Agenda

Nelson Almeida – CreditLens™

Jamie Stark – Alternative Data in Credit Scoring and Decisioning
Pain Points Cited by Banks in Lending

- Manual data entry: duplication of data entry and errors
- Inability to auto-import financial data directly from 3rd party sources
- Lack of sufficient data on borrowers/low quality data
- Slow availability of borrower data
- Manual and excel-based calculations for spreading, scoring or pricing
- Lack of a scoring model that reflects the business factors
- Lack of dual risk-ratings
- Inability to benchmark against industry peers
- Lack of automated credit approval process
- Inability to accurately assess exposures
- Lack of pricing model
- Manual data entry of information in credit presentation template
- Inability to store and archive documents
- Inability to track and produce documents for legal and compliance purposes
- Inability to automatically generate letters and notifications to customers
- Lack of early warning signs for covenant breaches and defaults
- Lack of a risk and reporting dashboard

- Lack of an automated business rules engine with integrated workflow functionality
The Challenges with Legacy Systems and Processes

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Impact</th>
<th>Bottom Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual and Paper Based Processes</td>
<td>Slow “Time to Decision” and “Time to Cash”</td>
<td>Competitive Disadvantage</td>
</tr>
<tr>
<td>Limited Coordination of Resources</td>
<td>No Single and Consistent Source of Truth</td>
<td>Inability to Respond to Regulatory Requirements</td>
</tr>
<tr>
<td>Inconsistent Credit Underwriting Processes</td>
<td>Poor Data Integrity</td>
<td>Timely and Accurately</td>
</tr>
<tr>
<td>Duplicate Data Entry</td>
<td>Sub-Optimal Risk and Performance Assessment</td>
<td>Unintended Risk Concentrations</td>
</tr>
<tr>
<td>Aging Systems Architecture</td>
<td>Rear View Mirror Approach</td>
<td></td>
</tr>
<tr>
<td>Lack of Integration with Risk Appetite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disparate Sources of Risk Data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delayed Covenant Tracking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incomplete Portfolio Management Reports</td>
<td></td>
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</tr>
</tbody>
</table>
“Say... What’s a mountain goat doing way up here in a cloud bank?”
The Future of Business Lending

Information Gathering
- Customer information is auto-populated from external data sources
- Pre-screening and peer benchmarking information is instantly available
- Tasks and timelines are assigned automatically

Credit Assessment
- Credit model and analysis requirements are automatically selected by borrower profile and needs
- Most credit decisions are automated, with option for manual review
- Spreads, where needed, are automated

Credit Presentation & Loan Structuring
- Where appropriate, credit presentation template is automatically selected
- Financial information, third party reports, and other details are automatically populated in the credit presentation
- Pricing is recommended based on factors

Data collection is automated, streamlined, and consistently applied
- Workflow updates automatically based on completed tasks
- Notifications are provided when tasks are due and past due
- Time-in-process is tracked and analyzed to drive efficiency

Monitoring & Portfolio Management
- Data is centralized and accessible for business intelligence reporting
- Personalized dashboards enable real-time tracking of risk, portfolio, process metrics
- Peer and industry data feeds to dashboards for benchmarking

Servicing & Collections
- Customer credit quality and scores are tracked electronically based on data feeds
- Customers receive automatic notifications when items are due
- Credits for review are identified based on score or behavior change triggers

Decisioning & Documentation
- Streamlined approval, focus on outliers
- Required documentation is captured electronically in the process
- A loan is packaged and sent electronically to the customer for e-signature
- Signed documentation is stored and archived
2 Meeting the Challenge
The CreditLens™ Vision

- A frictionless environment
- Consistent control of risk
- Seamless automation & integration
- Leverage new technology
Example: Illustrated Financial Spreading Savings*

80% Time Reduction

7,500 Hours saved p.a.

