# Amarcord Incorporated: Combating Money-laundering Using Data Analytics

## The Amarcord Incorporated Case

According to the Department of Justice, money laundering is the process by which criminals knowingly conceal or disguise the proceeds of their crimes or convert those proceeds into goods and services. Some illegal sources of income are drug trafficking, illegal gambling, arms trafficking, and bribery. The Bank Secrecy Act (also known as the Anti-money Laundering Law or AML) passed by U.S. Congress in 1970, together with the USA PATRIOT Act of 2001, tightened the regulation of banks regarding money laundering. In particular, those laws require banks to have effective fraud detection platforms in place to identify and flag potential money launderers. When the latter are identified, banks are required to file a Suspicious Activity Report (SAR) to the Financial Crimes Enforcement Network (FINCEN) for each transaction signifying a potential money laundering behavior. One of the many responsibilities of the Office of the Controller of the Currency (OCC), an independent bureau within the U.S. Department of Treasury, is to provide oversight ensuring that the AML regulations are closely followed by banks and financial institutions. The OCC regularly examines banks to ensure that they are well prepared to combat money laundering. Amid growing concerns regarding the preparedness of a number of banks to effectively combat money-laundering, the OCC is planning a thorough examination of Amarcord Incorporated, a bank in the southern U.S.

Amarcord is a $40 billion asset regional bank holding company headquartered in New Orleans, Louisiana. The Bank was founded in 1951 under the name Amarcord Trust Company on the outskirts of Baton Rouge, Louisiana, before moving to its current headquarters. At its inception, the Bank mainly provided commercial banking services and served the greater Baton Rouge area. Within a decade, the Bank extended its operations and started serving small business in the state of Louisiana. Currently, Amarcord provides consumer banking services, mortgage banking services, equipment leasing, wealth and investment management services,

trust services, and brokerage services, as well as other financial products and services. Through well-established relationships with automotive companies, Amarcord also offers commercial banking services to auto dealerships. The primary market for the Bank is Amarcord's four-state retail banking franchise, including Louisiana, Texas, Arkansas, and Mississippi. The services are distributed through conventional channels consisting of over 250 branches located in various business centers as well as through alternative distribution channels such as internet, mobile, telephone, and more than 900 ATMs.

The AML Chief Compliance Officer (CCO) Leonard Peterson of Amarcord is well aware of recent money laundering scandals involving banks such as BNP Paribas, HSBC, and Barclays.

**BNP PARIBAS**

- In June, 2014, France's BNP Paribas pleaded guilty to concealing billions of dollars in transactions for clients in Sudan, Iran and Cuba in violation of U.S. sanctions and agreed to pay $8.9 billion in fines, according to the Justice Department (Source: Washington Post)

**HSBC**

- In July, 2013, HSBC Holdings Plc agreed to pay $1.92 billion in fines to U.S. authorities for allowing itself to be used to launder a river of drug money flowing out of Mexico and other banking lapses (Source: Reuters)

**BARCLAYS**

- In August, 2010, Barclays Bank has agreed to forfeit $298 million for violating U.S. financial sanctions against Cuba, Iran, Libya, Sudan, and Burma for more than a decade by knowingly aiding banks in those countries with $500 million in transactions with U.S. entities from 1995 to 2006 (Source: Washington Post)

Mr. Peterson is aware that Amarcord does not transact with the entities listed in the Financial Action Task Force (FATF) blacklist, namely the terrorist organizations and countries that are not cooperative in the global fight against money laundering and terrorist financing. In addition, he is confident in the Bank's proprietary software that meticulously monitors transactions coming from Cash Intensive Businesses (CIBs) such as casinos and restaurants as well as from Money Service Businesses (MSBs) such as currency exchanges and money transmitters. Nonetheless, Mr. Peterson is worried that certain money laundering activities may go unnoticed if Amarcord's suspicious activity monitoring and detection platform does not undergo material enhancements in the area of predictive analytics. Judging from the media news release at the end of the last fiscal quarter, competing banks in the region are undertaking significant investments in the area of data analytics and predictive modeling. Failing to adopt a fully operational data analytics platform would imply falling behind in the competitive landscape of regional banking in addition to risking the Bank's reputation and compliance.

Mr. Peterson has been particularly keen on tracking Bank's customers' spending habits over time and building profiles for each and every customer. According to Mr. Peterson, the majority of bank customers have predictable transacting habits and it is the sole responsibility of the Bank to uncover those transacting patterns by diligently and accurately mining the data that is being automatically collected and fed into Amarcord's repositories round the clock. In fact, money launderers often use bank accounts of legitimate-looking businesses to circulate the corrupted money through the financial system, thus suddenly injecting huge amounts of cash into those accounts. Consequently, for instance, knowing the typical transacting behavior of a business account would be crucial, since if all of a sudden that account is being used for money laundering through a deposit of a suspicious check with a large amount, the typical transacting behavior of that account will serve as a benchmark to measure the latest transaction against. Of course, flagging customers, according to Mr. Peterson, would not necessarily imply true money-laundering behavior but would certainly raise the Bank's awareness regarding monitoring the "flagged" customers' transaction activity more closely in the future.

