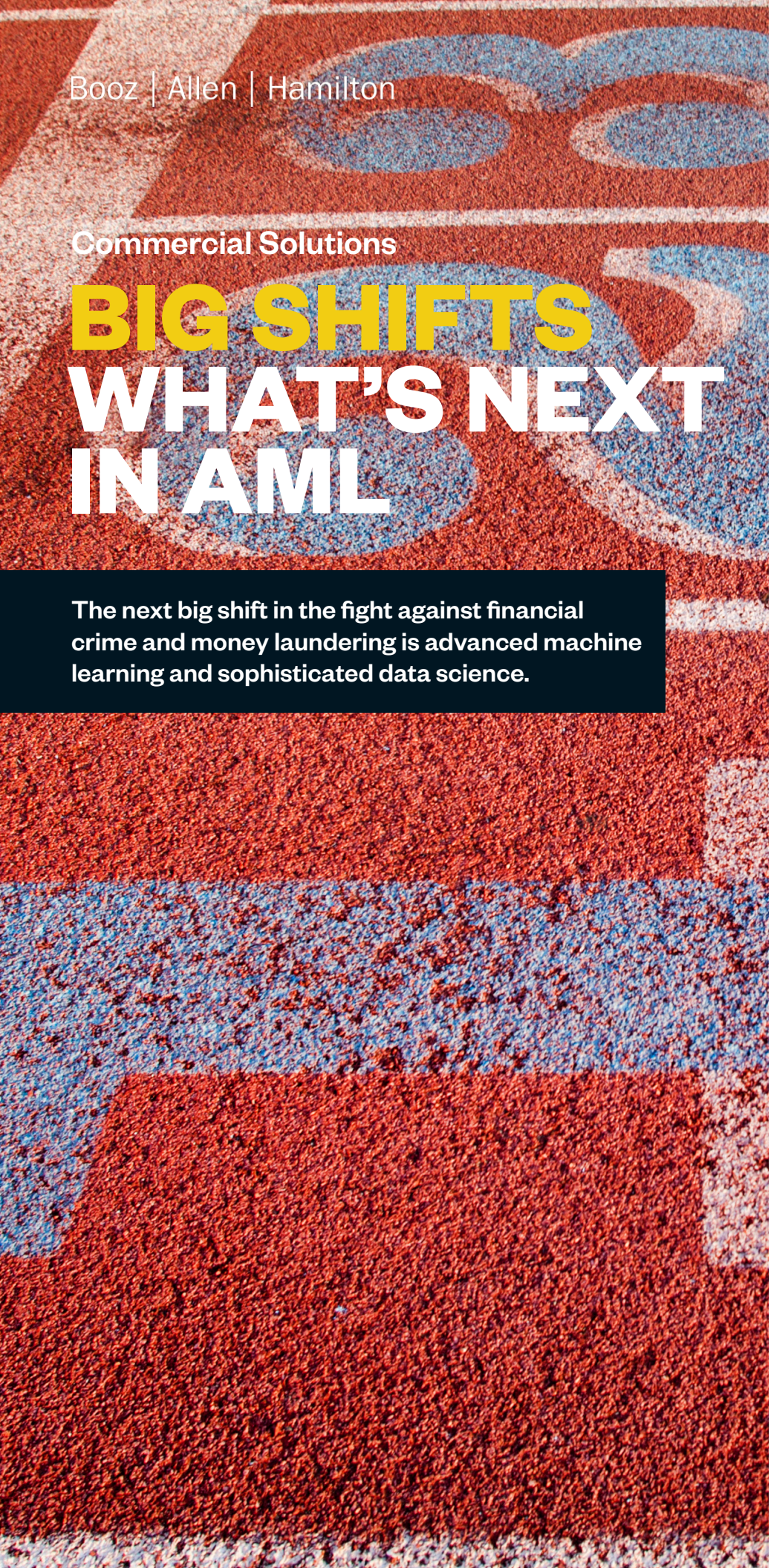

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Commercial Solutions

BIG SHIFTS WHAT'S NEXT IN AML

The next big shift in the fight against financial crime and money laundering is advanced machine learning and sophisticated data science.

Booz Allen's Financial Crime Solutions team has produced this paper to explain why incorporating machine learning and data science into anti-money laundering (AML) transaction monitoring will improve program effectiveness.

A brief history of big shifts

The AML industry has witnessed several significant turning points over the past 40 years that have led us to where we are today.

Reliance on transaction monitoring

The most recent shift in AML has been the prioritization and emphasis on transaction-monitoring technology. Is this approach working?

Technology evolution, machine learning and data science

Rapid advances in technology have enabled us to create smarter systems which can detect patterns across enormous data sets.