225k-375k Equivalent cost saving

*Based on 50 weeks, 25 RM’s each taking 2.5 hours to re-enter 5 years of financial statements in support of c3 reviews per week. Costs based on $30-50 per hour. Time per case drops from 2.5 hrs to 0.5 hrs.
Golden Source of Risk Data

Maintain a single, auditable golden source repository of credit and risk-related data with workflow enablement to apply simple business rules, such as automated rating model selection and mandatory data capture.
With Deeper Insight and Control of the Entire Relationship

Entity Management

» Dedicated entity management module provides core building block

» Construct relationship structures pivotal to accurate risk assessment

» Tune and validate data capture in accordance with entity type – improving data strength and quality

» Control and distribute risk grades within a relationship

Provides a consistent and complete view for risk assessment
Analytics

Powerful financial analysis and risk grading developed over 30 years

» Probability of Default and Loss Given Default measures

» Industry standard and custom ratio analysis

» Multiple accounting templates available to support regional and industry specific accounting standards

» Integration with our +35 industry and regional specific market leading RiskCalc models, which leverage the largest global database of private company financial information

» Integration with internal, regulator approved models, or statistical platforms such as ‘R’.
Deal Structuring Screens

### Facilities

#### Product Summary

<table>
<thead>
<tr>
<th>Entity</th>
<th>Currency</th>
<th>Rating</th>
<th>Total Aggregated Limit</th>
<th>Total Utilization</th>
<th>Utilization Level</th>
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<tr>
<td>Logistics International Ltd</td>
<td>GBP British Pound</td>
<td>-</td>
<td>5,000,000.00</td>
<td>4,000,000.00</td>
<td>80.00%</td>
</tr>
<tr>
<td>Proposed Position</td>
<td></td>
<td>-</td>
<td>5,000,000.00</td>
<td>4,000,000.00</td>
<td>80.00%</td>
</tr>
<tr>
<td>Approved Position</td>
<td></td>
<td>-</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00%</td>
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<tr>
<td>Variation</td>
<td></td>
<td></td>
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#### Collateral

<table>
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<tr>
<th>Collateral ID</th>
<th>Collateral Type</th>
<th>Collateral Name</th>
<th>Valuation</th>
<th>Market Value</th>
<th>Discounted Value</th>
<th>Approved Discounted</th>
<th>Variation</th>
<th>Approval</th>
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<td>2</td>
<td>General Charge</td>
<td>Fixed and floating debt</td>
<td>GBP British Pound</td>
<td>25,000,000.00</td>
<td>5,000,000.00</td>
<td>5,000,000.00</td>
<td>0.00</td>
<td></td>
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#### Guarantees

<table>
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<tr>
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<th></th>
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<tr>
<td>2</td>
<td>Corporate Guarantee</td>
<td>GBP British Pound</td>
<td>0.00</td>
<td>0.00</td>
<td>No</td>
<td></td>
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</table>
Flexible Routing Patterns – to meet most business needs

Resolve scenarios of different complexity

» Highly predictable and repeatable business scenarios
  – Relatively small scale customer
  – Limited number of business departments
  – Repeatable business activities

» Unpredictable and unrepeatable business scenarios
  – Large scale customer
  – A number of business departments
  – Complex business activities without a standardized pattern

» Hybrid business scenarios
Credit Presentation and Memo
Capturing the data and presenting in the Bank’s format

Credit Presentation & Credit Memo

Credit Presentation Module

Credit Memo (Output)

Credit Memo Configuration

Credit Presentation Configuration
Credit Presentation and Memo

Consolidate and inform

The analysis of this company uses the 2017 data for all of the companies in the industry code 335122, Commercial, industrial, and institutional electric lighting fixture manufacturing, for comparative purposes. The peer group consists of 94 companies.

Please note that comparing the borrower's interim financial figures to annual industry figures would result in inaccurate assessments. To avoid this inconsistency, all financial ratios that are based on a combination of balance sheet and income statement items are annualized. This could produce misleading results for borrowers with high seasonality in their sales cycle. Please be aware of this potential problem as you analyze this case.

OPERATING PERFORMANCE

NET SALES GROWTH: Net Sales increased moderately, changing by 4.99%. Net Sales were 4,362 in the 6-month period ending 6/30/2017, compared to 8,309 for the 12-month period ending 12/31/2016. The two-year average Net Sales Growth was 2.37%.

PROFITABILITY

GROSS MARGIN: The Gross Margin percentage increased moderately from 12/31/2016 to 6/30/2017. Gross Profit was 1,343 for the 6-month period ending 6/30/2017, resulting in a Gross Margin percentage of 30.79%. In the 12-month period ending 12/31/2016, Gross Profit was 2,496, resulting in a Gross Margin percentage of 30.04%.

The Gross Margin percentage was below the industry average of 41.1%.

OPERATING EXPENSES: The Operating Expenses to Net Sales percentage increased moderately to 26.18% in the 6-month period ending 6/30/2017 compared to 24.85% in the 12-month period ending 12/31/2016.

