

Security and Risk Management

SPARK Matrix™: **Trade Surveillance and** **Monitoring, 2022**

Market Insights, Competitive Evaluation, and Vendor Rankings

November 2022

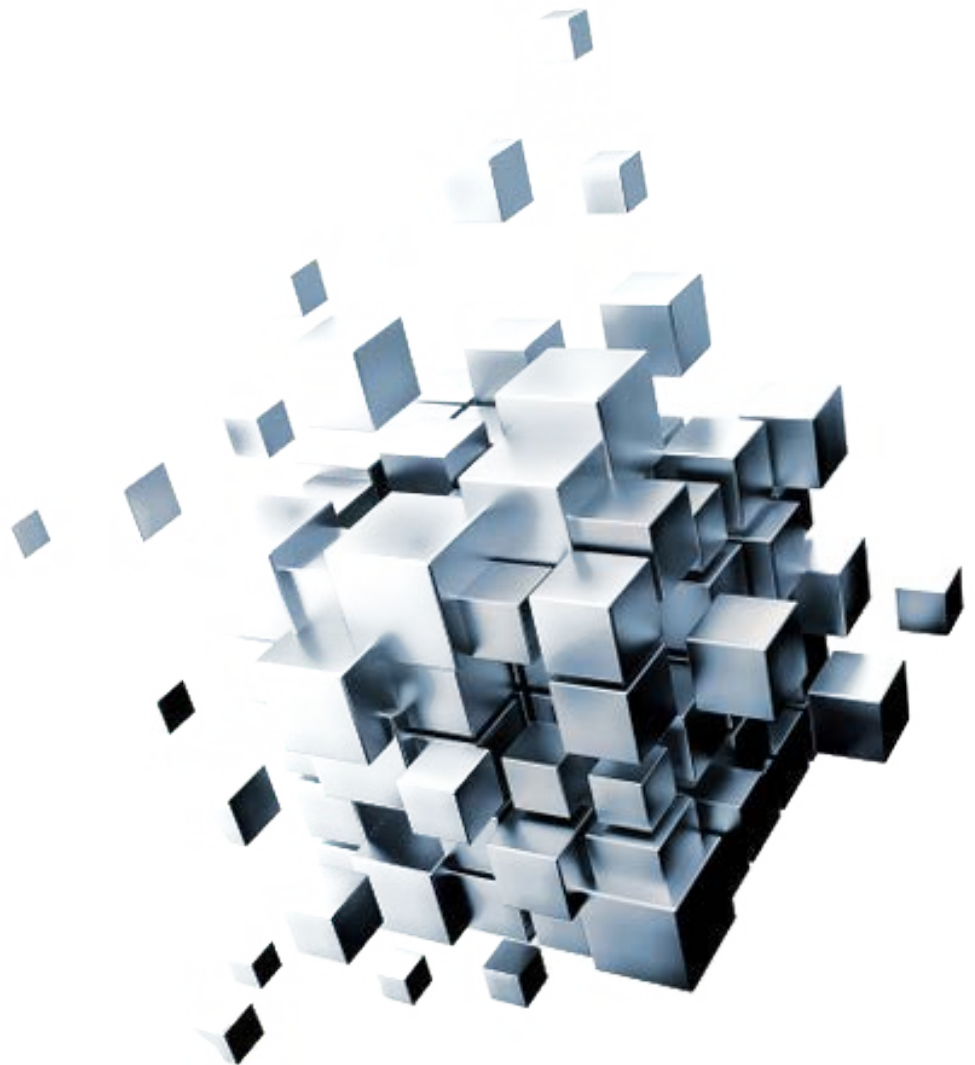


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Executive Overview

This research service includes a detailed analysis of global Trade Surveillance & Monitoring solution market dynamics, major trends, vendor landscape, and competitive positioning analysis. The study provides competition analysis and ranking of the leading Trade Surveillance & Monitoring vendors in the form of the SPARK Matrix™. This research provides strategic information for technology vendors to better understand the market supporting their growth strategies and for users to evaluate different vendors' capabilities, competitive differentiation, and market positions.

Market Dynamics and Overview

Quadrant Knowledge Solutions defines a Trade Surveillance and Monitoring solution as “A software that identifies and prevents abusive trading practices by monitoring market manipulation, fraud, and illicit trading behavior.” A trade surveillance and monitoring solution should cover all asset classes and geographies to identify threats from any trading transaction. The software protects organizations from reputational risk and losses from penalty and fraud while ensuring regulatory compliance.”

A trade surveillance and monitoring solution offers capabilities for pre-trade, post-trade, & market surveillance and identifies market abuse practices and trade violations. The solution performs activities that include a complete analysis of the order book, investigation of complete audit trails of orders and trades, and analysis of cross-market cross-asset trades to help mitigate illegal trade practices, safeguard organizations from losses, frauds, and penalties, enhance consumer trust, and ensure regulatory compliance.

Financial markets have experienced failures and enormous losses in the last decade owing to various factors, including rogue traders. These events have led to the evolution of increasingly stringent regulations, such as Reg BI, MAR, MiFID II, Dodd-Frank, and Code of Conduct, along with guidelines from regulatory agencies, including CFTC, SEC, FINRA, and ESMA, as well as other national regulations across various countries to detect trading activities that sabotage public confidence in the markets. The rising thrust on financial markets to comply with these regulations is the primary driving force for robust and accurate trade monitoring systems.

As expectations by regulators for trade surveillance are increasing, financial organizations are relentlessly attempting to eradicate breaches of policies leading to unlawful trading activities. In recent times, trading practices globally have been adhering to a broader range of global regulations, embracing cross-asset class and cross-market trade surveillance measures to identify market abuse, behavioral patterns, and non-compliant activities. Trade surveillance and monitoring solutions identify trading rule violations or unlawful trading practices in the trading landscape. With the benefits of transparency, efficacy, and oversight in capital markets, trade surveillance and monitoring solutions are getting increasingly popular amongst both buy-side and sell-side firms in the trading market. Trade surveillance and monitoring solutions focus on restraining market manipulation and market abuse,

which causes reputational damage to firms. Regulators emphasize on enhancing market transparency and boosting investor confidence through these solutions. The solution focuses on both pre-trade surveillance and post-trade surveillance. While pre-trade surveillance helps authenticate trade instructions, assuring trading thresholds are never breached and block trades being performed on restricted instruments, post-trade surveillance can track front-running, suitability, as well as best-execution, and perform regulatory transaction reporting.

A trade surveillance & monitoring solution offers comprehensive market surveillance, including cross-market, equity market, and OTC traded derivatives surveillance; and identifies market abuse practices and trade violations, such as wash trades, portfolio pumping, insider trading, rogue trading, and others. A robust trade surveillance solution should offer capabilities for accessing complete historical & real-time data, big data analytics and extensive business rules engine, efficient workflow management through customizable dashboards, and robust reporting capability. Furthermore, trade surveillance focuses on detecting anomalies in trading activities, behavioral pattern analysis, and streamlines case management. Trade surveillance & monitoring solutions monitor trading activities and generate alerts based on suspicious transactions, thereby enhancing the agility and efficacy of financial institutions.

Following are the key capabilities of Trade Surveillance & Monitoring solutions:

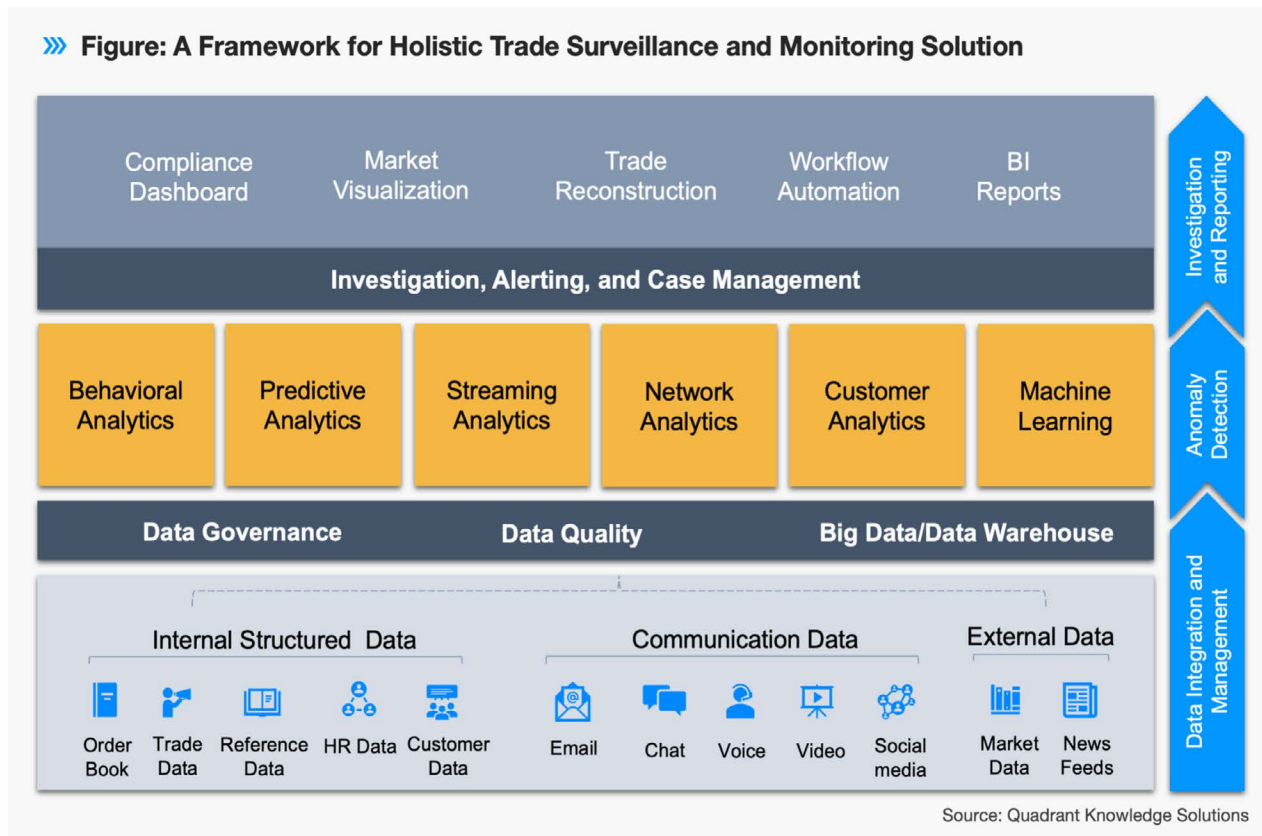
- **Real-Time Data Integration:** A trade surveillance & monitoring solution enables data integration from a variety of sources. It offers optimum integration of in-house data and external trading data. It supports both structured and unstructured data across trade, market, written & voice communications, third parties, and various other sources. The solution should integrate historical transaction data and manage large datasets from multiple sources, store essential data in-memory, and survey across asset classes and geographies. A trade surveillance and monitoring solution provides real-time decisioning and detection of trading patterns across asset classes and markets.
- **Cross-Asset, Cross-Market Surveillance:** A Trade surveillance & monitoring solution provides robust and consistent surveillance coverage across numerous trading venues, markets, asset classes, and jurisdictions. It meets regulatory mandates, handles risk, and drives trading efficiencies in any market across the globe, prevents

sophisticated trade abuse, helps maximize revenue, and safeguards reputational damage across the multi-venue and multi-asset classes.

- **Advanced Analytics:** A trade monitoring solution uses advanced analytics to detect anomalous behavior, enable risk-based discovery, support cross-asset class & cross-market surveillance, facilitate effective trade reconstruction, and such others. Some of the advanced analytics tools used by trade surveillance & monitoring solutions are predictive analytics, sentiment analytics, big data analytics, real-time streaming analytics, behavioral analytics, entity & network analytics, and such others.
- **Trade Regulatory Compliance:** Numerous global and country-specific compliance frameworks, including Reg BI, MAR, MiFID II, Dodd-Frank, Code of Conduct, and such others, are pushing financial institutions to have a robust surveillance system in place to meet market abuse guidelines. Trade surveillance & monitoring solution offers the capability to effectively meet global trade regulations and avoid hefty fines. A trade surveillance solution monitors a broad range of products (cross-asset class & cross-market) to identify non-compliant activities/behavior.
- **Dynamic Workflow Engine:** Trade surveillance models need to be dynamic to keep abreast with the changing trading landscape. They need to be reviewed and improved continuously. A trade surveillance and monitoring solution offers a dynamic workflow engine for improved integration, agility, and responsiveness in trade surveillance activities.
- **Investigation & Case Management:** A trade surveillance & monitoring solution offers robust and fully integrated configurable case management capability. The solution leverages advanced analytics for in-depth investigation of alerts and trading scenarios. It provides a centralized interface to seamlessly capture alerts and data, modify trade surveillance operations, and carry out investigations through advanced analytics and automation. The interface also allows the user to perform other activities like enabling defined compliance workflows, maintaining a comprehensive audit trail investigation and documentation, managing alert processing and escalation, effectively detecting false positives, and efficiently managing regulatory risk across the trading domain.

- **Abuse Detection:** A trade monitoring solution uses advanced analytics to detect anomalous behavior, enable risk-based discovery, support cross-asset class & cross-market surveillance, and facilitate effective trade reconstruction. The solution uses advanced analytics tools such as predictive analytics, sentiment analytics, big data analytics, real-time streaming analytics, behavioral analytics, entity & network analytics, and such others. In addition, some vendors offer machine learning-powered abuse detection to enable enhanced real-time fraud detection. Leading vendors are also offering self-learning ML models to keep up with the changing market and trade dynamics.

Figure: A Framework for Holistic Trade Surveillance and Monitoring Solutions



Competitive Landscape and Analysis

Quadrant Knowledge Solutions conducted an in-depth analysis of the major trade surveillance and monitoring vendors by evaluating their products, market presence, and value proposition. The evaluation is based on primary research with expert interviews, analysis of use cases, and Quadrant's internal analysis of the overall trade surveillance and monitoring market. This study includes an analysis of key vendors, including Abel Noser Solutions, ACA, Altair, b-next, BAE Systems, Bloomberg L.P., Eventus, Features Analytics, Intellect Design Arena, List, LSEG, MCO (MyComplianceOffice), Nasdaq, NICE Actimize, OneTick (OneMarketData), Quantexa, S3, Scila, SteelEye, and Trillium Surveyor.

b-next, BAE Systems, Eventus, Intellect Design Arena, List, LSEG, Nasdaq, NICE Actimize, and SteelEye are the top performers in the global Trade Surveillance and Monitoring market and have been positioned as the top technology and emerging leaders in the 2022 SPARK Matrix™ analysis of the Trade Surveillance and Monitoring market.

b-next's capital markets compliance (CMC) suite protects organizations from the threat of market abuse, thus preventing reputational damage. The suite offers a module titled CMC: Market Abuse. This powerful automated surveillance module monitors attempted market abuse and market manipulation. The module titled CMC: Insider Compliance monitors proprietary, customer, and staff trading and allows the compliance teams to get an extensive view of all trading activities of the organization.

BAE Systems offers a platform titled NetReveal, which protects users from financial crime and provides risk management as well as fraud detection and prevention across banking, financial markets, and insurance domains. Its advanced analytics engine provides effective detection of anomalous behavior and is instrumental in positive/negative detection and false positive reduction.

Eventus offers holistic trade surveillance and market risk solution portfolio addressing regulatory, operational, financial, and technology risks in a single platform. The solution titled Validus is scalable and offers key differentiators that include RPA and ML-driven capabilities for alert and workflow management, enhanced Python scripts to offer quick customization, and robust alert audit trail functionality that enables managers to supervise surveillance analysts more effectively.

Intellect Design Arena, through its flagship brokerage solution CaptialAlpha, a multi-exchange, multi-asset, multi-channel, multi-currency, multilingual integrated platform, offers contextual and real-time trading supported by online market rates and news, comprehensive AI-based analytics, and research. CapitalAlpha provides holistic surveillance across levels and asset classes, including exchange-traded and distributed, trade surveillance with the market and compliance monitors for retail and institutional investors, and adjustment capability of risk rules, risk limits, exposure rules, and margin rules depending on the investor trading pattern and exposures. Capital Alpha also provides real-time pre- and post-trade risk management.