For a long time Mr. Peterson's vision of such a detection platform was politely welcomed by the upper management at the Bank, the only obstacle being that the Bank did not have the appropriate staff to commit to such a major undertaking. But towards the end of the last fiscal quarter, Mr. Peterson – together with the Chief Information Officer (CIO), Mr. Ricardo Martinez – finally managed to convince upper management that the scope and urgency of the proposed solution necessitated the bank to contract out the work.

## Assignment Details

You and your team submitted a proposal for a pilot-study with Amarcord and have recently been notified that you are being awarded the contract. Your team's task on this urgent assignment is to design and propose a data-driven approach that will effectively accomplish Mr. Peterson's vision. To arrive at the procedure, you are provided data, culled from Amarcord's repositories, on monthly aggregate incoming wire transfer amounts into the bank account of one of its customers, a U.S. chain of stores selling swimwear. Based on business knowledge related to swimwear retail, the management of Amarcord finds it extremely unlikely that a swimwear chain of that size will have an aggregate monthly incoming wire transfer amount exceeding $500,000.

Your client company is looking for two things: a presentation/pitch to management explaining the data-driven approach that you will come up with for flagging bank accounts based on suspicious incoming wire transfers, and a written deliverable report detailing your approach. The deadlines for both the presentation and the report will be announced by the instructor at the project kick-off. During the final presentation, the management of your client company expects that your engagement team will:

- Present the business problem and emphasize the necessity for a data analytic solution;

- Clearly explain your team's data-analytic approach to tackle the business problem that your client is facing;

- Explain the nature and structure of the received data, and how data inconsistencies and issues were resolved by your team;

- Apply the data-analytic approach that your team designed using the data that were received and "cleaned" by your team. The team also needs to elaborate on all the undertaken modeling and forecasting approaches by clearly comparing and contrasting them;

- Emphasize and summarize the key findings as well as observations, and recommend further steps that your client should undertake in the data-analytics realm, which could potentially lead to another engagement with your consulting team;

- Fit the presentation within the allocated timeframe;

- Deliver the presentation in a way that is well-organized and accessible to both technical and non-technical audiences; and

- Provide clear and thorough answers to all the questions asked by the audience.

Note that each presenter will have anywhere from 3 to 5 minutes for his/her pitch except for the first presenter, who will both open up the presentation for 3-5 minutes and conclude it for another 3-5 minutes.

The management expects that in the written deliverable report your engagement team will:

- Discuss the business problem and the data-analytic approach undertaken by your team for solving it;

- Explain in detail how each data inconsistency/issue (outlier, missing value, duplicates, etc.) was resolved prior to the analysis;

- Carefully apply the data-driven approach that your team designed to the data that you received and "cleaned." Employ the necessary technical sophistication and depth, including but not limited to accurate residual diagnostics, model fitting summaries, and model validation; and

- Clearly lay out all the assumptions behind both the data-analytic approach and the time series models that were used.

Note that there is no set page limit for the written deliverable report. The report should be typed in Times New Roman 12-size font using 1-inch margins on both sides of each page. In addition, page numbers and double spacing are required throughout the entire document. All figures and tables should have clear captions and legends, and should be appropriately

referenced within the text. In addition, figures must have clearly labeled axes. The report should be spell-checked and follow the proper rules of grammar.

You have a unique opportunity to enhance the business intelligence of Amarcord Incorporated and help the Bank combat money laundering more effectively. Good luck on your important mission.

## Logistics and Organization

The engagement team will be formed by the instructor prior to the engagement kick-off. The team will consist of either 5 or 6 members. Throughout the entire project, the team members are expected to collaborate. Rather than solely focusing on individual tasks, each student is expected to take full ownership of the engagement and add her/his contribution in all stages of the work. Collaboration is in the best interest of each student, in light of the fact that each team member gets the same grade for the written deliverable report. At the completion of the engagement, students will be required to submit a peer-evaluation assessing the collaborative skills and effectiveness of their team members.

The instructor will serve as the "client" for the engagement. As such, the instructor will promptly address any questions, which should be addressed by email or in person during scheduled status updates or extra appointments scheduled by the team. Note that students are expected to have meaningful questions regarding the data inconsistencies (outliers, missing data, etc.) during the first scheduled status update meeting, at the latest. It should be emphasized that a number of subtleties regarding the data are left out from the caselet and are instead supposed to be brought to light as a result of thoughtful and relevant questions asked by students during the first status update meeting, at the latest. Note that, while clearly answering the questions asked by the team, the instructor will not provide solutions but may instead direct the teams towards the right approach in case the team is significantly off track with its approach. During the final presentation, the team is expected to defend its approach by clearly demonstrating how it works and by carefully addressing all of the instructor's questions.