This percentage is better than the industry average of 35.0%.

For analysis, consider these questions and issues:

Control of overhead appears to be slipping as the Operating Expenses to Net Sales percentage increased moderately. In spite of the deterioration, this ratio compares favorably with the industry average. You should determine the reasons for the increase in operating expenses and the likelihood that the increase will continue. Consider the ability of management to maintain this ratio in the face of rising costs or a declining sales level.

OPERATING PROFIT MARGIN: The Operating Profit Margin decreased moderately from the 12-month period ending 12/31/2016 to the 6-month period ending 6/30/2017, decreasing by 0.58 percentage points. Operating Profit was 201 in the 6-month period ending 6/30/2017, resulting in an Operating Profit Margin of 4.61%. In 12/31/2016 the Operating Profit was 431 resulting in an Operating Profit Margin of 5.19%.

The Operating Profit Margin was below the industry average of 6.1%.
CreditLens Covenants Meets the Markets Needs

» Automate compliance checking
» Monitor early-warning indicators
» Improve credit origination practices

Integrated Data Source

Covenant Compliance & Portfolio Monitoring

Automated Tracking & Testing
Auto calculate ratios and monitor borrower against risk metrics

Business Insights & Report
Generate portfolio report and visualize analysis

Document Management
CreditLens cloud-based repository | integration with bank’s repository

Notification & Email
Outbound email notification to borrower & internal notification to stakeholders
Covenants Overview

Top Borrowers with Deferred Covenants

Top Borrowers with Waived Covenants

All Borrowers with Covenants

Borrower | Late Compliance Items | Covenant Type | Sub Type | Credit Officer | Days Past Due | Total Exposure |
---------|----------------------|---------------|----------|----------------|---------------|---------------|
Kitchen Store | Financial statement | Financial | Leverage | Megan Bridwell | 29 | 14,066,988 |
Wayne Enterprises | | Financial | Profitability | Barry Johnson | 28 | 13,802,988 |
Pacific Corporation | Compliance certificate | Financial | Leverage | Barry Johnson | 15 | 4,486,997 |
American Gourmet Products | Compliance certificate | Non-Financial | Documentation | Megan Bridwell | 14 | 11,920,965 |
Portico Productions | Compliance certificate | Financial | Leverage | Megan Bridwell | 12 | 133,356,81 |
HK Asset Management | Financial statement | Financial | Leverage | Elizabeth Harper | 12 | 76,776,444 |
Pacific Corporation | Compliance certificate | Financial | Liquidity Ratio | Barry Johnson | 8 | 44,866,978 |
Tracking & Testing

An overall view of statuses of all active covenants
Business Insights

Visualize data with integrated and intuitive dashboards for different users from credit analysts to executive management and auditors, providing business intelligence across your team and the entire organization.
Deployment Options

Three approaches:

**On Premise**
- CreditLens is installed on client site, as RiskAnalyst is currently

**Private Cloud**
- CreditLens is hosted by Moody’s infrastructure

**Public Cloud**
- CreditLens is hosted on a 3\textsuperscript{rd} party site
  - E.g. Amazon AWS
  - Datacenter in EU and or UK
Model Authoring Platform
CreditLens Model Authoring Platform (MAP)

Rating Model

Model Inputs

Model Outputs

# Repayment History
score2 <- model.inputs$RepasMe
weight2 <-
    weight.mapping[weight.mapping$Attribute == "RepasMe", 2]
return.data <-
    appendFactor("RepasMe",
                model.inputs$RepasMe,
                weight2,
                score2)
CreditLens Reduces Cost of Ownership

Cloud Deployment
- SaaS, Private and Commercial Cloud options

Modular Licensing
- Modular not Monolithic

Powerful Configuration
- Configuration not Customization

Efficient Upgrades
- Frictionless Standard Product Upgrades

Open Architecture
- Data Automation & Integration

CreditLens architecture puts the customer back in control
Benefits to Risk Management

**Regulatory Compliance**
*Enforce high standards of compliance* in data governance, credit assessment and risk management

**Process Efficiency**
Increased collaboration, cleaner data, improved communication and automated tools *reduce the ‘time to decision’ and increase productivity*

**Consistency & Control**
Consistent capture of financials, approvals and overrides underpin system integrity and *helps simplify oversight and internal policy adherence.*

**Business Insight**
Sharper, focused and comprehensive data reports driving *better business decisions* and allowing concentration on *pro-active risk assessment and monitoring.*

**Operational Risk**
Eliminate manual process and financial statement re-entry and duplication *reducing manual effort and increasing the accuracy of data.*

**Provisions & Losses**
Increasing understanding of credit risk and early detection of warning signals through enhanced monitoring. Reduce probability of losses via more robust risk management
Benefitting the Bottom Line

Revenue & Growth
Generate additional capacity to write more loans by reducing processing time and increasing collaboration amongst the deal team.