LIST offers a data-centric, multi-asset, multi-compliance trade surveillance system titled LookOut for market surveillance, record-keeping, regulatory reporting, and business analytics. The system is specially designed as a robust, reliable yet flexible, fast data collecting storage, retrieval, and analysis system for buy-side, sell-side firms, and trading venues. The solution is efficient and highly scalable as it processes a large amount of data while complying with MiFID II requirements. The solution complies with European regulations and similar requirements globally, including MAD/MAR, MiFID/MiFIR, SFTR, Dodd-Frank, and more. List's FX Global Code module extends support of the surveillance system to the foreign exchange domain. It offers the detection of insider dealing patterns, market manipulation patterns, and specific FX global code patterns.

LSEG provides a multi-asset, multi-market, out-of-the-box robust surveillance platform titled Millennium Surveillance that offers powerful analytical tools to analyze and report suspicious behavior for improving the efficiency of market abuse investigations. It is scalable, flexible, highly adaptable to rules, and enables swift compliance with regulatory changes on any trading platform. The platform supports real-time and offline analysis features, with simple market replay and robust reporting capabilities.

Nasdaq, through its trade surveillance solutions suite, offers a flagship SaaS-hosted solution titled Nasdaq Trade Surveillance that provides holistic surveillance with an industry benchmark for real-time and T+1 transactions, and cross-market cross-asset classes to detect, investigate, and mitigate market abuse.

NICE Actimize offers holistic conduct and trade surveillance solution titled SURVEIL-X with capabilities for extensive market data feed integration, wide analytics coverage via OOTB models and self-service analytics, and automated

Trade Reconstruction. The solution analyses all trade, communications, and other surveillance data and uses AI-powered analytics and advanced machine learning to produce precise alerts and help organizations significantly reduce false positives.

SteelEye offers an advanced market abuse detection and trade surveillance software titled SteelEye Trade Surveillance, which integrates and connects large volumes of data and applies advanced automation to enable organizations to monitor their market abuse requirements more efficiently and accurately. The asset class-agnostic Trade Surveillance solution integrates trade and order data on a single platform aggregated with market data, news, and social media sources to provide organizations with more insightful data.

Vendors such as Altair, Bloomberg L.P., OneTick (OneMarketData), Quantexa, and Trillium Surveyor are positioned as challengers. These companies provide comprehensive service capabilities and are rapidly gaining market traction across industries and geographical regions. These businesses are also aware of upcoming market trends and have developed a comprehensive roadmap to capitalize on future growth opportunities. Furthermore, these businesses are primarily concerned with catering to large and complex organizations.

Altair offers a streaming analytics platform titled Panopticon that enables traders to build, modify, and deploy customized trading surveillance applications based on their business-specific requirements. The platform allows users to connect to virtually any data source, including big data sources, SQL and NoSQL databases, and message queues. The platform also allows users to develop complex programs and design visual user interfaces that provide insights to make fully informed decisions based on massive amounts of data.

Bloomberg L.P. offers an integrated compliance and surveillance solution, Vault, that helps financial institutions meet their regulatory and business requirements. The solution enables organizations to capture, control, archive, reconstruct, and analyze their trade, e-communication, and voice data across the full trading life cycle on a real-time or historic basis. The solution also strengthens the terminal community with the capture of Bloomberg's proprietary e-communications and trading data, as well as surveillance, basic archival, and search tools for authorized reviewers.

OneTick (OneMarketData) offers a trade surveillance solution that offers smart features to enable trading supervisors and compliance teams to identify, investigate,

and make decisions on anomalies. The solution is built on OneTick's proprietary database and stream processing platform and delivers robust, configurable built-in alerts to support brokers in identifying quote stuffing, layering and spoofing, wash trading, marking the close, and more.

Quantexa's anti-money laundering solution for capital markets uses context to offer a holistic view of the customers and counterparties by connecting data from various data sources to identify new and emerging risks swiftly and more accurately, connect to networks to find and understand their trading patterns, the companies they associate with, and generates contextual alerts to issue faster and higher quality alert reviews to identify high-risk relationships that deviate from normal behavior.

Trillium offers a trade surveillance platform titled Surveyor that generates alerts using full depth-of-book market data, which helps detect market manipulation and reduce false positives. The workflow functionality significantly reduces the time required to communicate and close issues. The platform's accurate filters catch critical market manipulations, including spoofing and layering, marking the close, wash trades, and more. The platform offers a clear and accurate interface, which minimizes the risk of errors while analyzing compliance data.

Vendors such as Abel Noser Solutions, ACA, Features Analytics, MCO (MyComplianceOffice), S3, and Scila are positioned as emerging challengers. These companies provide comprehensive service capabilities and are rapidly gaining market traction across industries and geographical regions. These businesses are also aware of upcoming market trends and have developed a comprehensive roadmap to capitalize on future growth opportunities. Furthermore, these businesses are primarily concerned with catering to large and complex organizations.

Abel Noser Solutions offers three TCA (Transaction Cost Analysis) products for pre-trade, real-time, and post-trade titled Trade Compass, Trade Pulse, and Trade-Zoom, respectively. The product suite provides organizations with the information to predict trading costs before the trade, analytics to immediately access results of real-time trading to manage and react to trading costs and evaluate trading performance post-trade by evaluating time-specific data, including historic data to understand trading costs.

ACA's abuse surveillance solution ComplianceAlpha (formerly Decryptex) offers automated, in-depth trade surveillance to help organizations identify Items of Interest (IOI) and non-compliant trading and investment activity.

Features Analytix offers an AI-driven Trade Surveillance solution titled eyeDES that detects and explains any market abuse across asset classes, which significantly reduces false positives by issuing only high-quality alerts and reduces the risk of penalties by detecting all known scenarios as well as emerging patterns. The solution is configurable to detect cases at any granular level, including trader, trading desk, account, warehouse, and beneficial owner. It evolves with the market dynamics and volatility and supports both deployment options, including cloud and on-prem.

MCO (MyComplianceOffice) offers compliance management software that enables companies around the world to reduce their risk of misconduct. MCO's trade surveillance software provides an automated solution to monitor investment activities across an organization. The solution is an integrated platform that enables organizations to run a wide variety of monitoring rules on trades, positions, accounts, funds, portfolios, clients, and households across a range of financial products for various compliance topics such as market manipulation, insider trading, and product suitability where the data is made available.

S3 offers trade surveillance through its platform titled Trade Surveillance Suite. The suite monitors trading for various types of restricted behaviors across multiple asset classes while ensuring compliance. The suite is preconfigured to meet the organization's supervisory requirements and allows organizations to document all trades with automated audit trails, all available in a single dashboard. The platform enables organizations to monitor trade activities, including spoofing, layering, marking the close, and trade-through while reducing false positives and helping in cross-product manipulation monitoring.

Scila offers a turnkey market surveillance solution titled Scila Surveillance for exchanges, trading participants, and regulators who seek to apply modern technology seamlessly to allow early detection of market abuse to presentable evidence. The solution covers all asset classes and market models and is deployed to many organizations globally.

Trade Surveillance and monitoring vendors are focusing on improving their technology value proposition to prevent market abuse through timely detection and advanced trade surveillance and monitoring solutions. The vendors are increasingly incorporating machine learning and artificial intelligence technology to improve the accuracy, speed, and scalability of their Trade Surveillance and Monitoring solutions. Vendors' continued efforts in enhancing the awareness and

overall value proposition in terms of implementing or enhancing Trade Surveillance and Monitoring functionalities to prevent market abuse and hefty regulatory fines for non-compliance are driving the adoption amongst small, mid-sized, and large enterprise organizations for a broad range of asset classes.

A majority of the Trade Surveillance and Monitoring vendors are specialized in providing purpose-built cloud-based trade surveillance and monitoring solutions. Considering the rapid market growth and adoption of cloud-based trade surveillance and monitoring solutions, Trade Surveillance and Monitoring solution providers have either built capabilities or are partnering with cloud-based service providers for integrated offerings to support hybrid deployments.

Key Competitive Factors and Technology Differentiators

The following are the key competitive factors and differentiators for the evaluation of trade surveillance & monitoring solutions and vendors. While a majority of trade surveillance & monitoring solutions may provide all the core functionalities, the breadth and depth of functionalities may differ by different vendors' offerings. Driven by increasing competition, vendors are increasingly looking at improving their technology capabilities and overall value proposition to remain competitive. The vendor's ability to accommodate following emerging technology trends is increasingly becoming a key differentiator for selecting the trade surveillance & monitoring solution:

The Sophistication of Technology Capabilities: Users should evaluate a trade surveillance and monitoring solution that offers comprehensive capabilities, data ingestion from internal and external sources, user and entity behavior analytics, automated trade reconstruction, comprehensive visualization, real-time anomaly detection, integrated case management, advanced modeling and rule-engine, scalability and uptime, an open technology architecture, and such other features. Additionally, the vendor's customer value proposition may differ in terms of ease of deployment, ease of use, price/performance ratio, support for a broad range of market and communication surveillance use cases, global support services, and such others.