How machine learning and data science can revolutionize the approach to transaction-monitoring

These advances in technology can improve the way that we do transaction monitoring, KYC, and other AML activities.

BIG SHIFTS IN ANTI MONEY LAUNDERING

The AML Community has come a long way in the past 40 years, but it is time to evolve and improve.

A Brief History

How we got to where we are today

The history of AML is marked by periodic and comprehensive shifts in the way that financial institutions fight money laundering.

- From the 1970s through 2001, companies largely focused on creating AML programs/ departments that had mature governance, policies, processes, and strategies that would respond to evolving legislation. AML investigations and analysts relied heavily on collaboration with law enforcement to identify suspicious actors. Compliance was a product of proper organization, record-keeping, and collaboration with regulators and law enforcement.

- The events of September 11th, 2001 triggered a monumental shift in the fight against money laundering and terrorist financing. Institutions saw transformation and unprecedented prioritization of AML as a critical component of their compliance requirements. The PATRIOT ACT, revisions to the Bank Secrecy Act and other considerable regulations escalated the requirements on financial institutions. The organization, processes, technology, and culture of AML programs had to expand and adapt to these wide scale shifts.

- As pressure to thwart terrorist financing continued to build, financial institutions have implemented technological solutions designed to detect suspicious activity within their stream of transactions. So much focus and effort has been applied to these large-scale systems (from institutions, regulators, and industry) that financial institutions' programs have become largely transaction-monitoring centric. Once again, organization, processes, technology, and culture have changed to respond to this shift.

Our reliance on transaction monitoring

Today, many AML programs are dictated by how their transaction monitoring systems function. Regulators are focusing more on analyzing the transaction monitoring rules and models, validating their effectiveness, and auditing alert response procedures and incidents. Indeed, it seems as if many AML programs are specifically designed to revolve around these technologies. Institutions have hundreds of analysts whose job is solely to investigate the alerts that these technologies generate. They have auditors and quality assurance teams who must validate the work of these analysts. Institutions dedicate some of their smartest "quant" type analysts to tuning, improving, and validating the models that these technologies enforce.

Financial institutions are spending more and more of their budgets on transaction monitoring technology. Additionally, these institutions have scaled-up their internal technology staff, and have brought in contractors to support these systems. Significant investments have also been allocated to implementation, hosting, support, and training for these systems.

With so much reliance on transaction monitoring in our AML programs, we must evaluate the effectiveness of this approach.

Is our approach to transaction monitoring working?

The technology is inadequate
Generally, transaction monitoring technology examines financial transactions against a set of discrete rules, and generates "alerts" on the transactions that match one or more rule (e.g., cash deposit in excess of $10,000 would be flagged for a Cash Transaction Report). While some rules are more sophisticated, all are based on decade-old data processing, computation, and analytic techniques, and they are rampant with massive false-positive alerting issues. From a technology perspective, current systems are plagued with architectural deficiencies including – data management in relational databases, processing within "n-tier"-style business layers, and lack of elastic resourcing.

These technology limitations lead to a meaningful problem
In many cases, hundreds of thousands of transaction alerts are being generated which require investigation. The resources needed to support these investigations requires an army of analysts, investigators, and auditors, and represents the largest expense of AML programs within most financial institutions. Understandably a company cannot survive if it spent all its earnings hiring AML analysts, therefore programs consistently feel under resourced compared to the volume of alerts and reports they must review. Consequently, AML leaders are forced to select arbitrary thresholds upon which they decide which alerts to review and which to ignore. This leads to the glaring "catch 22" in the AML world:

Set the transaction monitoring thresholds too low and you are forced to hire more and more people. Set the threshold too high and risk heightened attention from regulators.

This has led to the notion that paying the price to deal with 80-95% false positive rates is just "the cost of doing business".

Do these technologies prevent AML related regulatory penalties, fines, citations?
Many would agree that despite implementation of these systems, most financial institutions are still facing stiff regulatory pressure, fines, and citations. These systems still produce false negatives and miss subtle money laundering behavior. So seemingly the answer would be "NO"- current transaction monitoring-centric approaches are not solving the problem.

Do these technologies help reduce cost of compliance?
The answer to this question is an emphatic "NO". This traditional approach requires expensive technology, expensive upkeep, and worst of all, it requires numerous analysts to keep up with the thousands of alerts that monitoring systems produce (95% of which are false positives).

Do these technologies employ a "risk based" approach?
In balancing regulator expectations to disposition every alert, and corporate pressures to make a profit, companies may end up with just enough resources to manage the flow. Each analyst brain is so engaged in the effort of disproving what a machine has generated that they often have no time to proactively seek out, prioritize, and mitigate risks facing the institution. The ongoing regulatory action against countless companies that have built their programs around these systems demands that the answer is "NO".