Profit
Better data governance, accurate risk assessment and increased transparency equals higher quality loans and improved pricing for risk.

Customer Satisfaction
Fewer information requests, faster turnaround times and increased quality time with Relationship Managers. Interact digitally at a client convenient time.

Technology/Cyber
Trust your critical business operations to advanced, reliable and proven technological architecture and IT.

Culture
Transition to a more modern business environment utilizing the latest technology. Enables further positive cultural advancement in the organization.

Credit Risk
A modern way to originate, assess and manage credit leading to better risk management and compliance.
3 Looking Forward
Moody’s Analytics Spreading Solution
A comprehensive set of data, tools and services

- **BvD Orbis**
  - Financials for public and private companies

- **MARQ**
  - Data extraction from customers’ general ledger

- **Tax Reader**
  - Automated data extraction from tax forms

- **ML Spreading**
  - Automated spreading of PDF documents

- **MAKS**
  - Dedicated teams of spreading analysts
Bureau van Dijk

MOODY'S CORPORATION
NEW YORK, United States of America

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BvD ID n° US133998945

WORLD TRADE CENTER 7, 250, GREENWICH STREET
NEW YORK, NY 10007
United States of America

+1 212 553 0300
www.moodys.com

Previous name: DUN & BRADSTREET CORPORATION (THE) (OLD) until 30/09/2000

Activity: Corp
Date of incorporation: 02/01/1920
Main stock exchange: New

Turnover for 2017
$ 4.20 bn 16.6%
Net income for 2017
$ 1.00 bn 275%

Ownership
99 shareholders

PEPs and sanctions
There are names that are the same or similar to a risk

Graph - Ownership structure

MOODY'S HOLDINGS
GB
100.00/100.00
MOODY'S ANALYTICS UK... GB NG/n.a.
CREDIT DATA RESEARCH
GB 85.00/n.a.
Gather loan application data digitally and automate spreading.

**MARQ™** online loan application
Instantaneous account linking

**MARQ™** portal
Secure relationship management

**CreditLens™ / Lending Cloud**
Automated spreading & scoring

BORROWER tools

BORROWER-LENDER interface

LENDER tools

MOODY'S ANALYTICS
Spreading Automation

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### Balance Sheets
**December 31, 2004 and 2003**

#### Assets

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current assets:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>$12,597</td>
<td>$8,173</td>
</tr>
<tr>
<td>Short-term investments</td>
<td>$5,003</td>
<td>$3,517</td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>$2,315</td>
<td>$3,750</td>
</tr>
<tr>
<td>Prepaid Rent</td>
<td>$3,000</td>
<td>$3,000</td>
</tr>
<tr>
<td><strong>Total current assets</strong></td>
<td><strong>22,915</strong></td>
<td><strong>18,440</strong></td>
</tr>
<tr>
<td><strong>Property, plant and equipment:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land and building</td>
<td>$65,553</td>
<td>$28,369</td>
</tr>
<tr>
<td>Machinery and equipment</td>
<td>$5,000</td>
<td>$3,511</td>
</tr>
<tr>
<td>Less accumulated depreciation</td>
<td>$70,553</td>
<td>$31,880</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td><strong>$89,329</strong></td>
<td><strong>$50,797</strong></td>
</tr>
</tbody>
</table>