Maturity of Emerging Technologies: The rapidly growing digitalization in trade is causing various vendors to use emerging technologies, including AI, ML, RPA,

behavioral modeling, and NLP, to augment their trade surveillance and monitoring solutions to perform sophisticated tasks with intelligence. Factors such as legacy technology, siloed operations, rising regulatory requirements, and complexity of in-house and outsourced solutions are leading to an intricate web of technology architecture that is driving the need for smarter trade surveillance & monitoring solutions. Augmenting RPA along with AI and ML technologies can seamlessly integrate technology, work systems, and people to help capture information from numerous sources, conduct advanced investigations with large datasets, issue intelligent alerts, automate rule-based, indicative tasks, and enables many types of bots such as task bots, IQ bots, basic chatbots, and more. Technologies such as behavioral analytics and NLP further help interpret text-heavy communications & intent and pre-empt trading abuse. Most of the vendors, including Nasdaq, NICE Actimize, Altair Panopticon, FIS Protegent, and Intellect Design Arena, have implemented these technologies and are continuing to invest heavily in further enhancing their products with automation, ML, behavioral analytics, AI, and NLP technologies.

Support for Meeting Changing Regulatory Requirements: Shifting trade patterns and increasing regulations have intensified the compliance burden on capital firms, hedge funds, and conventional asset managers. Users should evaluate vendors whose trade surveillance solutions support several revised regulations in financial instruments, such as Reg BI, MiFID II, MAR, and Dodd-Frank. Furthermore, guidelines from regulatory agencies, such as CFTC, SEC, FINRA in the US and ESMA, FCA & other regulators in the European economies, are further driving the adoption of trade surveillance solutions by financial institutions. While compliance with the trade regulations helps enable protection from trading risks, safeguard an organization's reputation, restore the investors' trust, and sustain the business, non-compliance means a higher risk of market abuse, huge penalties, negative publicity, and such other disadvantages.

360-Degrees Trade Surveillance: Driven by complex regulatory compliances and increasing instances of trade malpractices, vendors are offering holistic trade surveillance & monitoring solutions with 360-degree surveillance. Organizations should evaluate solutions that monitor & analyze transactions, communications, and behavioral patterns to provide enhanced & comprehensive investigation. The 360-degree approach to trade surveillance & monitoring improves true positives, decreases efforts needed to process false positives, and better identifies patterns for trade surveillance. Users should evaluate vendors that offer robust trade surveillance solutions that gather data from myriad channels, such as trade and

order data, social networking sites, voice communications, and behavioral data. Moreover, 360-degree surveillance offers analytical insights into data captured in real time from market activity, sentiments, and trading behavior at multiple touchpoints in the client lifecycle.

Cloud-Based Trade Surveillance Deployment: Organizations should evaluate vendors that offer cloud-based deployment owing to its significant advantage in terms of scalability and cost-effectiveness. Additionally, cloud vendors ensure that user organizations always have access to the latest version of the solution with regular updates, maintenance, and support services. Further, small and mid-sized businesses (SMBs) often have insufficient resources to deploy cutting-edge technologies and are associated with the same sets of operational challenges as large organizations. Therefore, SMB organizations usually prefer cloud-based deployments to cut their operational costs and fulfill all their unmet needs with a low monthly/yearly charge.

Comprehensive Trade Surveillance: Organizations should evaluate Trade surveillance & monitoring solutions that offer comprehensive trade surveillance capabilities, including cross-market, equity market, and OTC traded derivatives surveillance; and identify market abuse practices and trade violations, such as wash trades, portfolio pumping, insider trading, rogue trading, and others. Additionally, a trade surveillance solution should offer capabilities for accessing complete historical & real-time data, big data analytics and extensive business rule engine, efficient workflow management through customizable dashboards and robust reporting capability. Furthermore, trade surveillance focuses on detecting anomalies in trading activities, performs behavioral pattern analysis, and streamlines case management. Trade surveillance & monitoring solutions monitor trading activities and generate alerts based on suspicious transactions, thereby enhancing the agility and efficacy of financial institutions.

Comprehensive Data Integration Capability: Vendors' capability to provide comprehensive data integration is essential in improving the performance of analytics engines and machine learning models. Few vendors may support data ingestion from transactional data, account information, basic customer profiles, limited communication channels, and such others. Many organizations are partnering with third-party data providers to get support for surveillance. Trade surveillance and monitoring platform should offer comprehensive data integration capability for large volumes of data in multiple formats and from contextual data sources across all transaction, reference, behavioral, communication, and external sources.

Model Performance: Model performance is a key differentiator, as the current multiple trade surveillance solutions can provide significantly differing performances. The traditional business rules-based trade surveillance system is no longer effective in responding quickly to emerging patterns of abuse and preventing market manipulation. Additionally, the traditional machine learning models, which are mostly refreshed according to the schedule, are insufficient to fight bad actors using increasingly sophisticated techniques. Also, continuous monitoring and updating of machine learning models are essential to adapt to emerging patterns of abuse and evolving threat landscape. Therefore, organizations should evaluate model performance in terms of speed and accuracy of abuse detection with low false positives.

Custom Model Development and Deployment: Typically, global financial organizations have internal data science teams and often prefer to utilize their in-house developed machine learning models. However, few vendors may compel the organization's internal data scientist team to work with the vendor's proprietary machine learning models, language, tools, and libraries. Additionally, organizations may be required to use vendors' professional services for the implementation and customization of models to suit specific use cases. Organizations often incur additional costs and delay in overall implementation because of such integrations with vendors' proprietary technologies. A Trade surveillance and monitoring platform should support an open system framework and facilitate easy imports of third-party models built using any language, platform, and library. Leading vendors also support custom model development, testing, and deployment capability for a variety of trade surveillance and monitoring use cases.

Integrated Communication Surveillance: Vendors are now integrating e-communication surveillance with their trade surveillance and monitoring solution rather than offering standalone communication surveillance systems. Communication surveillance enables monitoring and analysis of all voice and written communication made by the trader to detect behavioral patterns. Communication surveillance gathers all forms of communication data, such as email, messages, text, voice, and others. Integrated communication surveillance ensures comprehensive investigation, reduces false positives, and helps improve compliance. With increasing risk in the trade landscape and granular regulations being enforced, communication surveillance integrated with comprehensive trade monitoring systems is becoming a key differentiator to vendor solutions. Communication monitoring can be more crucial for buy-side firms to prevent insider trading.

Support for a Broad Range of Use Cases: A Trade Surveillance platform should be able to cater to a wide range of use cases, including pump-and-dump, spoofing detection, off-market, front running, risk assessment and reduced investigation time, full market surveillance for trade, voice, communication, and such others.

Comprehensive Coverage for Asset Classes: Organizations should evaluate solutions that provide surveillance across all asset classes to detect market abuse. The solution should also be able to provide compliance coverage across a wide variety of asset classes and markets. This coverage helps organizations to handle risk, maintain fair trading practices, prevent trade abuse, and protect against reputational damage across multi-venue and multi-asset classes.

Vendor's Expertise and Domain Knowledge: Organizations should evaluate vendors' expertise and domain knowledge in understanding their unique business problems, use case, and industry-specific requirements. Organizations are advised to conduct a comprehensive evaluation of different trade surveillance solutions and vendors before making a purchasing decision. Users should employ a weighted analysis of the several factors critical to their specific organization's use cases and industry-specific requirements. Users should also look for trade surveillance and monitoring solution with a history of successful large-scale deployments and carefully analyze the existing case studies of those deployments. This should form the basis for preparing best-practice for trade surveillance and monitoring solution deployments.

Technology Vision and Roadmap: The financial crime and risk management market is continuously experiencing constant evolution. The rapid technological progress and regulatory advancements have created important changes in the trade and security market framework, owing to which advanced financial crime and compliance technology has become one of the key decisions in most firms' technology investment roadmaps. Trade surveillance and monitoring solution providers are continuously improving their technology value proposition in terms of providing a holistic surveillance solution with comprehensive data integration, sophisticated analytics suite powered by advanced analytics and machine learning, custom model development, robust investigation and case management, advanced visualization tools, incorporation of workflow and process automation, and such others. Organizations should carefully evaluate vendors' existing technology capabilities along with their technology vision and roadmap to improve overall satisfaction and customer ownership experience for long-term success.

