accounts that need to go through a restructuring process.

#### **Red List**

Accounts that have the highest probability of default due to fundamental weaknesses or challenges in the business model due to internal or external factors. These factors could be regulatory, economic or caused by management/promoter wrongdoings. These are the accounts where banks need to take immediate action like stop all funding, initiate recovery, enforce collateral, etc. to minimize the EAD.

#### **Red List – Forensic Audit**

This additional list category is appropriate when the bank may also need to initiate a forensic audit. This applies in cases where the triggers show a potential diversion of funds or other fraud.

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# EWS PERFORMANCE EVALUATION

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A&M has designed a robust performance evaluation criterion for its EWS solution. The performance of the EWS solution needs to be measured on two dimensions. Firstly, we evaluate how well the EWS trigger mechanism is working in terms of identifying accounts that may go delinquent in six to nine months' time. Secondly, we evaluate how effectively the monitoring unit is managing the trigger accounts in order to turn them around or minimize the exposure at default

**The EWS trigger mechanism can be evaluated based on three related metrics:**



1

**Trigger Rate** – This is the ratio of the total number of accounts that have been flagged as potentially delinquent out of the total accounts in the portfolio. If the EWS system has flagged 20 accounts out of 100, the trigger rate is 20 percent. It must be noted that all triggered accounts go through an A&M validation process to ensure that there are no false triggers or other false positives.



2

**Hit Rate** – This is the actual number of accounts that qualify as potentially delinquent (true hits) based on A&M analysis of the triggered account. Out of the 20 triggered accounts identified above, if A&M approves 15 accounts, the hit rate will be 15 percent.



3

**Time Interval** – This is the interval between the time of the EWS trigger and the time of default.

The effectiveness of the monitoring efforts also needs to be measured in terms of how many triggered accounts have been taken out of the EWS system, as well as how much reduction in exposure has been achieved for defaulted accounts.

Some metrics that aid in measuring the effectiveness of the monitoring mechanism include:

- **Turn-Around Rate** – This is the number of true hits that have been turned around and taken out of the EWS.
- **Default Rate** – This is the number of true hits that go into default.
- **Exposure Reduction** – This represents the value of reduced exposure from the date of an account became a true hit.

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# CONCLUSION

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## Key Success Factor for an Effective EWS System

There are various aspects in an EWS system that need to come together in order for the solution to work effectively. In A&M's view, the people involved, and their skills are the most critical success factors.

Although EWS systems are extremely valuable as innovative tools for banks looking to make better decisions about their loan portfolios, the following actions are also required in order to achieve success:



- Establish collaboration between banking, technology and industry or functional experts;



- Maintain depth and accuracy of data through a stringent data selection process and pre-integration data corroboration procedures;



- Design the risk scenarios and customize based on borrower profile;



- Review the alerts and eliminate the false alerts by leveraging functional expertise; and



- Enact last mile resolutions of flagged accounts to resolve the fraud and credit risk in a transparent and auditable manner.



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**ABOUT ALVAREZ & MARSAL**

Companies, investors and government entities around the world turn to Alvarez & Marsal (A&M) when conventional approaches are not enough to make change and achieve results. Privately held since its founding in 1983, A&M is a leading global professional services firm that provides advisory, business performance improvement and turnaround management services.

With over 3,500 people across four continents, we deliver tangible results for corporates, boards, private equity firms, law firms and government agencies facing complex challenges. Our senior leaders, and their teams, help organizations transform operations, catapult growth and accelerate results through decisive action. Comprised of experienced operators, world-class consultants, former regulators and industry authorities, A&M leverages its restructuring heritage to turn change into a strategic business asset, manage risk and unlock value at every stage of growth.

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