#### Liabilities

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current liabilities:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note payable</td>
<td>$4,200</td>
<td>$4,752</td>
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<tr>
<td>Accounts payable</td>
<td>$375</td>
<td>$15</td>
</tr>
<tr>
<td>Accrued wages</td>
<td>$1,579</td>
<td>$1,149</td>
</tr>
<tr>
<td>Taxes payable</td>
<td>$5,386</td>
<td>$4,722</td>
</tr>
<tr>
<td><strong>Total current liabilities</strong></td>
<td><strong>11,540</strong></td>
<td><strong>10,638</strong></td>
</tr>
<tr>
<td><strong>Long-term debt</strong></td>
<td>$50,000</td>
<td>$20,000</td>
</tr>
<tr>
<td><strong>Owner’s Equity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total owners’ equity</strong></td>
<td>$27,789</td>
<td>$20,159</td>
</tr>
<tr>
<td><strong>Total liabilities and owners’ equity</strong></td>
<td><strong>$89,329</strong></td>
<td><strong>$50,797</strong></td>
</tr>
</tbody>
</table>

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File system

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PDF, scanned docs

Table Identification
Moody’s Analytics Spreading Solution
A comprehensive set of data, tools and services

BvD Orbis
Financials for public and private companies

MARQ
Data extraction from customers’ general ledger

Tax Reader
Automated data extraction from tax forms

ML spreading
Automated spreading of PDF documents

MAKS
Dedicated teams of spreading analysts
Alternative Data in Credit Scoring
Motivation

Role of Alternative Data in Credit Scoring and Decisioning
Introduction

Understand credit relevance embedded in text

- Text based information
- Credit relevance model
- Credit relevance score

Company Research
Highlight relevant news and reviews

Early Warning Indicator
Scan feeds to detect increased risk

Improve Models
Improve traditional credit risk models
Method
Train model on historic text sources

- Credit relevance model
- Cutting edge AI research
- World leading Credit Risk expertise, historic data and models
- Text Mining & Machine Learning techniques
- Large collection of machine readable text
Disclaimer

I didn't have anything useful to say so I made this pie chart.

Oooh!

Oooh!

It must be true because it's pie.

That worked too well.

I pledge my life and my fortune to the pie!
Dear Lucy
The duties of a secretary vs. a Girl Friday or Stern Page 16

BP Russia chief in corporate tax probe

Panglossian approach
Private equity's cheap debt addiction JOHN GAPPER Page 15

Suits you Sir Stuart
Third BAE man is targeted by US officials
Patriot National Chapter 11 Petition, Plan Filed

- Patriot National (a/k/a Old Guard Risk Services) and 18 affiliated Debtors filed for Chapter 11 protection with the U. S. Bankruptcy Court in the District of Delaware, lead case number 18-10189.
Patriot National, Inc. Alert: Miscellaneous

- On Nov. 28, 2017, Patriot National Inc. entered into a restructuring support agreement with the lenders, including Cerberus Business Finance LLC and TCW Asset Management Co.
Robbins Arroyo LLP: Patriot National, Inc. (PN) Misled Shareholders According to a Recently Filed Lawsuit

- Shareholder rights law firm Robbins Arroyo LLP announces that a lawsuit was filed against current and former members of the board of directors of Patriot National, Inc. (NYSE: PN) in the U. S. District Court for the Southern District of New York.
6 Social Media
great customer services with professionals and amazing people, more than 62 nation ship and work together.

best trip of my life!!! went on the 3 day majesty of the sea cruise from feb 13th-16th and it was the most magical experience ever! best service, most awesome people. royal caribbean is the pinnacle of cruising. will most def be back. thanks for some amazing memories! -

this company is run by arrogant liars. they left my family stranded 6000 miles from home when their travel office failed to make our flight reservations. they emailed us confirmation of our tickets but no tickets had been purchased. after paying an additional $10,000 at the airport in europe in order to get home, the president office at royal caribbean refused to refund what we had paid them for the tickets they never bought. they are crooks.

do not ever book with royal caribbean!!!!! run away now!! this will save you a lot of grief!!! one good thing that happened is the food was so bad that i lost 10 pounds on the cruise!! you have been warned!! the ship is the navigator of the sea that we were on... we will never use them again!! or their sister lines!!! really sad rc used to be a class act... no more...
Improve Default Prediction

Preliminary research yields promising results

52% Performance* of RiskCalc

60% Performance of RiskCalc + Sentiment Scoring Model

* Accuracy ratio calculated on matched sample of firms with both Social Media Reviews and RiskCalc EDFs containing 6588 observations with 41 defaults.
What’s next?
And Finally
Introducing the Data Alliance
Share Data, Gain Insight, Take Action

https://dataalliance.moodysanalytics.com/

A collaborative effort providing high quality credit risk insights for portfolio-level benchmarking and data augmentation
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