Following the engagement kick-off, the engagement team has to determine internally how to split the tasks among its team members, and who will present what, during the final presentation. However, there are fixed responsibilities that the instructor has pre-defined for students to choose from. Note that the role that a student assumes throughout the engagement should match his/her role during the presentation. For example, the student responsible for cleaning the data has to present about the data cleaning efforts. The structure of the presentations for both 5-member and 6-member teams is outlined below. During the first internal team discussion/meeting, the engagement team should distribute the exact roles by choosing those from the second column of the corresponding table below.

For 5-member Teams

| Team Member | Role |
|---|---|
| A | Explain the business problem that the team is trying to solve and provide a background of the subject matter (3-5 minutes) |
| B | Explain the structure of the data, the cleaning of the data, and the data-analytic solution (in a nutshell) that the team is proposing (5 minutes) |
| C | Present the analysis of the 1st time series model that was used to model the data (5 minutes) |
| D | Present the analysis of the 2nd time series model that was used to model the data (5 minutes) |
| E | Present the analysis of the 3rd time series model that was used to model the data (5 minutes) |
| A | Compare models 1-3 and conclude the presentation (3-5 minutes) |

For 6-member Teams

| Team Member | Role |
|---|---|
| A | Explain the business problem that the team is trying to solve and provide a background of the subject matter (3-5 minutes) |
| B | Explain the structure of the data, the cleaning of the data, and the data-analytic solution (in a nutshell) that the team is proposing (5 minutes) |
| C | Present the analysis of the 1st time series model that was used to model the data (5 minutes) |
| D | Present the analysis of the 2nd time series model that was used to model the data (5 minutes) |
| E | Present the analysis of the 3rd time series model that was used to model the data (5 minutes) |
| F | Present the analysis of the 4th model (can be **any** model, not necessarily a time series model) that was used to model the data (5 minutes) |
| A | Compare models 1-4 and conclude the presentation (3-5 minutes) |

The engagement team will email the instructor, no later than the date set by the instructor at the engagement kick-off, of the exact task assigned to each member.

## Scheduled Status Updates and Deliverables

The following is the list of the status updates and deliverables that the engagement team is required to adhere to. The deadline for each of those action items will be announced by the instructor at the engagement kick-off.

| Action Item | Description |
|---|---|
| **Breakdown of Responsibilities** | Engagement team notifies the instructor of the role that each team member is responsible for throughout the engagement; |
| **First Status Update** | Engagement team meets with the instructor to clarify the data-related questions. Questions pertaining to definitions of data attributes, and nature of missing values and outliers, as well as data dictionaries, all are particularly relevant at this meeting. At the end of the meeting, the team is expected to have a solid understanding of the data and should be ready for subsequent data cleaning; |
| **Second Status Update** | Engagement team meets with the instructor to provide an update on data cleaning/preparation efforts as well as on the formulation of their data-analytic approach. Relevant topics of discussion include but are not limited to resolution of missing values, outliers, and duplicates, as well as the logic behind the data-analytic method. It is expected that at the end of this meeting, students are able to successfully complete the data preparation and enter the modeling stage of the engagement; |
| **Presentation** | Engagement team presents its work. After delivering the presentation, engagement team is expected to put the finishing touches on the written report before the submission; |
| **Deliverable Report** | Engagement team delivers the written report; |
| **Peer Evaluations** | Each team member evaluates the effectiveness of her/his peers through an online peer evaluation survey. |

# Grading

To evaluate the objectives outlined above, each student's performance on this caselet may be assessed in line with the scheme below, varying the component weights as the instructor finds appropriate:

| Grading Component | Weight |
|---|---|
| Presentation | 20% |
| Deliverable Report | 60% |
| Received Peer Evaluation | 10% |
| Submitted Peer Evaluation | 10% |

Each student's overall grade for the caselet will be based on:

- The student's presentation to the class. This component will be graded based on the overall soundness of the presented content, as well as student's presentation and communication skills.

- A written deliverable report that the student's team will submit on the date set by the instructor at the engagement kick-off. Each team submits a single deliverable and each team member gets the same grade for the report. The grading of this component will be strictly based on technical soundness, accuracy, breadth, and depth of the content.

- Peer evaluations, submitted by the student's team members on the date set by the instructor at the engagement kick-off, assessing the student's effectiveness when working with his/her team members.

- A peer evaluation, which the student will submit on the date set by the instructor at the engagement kick-off, assessing the effectiveness of his/her team members. Note that simply submitting the completed evaluation will earn the student the 10% of the project grade outlined in the table above.