SPARK Matrix™: Strategic Performance Assessment and Ranking

Quadrant Knowledge Solutions' SPARK Matrix™ provides a snapshot of the market positioning of the key market participants. The SPARK Matrix™ provides a visual representation of market participants and provides strategic insights on how each supplier ranks related to their competitors concerning various performance parameters based on the category of technology excellence and customer impact. Quadrant's Competitive Landscape Analysis is a useful planning guide for strategic decision-making, such as finding M&A prospects, partnerships, geographical expansion, portfolio expansion, and similar others.

Each market participant is analyzed against several parameters of Technology Excellence and Customer Impact. In each of the parameters (see charts), an index is assigned to each supplier from 1 (lowest) to 10 (highest). These ratings are designated to each market participant based on the research findings. Based on the individual participant ratings, X and Y coordinate values are calculated. These coordinates are finally used to make the SPARK Matrix™.

Technology Excellence	Weightage	Customer Impact	Weightage
Sophistication of Technology	20%	Product Strategy & Performance	20%
Competitive Differentiation Strategy	20%	Market Presence	20%
Application Diversity	15%	Proven Record	15%
Scalability	15%	Ease of Deployment & Use	15%
Integration & Interoperability	15%	Customer Service Excellence	15%
Vision & Roadmap	15%	Unique Value Proposition	15%

Evaluation Criteria: Technology Excellence

- **The sophistication of Technology:** The ability to provide comprehensive functional capabilities and product features, technology innovations, product/platform architecture, and such others
- **Competitive Differentiation Strategy:** The ability to differentiate from competitors through functional capabilities and/or innovations and/or GTM strategy, customer value proposition, and such others.

- **Application Diversity:** The ability to demonstrate product deployment for a range of industry verticals and/or multiple use cases.
- **Scalability:** The ability to demonstrate that the solution supports enterprise-grade scalability along with customer case examples.
- **Integration & Interoperability:** The ability to offer product and technology platform that supports integration with multiple best-of-breed technologies, provides prebuilt out-of-the-box integrations, and open API support and services.
- **Vision & Roadmap:** Evaluation of the vendor's product strategy and roadmap with the analysis of key planned enhancements to offer superior products/technology and improve the customer ownership experience.

Evaluation Criteria: Customer Impact

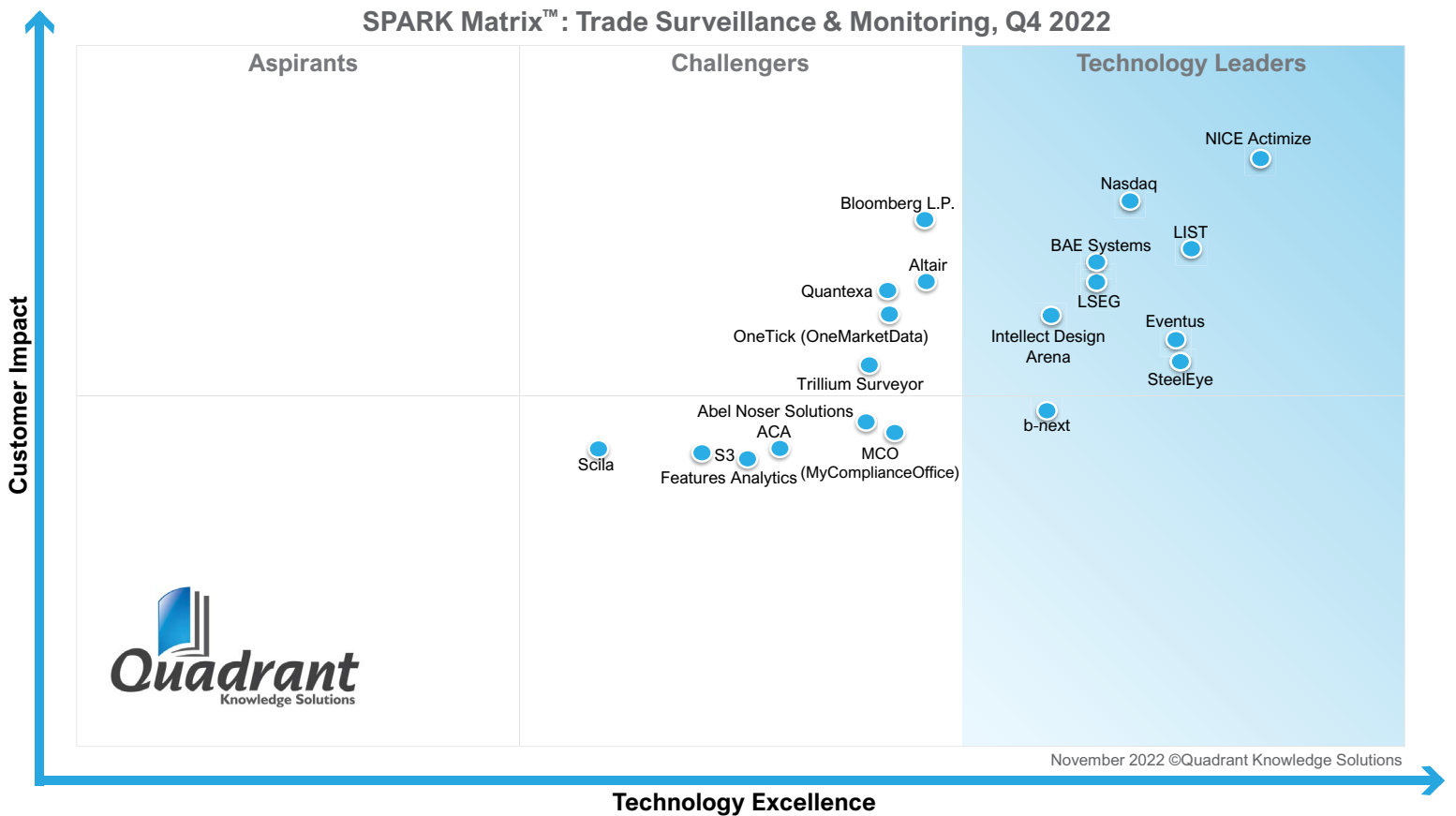
- **Product Strategy & Performance:** Evaluation of multiple aspects of product strategy and performance in terms of product availability, price to performance ratio, excellence in GTM strategy, and other product-specific parameters.
- **Market Presence:** The ability to demonstrate revenue, client base, and market growth along with a presence in various geographical regions and industry verticals.
- **Proven Record:** Evaluation of the existing client base from SMB, mid-market and large enterprise segment, growth rate, and analysis of the customer case studies.
- **Ease of Deployment & Use:** The ability to provide superior deployment experience to clients supporting flexible deployment or demonstrate superior purchase, implementation and usage experience. Additionally, vendors' products are analyzed to offer user-friendly UI and ownership experience.

- **Customer Service Excellence:** The ability to demonstrate vendors capability to provide a range of professional services from consulting, training, and support. Additionally, the company's service partner strategy or system integration capability across geographical regions is also considered.
- **Unique Value Proposition:** The ability to demonstrate unique differentiators driven by ongoing industry trends, industry convergence, technology innovation, and such others.

SPARK Matrix™: Trade Surveillance and Monitoring

Strategic Performance Assessment and Ranking

Figure: 2022 SPARK Matrix™
(Strategic Performance Assessment and Ranking)
Trade Surveillance and Monitoring Market



Vendors Profile

Following are the profiles of the leading Trade Surveillance and Monitoring Solution vendors with a global impact. The following vendor profiles are written based on the information provided by the vendor's executives as part of the research process. The Quadrant research team has also referred to the company's website, whitepapers, blogs, and other sources for writing the profile. A detailed vendor profile and analysis of all the vendors, along with various competitive scenarios, are available as a custom research deliverable to our clients. Users are advised to directly speak to respective vendors for a more comprehensive understanding of their technology capabilities. Users are advised to consult Quadrant Knowledge Solutions before making any purchase decisions regarding software composition analysis technology and vendor selection based on research findings included in this research service.