Enter Machine Learning and Sophisticated Data Science: The Next Big Shift in AML

Machine Learning and Data Science

Technology Evolution

With the rapid evolution in distributed computing and the growing sophistication of data science, the adoption of machine learning has been a game-changer for many industries. Through machine learning, companies have constructed algorithms that can learn from and make predictions on data. In particular, the retail industry has benefited by improving the online shopping experience, predicting products that users may prefer based on previous buying habits. Healthcare companies have also benefited from machine learning by incorporating it into research and development, suggesting new compounds for drug development. The government has also adopted machine learning to learn the behaviors of criminals and terrorists and prevent incidents before they occur. Data science is simply the science of extracting knowledge from data.

The advent of machine learning has created a paradigm shift for data scientists. Whereas historically data scientists had to know what exactly they were looking for before exploiting the data, with machine learning, these data scientists can allow the machine to discover hidden or non-obvious insights from the data.

Machine learning and advanced data science present a powerful solution to the current problems facing AML programs at Financial Institutions and is the next big thing in the evolution of AML.

What Machine Learning and Data Science can do for AML

Machine learning can transform the way that transaction monitoring technologies identify suspicious activity. Machine Learning can be used to:

- Learn transaction behavior for similar customers
- Discover transaction activity of customers with similar traits (business type, geographic location, age, etc.)
- Pinpoint customers with similar transactions behavior
- Identify outlier transactions and outlier customers
- Learn money laundering typologies and identify typology specific risks
- Dynamically learn correlations between alerts which produced verified suspicious activity reports
- Continuously analyze false-positive alerts and learn common predictors

A Deeper Look: Machine Learning and Data Science techniques applied to AML

Machine learning is a mature science, which provides a toolkit of algorithms and methods for application. Some of the techniques that can be used to achieve the above-mentioned goals include:

- Unsupervised Similarity Clustering
- Iterative Winnow
- Typology-based Bayesian Belief
- Random Forest
- Supervised training based on validated true positives and true negatives
- Trained binary classification review
- Statistical Comparison against baseline performance

The future of AML

Cutting edge technology and specialized investigative units
Machine learning will revolutionize the way that AML programs operate. The future of AML will not be defined by the growing number of analysts investigating of false-positive alerts – an approach that is ineffective and not sustainable. Rather, the future will be driven by the advances of machine learning and other technology which can improve the automatic detection of suspicious activity, making it more difficult for criminal activity to go undetected.

Stove-piped technology and analyst teams are becoming irrelevant and more costly. The future of AML programs is leaner, smarter, and more agile, supported by sophisticated technology that can detect and respond dynamically as their AML risks evolve. The members of these teams possess hybrid skill sets from across the relevant disciplines (e.g., CAMS certified data scientists and financial intelligence analysts that can code).

About Booz Allen's Financial Crime Technology Solutions

Booz Allen has been on the cutting edge of advances in distributed computing and machine learning. Booz Allen has led the transformation of several government organizations including Treasury, IRS, DoD, and Law Enforcement, along with several of the world's largest financial institutions, helping these organizations unlock the power of machine learning and Big Data analytics to improve their ability to investigate threat actors. Booz Allen has now leveraged this technology to create a suite of technology designed to help financial institutions improve their ability to combat financial crimes.

Designed by our Financial Crimes Task Force consisting of AML experts from top tier financial institutions, regulatory experts from our FinCEN and Treasury support teams, and technologists from our Strategic Innovation Group, our financial crime technology solves complex challenges for financial institutions. Our technology aims to improve regulatory compliance, operational efficiency, and cost savings.

To learn how Booz Allen Hamilton can help your business thrive, contact:

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Booz Allen is committed to helping Financial Institutions achieve regulatory compliance, enhanced operational efficiency, and regulatory cost reduction. Our decades serving the regulators and law enforcement, combined with over 100 years of management consulting, and unmatched technology capabilities make us the best partner for your AML Program.

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Booz Allen Hamilton has been at the forefront of strategy and technology consulting for nearly a century. The firm provides business and technology solutions to major corporations in the financial services, health, and energy markets, leveraging capabilities and expertise developed over decades of helping US government clients in the defense, intelligence, and civil markets solve their toughest problems.

Booz Allen is headquartered in McLean, Virginia, employs more than 22,000 people, and had revenue of $5.48 billion for the 12 months ended March 31, 2014. In 2014, Booz Allen celebrates its 100th anniversary year. To learn more, visit www.boozallen.com. (NYSE: BAH)