NICE Actimize

URL: www.niceactimize.com

Founded in 1999 and headquartered in Hoboken, New Jersey, NICE Actimize is a provider of financial crime, risk, and compliance management solutions for global financial services organizations. The company offers the SURVEIL-X Holistic Conduct Surveillance Suite that analyses and correlates all trade-related data, detects all forms of risky behavior, and ensures regulatory compliance. SURVEIL-X offers comprehensive surveillance coverage, real-time data integration from various data sources and communications, AI-Powered analytic techniques, complete trade regulatory compliance and case management, and alerting and story visualization.

The SURVEIL-X suite provides AI-powered and traditional expert rule-based analytics that offer comprehensive surveillance coverage for all regulatory needs. The suite analyses and correlates all data into a single alert for more accurate and comprehensive risk detection. It can connect to, ingest, and analyze data from real-time sources, including traditional market information, behavioral data derived from analytics, and all forms of communications. It provides comprehensive coverage through over 150 out-of-the-box models covering 25 asset classes and monitoring twelve communication types from any source archive.

SURVEIL-X's AI-powered advanced analytics techniques significantly reduce false positives by helping in analyzing, understanding, and revealing the meaning of conversations. The suite enables users to leverage unsupervised machine learning for anomaly detection and address previously undetected suspicious behaviors, optimize analytics to strengthen detection and accelerate innovation, develop custom analytic models, alert visualization, and distribution rules to address the unique policies and business requirements. The company also offers a managed analytics service that improves the firm's agility, detection accuracy, and compliance effectiveness. The service offers model optimization services to ensure analytics models are up to date, ensuring detection accuracy for Markets, Communications, Suitability, and Conduct surveillance solutions.

SURVEIL-X uncovers all forms of risky behavior to insulate firms from fines and reputational damage while ensuring complete compliance with current and future regulations. SURVEIL-X offers risk coverage for buy and sell-side firms, insurance companies, crypto exchanges, and more by enabling accurate detection and rapid,

thorough investigation of market abuse, inappropriate sales practices, conduct risk, and undetectable compliance risks. The company also offers SURVEIL-X Studio, a solution that allows organizations to create custom analytic risk detection models. The solution's drag-and-drop interface enables organizations to choose from an expansive library of customizable templates to create, test and deploy these models.

The SURVEIL-X platform suite also includes a fully integrated, web-based case manager with workflow capability for efficient alert management, investigation, and audit trail by leveraging intelligent automation, entity-centric triage, and comprehensive visualization of activities and relationships between entities, alerts, and cases.

SURVEIL-X's data-rich alerting capabilities offer insights related to market movements, market events, trading patterns, and conversations. It offers communication records of employee and client discussions across channels, leverages ML and NLP to understand and classify conversation, and thereby closes compliance gaps along with links to related market data, news, communications, HR data, compensation information, etc.

The platform's story visualization capability enables users to gain insights into the impacts of trades at the microsecond level, streamline case management and investigations with process-driven automated workflows and reconstruct trade timelines significantly faster with automated trade reconstruction. Trade Reconstruction offers a simplified reconstruction of a trade by aggregating, analyzing, and acting on all trade-related data and communications. SURVEIL-X Sales Practices and Suitability detects a wide range of prohibited sales practices, thereby minimizing risk, improving productivity, and enforcing compliance. The platform supports multiple deployment options, including cloud and on-prem.

Analyst Perspective

Following is the analysis of NICE Actimize's capabilities in the Trade Surveillance and Monitoring solutions market:

- NICE Actimize's SURVEIL-X Holistic Conduct Surveillance Suite offers holistic trade surveillance with capabilities for extensive market data feed integration, wide analytics coverage via OOTB models and self-service analytics, and automated Trade Reconstruction.

- NICE Actimize's SURVEIL-X platform analyses all trade, communications, and other surveillance data and uses AI-powered analytics and advanced machine learning to produce precise alerts and help organizations significantly reduce false positives. With its new enhanced version of SURVEIL-X Holistic Conduct and Trade Surveillance solution, NICE Actimize offers improved surveillance and risk detection capabilities and scalability, better detection coverage, combined with new AI applications to reduce false positives, as well as the ability to monitor Microsoft Teams communication.
- Additionally, the company offers SURVEIL-X Behavior, an employee monitoring solution that combines behavioral science with multi-factor detection to proactively identify risks. The solution leverages the SURVEIL-X holistic conduct surveillance platform to perform multi-factor detection using trading data, employee communications, sentiment analysis, and employee information (compensation, attendance, access to network).
- Some of the key differentiators of the SURVEIL-X platform include AI-driven holistic surveillance with precise alerting and integrated visualization capabilities, simplified client data integrations in both trade and communications surveillance, ability to access over 750+ exchange/venue market data sources, integration with conduct risk scores to build risk profiles on any entity based on customizable behavioral risk factors, and case management tool with robust workflow functionality. The company also offers SURVEIL-X Studio Analytics Development, a cloud-based self-development platform that allows organizations to focus on and build their own detection models.
- NICE Actimize's customers recognize the SURVEIL-X platform for its ease of deployment, integration and interoperability, overall technology experience and customer value proposition, and its customization capabilities to meet their business-specific needs. The company is also highly known for its holistic market surveillance approach backed up by advanced market visualization, advanced analytics, and out-of-the-box coverage capabilities.
- In terms of geographical presence, NICE Actimize has a major presence in North America, particularly the US, EMEA, and APAC.

The company supports a variety of financial customers from the sell-side and buy-side. The major verticals for NICE Actimize include investment banking, global banks, wealth management, asset management, insurance, cryptocurrency, utilities, and brokerage sectors. NICE Actimize supports various use cases, including ensuring compliance with suitability regulations in the cloud, reduction in false positives, coverage for a broad range of asset classes from equities, including FX and cryptos, SURVEIL-X for wealth surveillance, strong and repeatable compliance process, monitoring voice and electronic communications, automated compliance with suitability regulations, and more.

- NICE Actimize's roadmap for SURVEIL-X includes continuing to build upon the focus areas for coverage, intelligent investigations, and precise detection. The company continues to invest in improving communication understanding capabilities by leveraging advanced NLP technology. The company plans to improve its real-time surveillance with risk-based 360-degree employee behavior monitoring with predictive scoring. NICE continues to leverage compliance data to provide revenue-generating business, sales, and trading insights. Additionally, it is focused on creating a global surveillance community promoting the sharing of best practices and analytical detection models.

LIST

URL: www.list-group.com

Founded in 1985 and headquartered in Pisa, Italy, List is a financial technology solutions and services provider to the global trading market and trading community, including trading venues, market makers, brokers, asset managers, risk managers, and compliance officers. The company provides a multi-compliance solution titled LookOut for trade and market surveillance, regulatory reporting, and business analysis. The solution has been specially designed for investment firms for both buy-side and sell-side and Trading Venues. LookOut's module titled FX Global Code also extends its data-centric surveillance system support to the foreign exchange domain. The LookOut solution offers comprehensive capabilities, including data quality management, surveillance engine, case management, and data analysis.

List's LookOut solution provides data quality management capability that offers easy data ingestion from various sources and data quality enforcement, which are crucial parameters to ensure regulatory-compliant record keeping, effective surveillance, and accurate reporting. LookOut's robust data management engine functions in real-time or in batches to integrate and correlate data from a variety of sources, perform pre-ingestion checks, including correct and consistent data, monitor full data feeds and quality assurance processes, and send alerts for unexpected behaviors.

The solution offers a sophisticated cross-product pattern recognition surveillance engine capability, which analyzes orders, trades, quotes, market data in public, and news in near real-time or batches to effectively detect market manipulation and insider trading behaviors. Further, it manages best execution policies, market making, as well as trading obligations and monitors market integrity. The digital detection agents investigate both trading data and the operator's behavior to ensure increased efficiencies and reduced false positives. The users can initiate surveillance runs using what-if analysis and threshold validation.

LookOut solution's web-based case management system leverages process automated algorithms and Natural Language Processing (NLP), which simplifies and accelerates the investigation process. The extensive dashboard correlates and gathers data required for investigation. The user navigates through this data using powerful tabular and graphical data navigation tools during case analysis to get a

holistic view of trading data and related market data for a better understanding of the events and their impact on the market.

The LookOut solution's data analysis capability embeds a robust no-SQL data analysis engine that can process a large number of data records in seconds, allowing data engineers to develop comprehensive dashboards and graphical analysis tools. Moreover, the LookOut data warehouse on this system leverages informational content, which is effectively used by organizations to implement custom analysis, data mining, and dashboard monitoring. The solution supports both deployment models, including cloud and on-prem.

The LookOut solution offers pattern detection agents that leverage the correlation between private and market data to spot manipulations. The solution also allows the setting up of what-ifs, as well as pattern groups, applied to specific sets of thresholds, trades, and subject scenarios.

List's FX Global Code module extends support of the surveillance system to the foreign exchange domain. It offers the detection of insider dealing patterns, market manipulation patterns, and specific FX global code patterns.

Analyst Perspective

Following is the analysis of List's capabilities in the Trade Surveillance and Monitoring solutions market:

- List offers a data-centric, multi-asset, multi-compliance trade surveillance system titled LookOut for record-keeping, market surveillance, regulatory reporting, and business analytics. The system has been specially designed as a robust, reliable yet flexible, fast data collecting storage, retrieval, and analysis system for buy-side, sell-side firms, and trading venues.
- The solution is efficient and highly scalable as it processes a large amount of data while complying with MiFID II requirements. It leverages high scalability and fault tolerance using the Cassandra Hadoop noSQL database system for its historical storage backend. The solution complies with European regulations and similar requirements globally, including MAD/MAR, MiFID/MiFIR, SFTR, Dodd-Frank, and more.

- List's differentiators include its pattern recognition surveillance engine, which allows organizations to autonomously set up/tweak patterns thresholds and launch runs during the day as well as set up and run specific production scenarios. The comprehensive dashboards accessible during case analysis provide a holistic view of trading data and related market data to organizations in the form of charts and tables.
- List has a strong presence in Europe, followed by North America and APAC. The company supports various use cases, including broker monitoring its clients for market manipulation on listed instruments such as equity, bonds, and more, asset manager monitoring its portfolio managers and traders for insider dealing frauds or price manipulation, dealer and banks monitoring their proprietary trading desks for manipulation, service bureau offering surveillance to their client network and, exchange surveillance. The solution serves a variety of industries, including investment firms, asset managers, trading venues, and service bureaus.
- From the perspective of the challenges in surveillance space, increasing the efficiency of the solution and continuously improving it by finding new techniques and approaches in identifying market abuses more accurately, thus reducing false positives. Rising data cost is another challenge. However, with the robust product strategy and roadmap, the company is well on track to overcome these challenges in the near future.
- From the product roadmap perspective, List will continue to focus on the adoption of innovative technologies, evolving and updating pattern detection, and product usability. The company will continue to invest in new machine learning and AI algorithms to improve insider trading detection patterns and alerting. The company is also focusing on adding detection models to cover cryptos. The company is further working towards a near real-time data monitoring tool to oversee data ingestion and to improve user experience.

Nasdaq

URL: www.nasdaq.com

Founded in 1971 and headquartered in New York, US, Nasdaq is a global provider of trading, clearing, listing, information, exchange technology, and public company services. The company offers trade surveillance and monitoring through its solution titled SMARTS to provide enhanced surveillance and market abuse detection for financial institutions, including banks, brokers, and exchanges. The solution offers comprehensive capabilities, including data ingestion, alerting and case management, advanced analytics, and market replay.

Nasdaq's SMARTS solution's data ingestion capability leverages Nasdaq market data that enables organizations to fulfill transactions quickly. This capability also facilitates organizations to receive automatic software updates for a smooth, secure experience. The solution offers alerting and case management that allows organizations to receive tailored alerts that are more sensible and actionable for a given market and asset. This capability allows organizations to evaluate alerts quickly by presenting cross-market issues in a snapshot.

The SMARTS solution's advanced analytics capability enables organizations to detect market manipulation. This capability leverages AI and analytics to help organizations identify and learn from emergent methods to detect suspicious patterns. The solution offers market replay capability that enables organizations to replay any transaction using advanced techniques. This capability allows organizations to revisit the order book to reconstruct transactions with precision for investigation.

Analyst Perspective

Following is the analysis of Nasdaq's capabilities in the Trade Surveillance and Monitoring solutions market:

- Nasdaq offers a comprehensive trade monitoring and crime detection solution titled SMARTS to help organizations track suspicious patterns across asset classes and markets. The solution helps organizations prioritize and focus on critical alerts by improving the organizations' data sorting, detection, and investigation efficiencies. The solution

also offers intuitive visualizations, ensures compliance, and provides organizations with the ability to track violations across a variety of markets and asset classes.

- The solution is expansive and offers a broad range of features, including coverage of hundreds of alert scenarios. The solution has the ability to meet various regulatory needs to help organizations stay compliant with various regional and global regulatory standards, including MAR, MiFID II, Dodd-Frank, the FX Code of Conduct, and more. Additionally, the solution enables organizations to streamline processes in monitoring while allowing analysts to focus on other critical investigations and helping organizations to reduce operational complexity.
- The key differentiators of the solution include its comprehensiveness, coverage of a wide range of asset classes and markets, hundreds of alert scenarios, and the company's own market data offering.
- In terms of geographical presence, Nasdaq has a strong presence in North America, EMEA, and APAC. The solution serves a variety of industries, including asset and wealth managers, banks, brokers, exchanges, ETFs, and more.
- The company may face competition from the larger and well-established players in the trade surveillance and monitoring market. However, with its sophisticated platform capabilities and robust product strategies and roadmaps, Nasdaq is well-positioned to retain its market share in the global trade surveillance and monitoring market.
- In terms of the roadmap perspective, the company continues to focus on enhancing its solution to provide a better experience. The company will continue to invest in enhancing its technology to improve predictive pattern detection.

BAE Systems

URL: www.baesystems.com

Founded in 1999 and headquartered in Falls Church, Virginia, USA, BAE Systems, Inc. is the U.S. subsidiary of BAE Systems plc. The company delivers a full range of products and services for air, land, and naval forces, as well as advanced electronics, security, information technology solutions, and customer support services. The company protects against financial crime and provides risk management and fraud detection and prevention across banking, financial markets, and insurance via the NetReveal Platform. NetReveal platform's key capabilities and features include centralized 360-degree customer view, data aggregation across multiple data sources, case management, alerts and dashboarding, KRI console and simulator (parameter and calibration), watch list manager, configurable workflow, audit trail support, integrated analysis of data extensions, market replay, visualizations and heatmap, repeat pattern detection, behavioral detection, and advanced analytics & machine learning.

The platform provides a centralized 360-degree customer view by covering all aspects of compliance and fraud by consolidating related alerts, evidence, and financial metrics. This central investigation source presents investigators with a single combined alert related to a customer or entity. The solution incorporates risk, compliance, fraud typologies, and advanced analytics from market abuse and manipulation through a fraud pattern recognition solution. It aggregates multiple data sources and identifies risks from seemingly unrelated data and relationships. It enables efficiencies across compliance, risk, and fraud by working, managing, and reporting cases through a single enterprise investigation management (EIM) tool, which is a part of financial crime, fraud, and trade surveillance solutions.

The NetReveal EIM case management tool is used across all banking divisions and geographies as a unified case management system. It provides transaction monitoring, contextual monitoring, social network analysis, advanced analytics, machine learning (supervised and unsupervised), and enterprise investigation management. It can be used to investigate, analyze, and report across multiple typologies for compliance and fraud operations. The solution is configurable and facilitates the roll-up of alerts for entity-specific or order, trade, event, and lifecycle components. The platform enables users to create and customize dashboards easily. Its white box detection engine allows authorized users to develop their own detection scenarios or duplicate existing scenarios and establish inclusions,

exclusions, or profile any field for thresholds, weightings, and standard deviations. The platform's key risk indicators (KRI) console and simulator allows authorized users to calibrate and manage parameters, weightings, thresholds, temporal strategies, and peer group analysis and develop models to compare the results against data sets, both current and historical, in a simulation environment.

NetReveal's watch list management enables real-time identification of restricted instruments, issuers, or monitored entities and supports all standard lists as well as customers' own lists. Inclusion and exclusion events and lists can be added or customized by authorized users or supervisors. The platform's workflows are configurable to suit customers' business processes and risk appetite. It also supports multi-layer investigator levels. It provides in-depth audit trails and configurations for appropriate authorized administration users or supervisors. Additionally, all types of data extensions can be incorporated as required, and examples include voice and electronic communications and news and sentiment analysis.

NetReveal's orders and trade analysis and search engines provide full lifecycle replay and a full historical replay of events. Its cross-filter analysis allows interactive visualization and drilldowns of orders and trades from years to mins/secs. As part of EIM, the cross-filter analysis tools provide graphical visualizations, heatmaps, timelines, weighted volume, or value analysis. Additionally, word analysis and other lifecycle component visualizations are available as required. An advanced analytics platform incorporated into NetReveal solutions can help provide advanced graphical visualizations, including 3D modeling. NetReveal's detection scenarios and key risk indicators include repeat pattern detection such as unusual concentrations, significant weighted volume against market venue or value, or other data fields. Using base currency equivalents as well as original currency valuations are easily comparable, filtered, searchable, and sortable together with risk score and priorities of whether orders, trades, or transactions or entities are alerted currently or previously.

NetReveal's reporting command and control tool and cross filter analysis dashboards enable users to configure their own MI reports and analysis. It provides entities such as employee behavior analysis, trade behavior analysis, and alerting. The latter allows alerts to be hibernated but are still tracked for audit purposes and other statistical analysis. Its advanced analytics platform (AAP) enables "Citizen Data Scientists" with business knowledge and does not require in-depth data science expertise to utilize machine learning and advanced analytics with data interrogation.

Analyst Perspective

Following is the analysis of BAE Systems' capabilities in the Trade Surveillance and Monitoring solutions market:

- BAE System provides NetReveal Enterprise Investigation Management (EIM), a platform that spans the entire financial crime, risk, fraud, and compliance functions. It is an open and flexible case management platform that efficiently organizes data inputs (including third-party data) and prioritizes and centralizes alerts and incidents into one enterprise-wide investigation platform to help manage investigations. Driven by advanced analytics, NetReveal can effectively detect anomalous behavior with effective positive/negative detection and false positive reduction. NetReveal supports fuzzy matching, machine learning, behavioral rules, and graph analytics and provides full flexibility to modify detection to match the businesses' risk needs. The platform's key differentiating factors include integrated risk management, data science practice, enterprise investigation management, and client self-service employment.
- Concerning geographical presence, BAE Systems has the strongest presence in Europe, followed by APAC. The major use cases of BAE Systems' trade surveillance & monitoring solution are fraud risk pattern recognition/unauthorized trading, AML for capital markets, market abuse and manipulation, supervised and unsupervised machine learning, advanced analytics and machine learning, order and trade analysis and MI reporting, and white box scenario detection.
- The key challenge for BAE Systems is competition from the emerging vendors that offer innovative technology solutions and some well-established trade surveillance vendors. However, with its sophisticated technology platform, comprehensive functional capabilities, robust roadmap, and high customer value proposition demonstrated by compelling customer references, BAE Systems is well-positioned to maintain and grow its market share in the trade surveillance & monitoring market.
- Concerning roadmap, BAE Systems is focusing on investing in cloud-native technologies, networking analytics, advanced analytics, unsupervised and supervised machine learning, and behavioral ecosystem.

London Stock Exchange Group (LSEG)

URL: www.lseg.com

Founded over 300 years ago and headquartered in London, UK, LSEG is a global financial markets infrastructure and data provider. LSEG acquired Refinitiv, a provider of data about financial markets and infrastructure, in 2021 to provide comprehensive financial data and analytics to its customers. LSEG offers solutions right from trading, market surveillance to wealth solutions and more. LSEG Technology, a fully owned subsidiary of LSEG, offers a trade surveillance platform titled Millennium Surveillance. The multi-asset, multi-market, out-of-the-box robust surveillance platform, focused on improving the efficiency of market abuse investigations, offers comprehensive capabilities such as real-time surveillance, alert configuration, integrated business analytics, self-serviceability, interactive dashboards, multi-asset class support, data visualization, and data analytics.

The Millennium Surveillance platform offers real-time alerting and investigation capabilities that identify market abuse and manipulation attempts for immediate action to maintain orderly markets. The platform leverages machine learning technologies to offer ML-based anomaly and outlier detection to help calibrate alert parameters. The platform also offers a standard pattern miner functionality that mines historical data to find missed market manipulations and provides continuous calibration of missed parameters. It also offers python and Scala languages for easy alert configuration.

The platform allows users to leverage preferred data visualization and analytics tools to increase the scope of alert investigation. It also enables users to create interactive dashboards that combine surveillance data with external data and provide a complete view of the order to reduce false positives, detect manipulations and insider trading behaviors. The platform's self-serviceability capability enables user-defined alerts, reports, and dashboards to leverage and extend surveillance features. It offers interactive dashboards derived via user preferred data visualization tools with an option to drill down to granular data. The platform also offers an alerts ingestion gateway that can ingest alerts and warnings from external systems to optimize alert workflow and management efficiencies.

Millennium Surveillance provides extensive support for multiple asset classes including equity, fixed income, currencies, commodities, and derivatives. It consolidates data from multiple markets/asset classes within the limits of a single instance.

Analyst Perspective

Following is the analysis of LSEG's capabilities in the Trade Surveillance and Monitoring solutions market:

- LSEG offers a trade surveillance platform titled Millennium Surveillance that supports multiple markets/assets on a single platform. It leverages a distributed process architecture, where logical units of a large system are broken down into small manageable processes deployed on off-the-shelf servers and high bandwidth networks. The Millennium Surveillance platform's data analytics framework provides a rich environment that allows the same dataset required for trade surveillance functions to be utilized for a multiplicity of new business use cases, thus optimizing the infrastructure, and sharing the costs across business units.
- Millennium Surveillance is a part of the integrated Millennium Trading product suite that includes Millennium Exchange, Millennium SOR, and Millennium market Data offerings to offer a fully integrated solution to address the trade execution requirements. Millennium Surveillance platform's key differentiators include its data analytics framework, collaboration, and self-serviceability for alerts configuration.
- Concerning geographical presence, LSEG has a presence in EMEA and APAC. The major use cases of LSEG's trade surveillance & monitoring solution include compliance/self-regulation, market replay, visualization tools, reporting, configurability, and multi-asset.
- Owing to the fragmented trade surveillance solutions market scenario, several small and large vendors are competing in terms of technology excellence to offer competitive solutions by leveraging ML technologies. LSEG faces competition from the emerging vendors offering innovative trade surveillance solutions as well as well-established trade surveillance vendors. However, with its sophisticated technology platform, comprehensive functional capabilities, and strong industry expertise, LSEG is well-positioned to maintain and grow its market share in the trade surveillance & monitoring market.

Intellect Design Arena

URL: www.intellectdesign.com

Founded in 2014 and headquartered in Chennai, India, Intellect Design Arena is a provider of financial technology to banking, insurance, and other financial services. Intellect Design Arena provides contextual and real-time trading aided by online market rates and news, comprehensive and AI-based analytics, and research through its flagship brokerage solution, Capital Alpha, which is a multi-exchange, multi-asset, multi-channel, multi-currency, multilingual integrated platform. The platform offers comprehensive trade surveillance capabilities, including omnichannel trading, risk management, fully integrated back office, research & analytics, dashboarding, advanced analytics, and dynamic workflow management.

Capital Alpha is an enterprise brokerage solution that consists of an integrated front-to-back “Broker-In-A-Box” solution, which provides contextual trading backed by research and analytics. Capital Alpha provides holistic surveillance across levels and asset classes. It offers omnichannel access to trade and market information and supports trading in multiple asset classes across markets. It enables surveillance across asset classes, including exchange-traded and distributed, trade surveillance with the market and compliance monitors for retail and institutional investors, and adjustment capability of risk rules, risk limits, exposure rules, and margin rules, depending on the investor trading pattern and exposures. Capital Alpha also provides real-time pre- and post-trade risk management.

Capital Alpha offers a fully integrated back office with comprehensive coverage for post-trade processing, ready adapters, flexible & template-driven fees & commission module, a three-level general ledger, and over 100 pre-built reports, including regulatory & client communications. The Capital Alpha research module helps users in making investment decisions based on contextual & real-time market news, charts, and analytics through a user-friendly dashboard. Capital Alpha analytics provide data-driven insights for improved decision-making. It incorporates AI-based Sentiment Analysis that enables actionable insights from unstructured data. The platform’s in-built tools provide better alpha generation, such as industry dashboard; sector performance dashboard for easy access to news, research, and events; technical analysis along with sentiment calculator; and real-time generation of analytical data which can be extracted into excel or

any other BI tool for research purposes. The suite includes AI-based sentiment analysis, NLP (Natural Language Processing) based bots to assist investors, research-based awareness, and real-time dashboards for monitoring trades and delivering insights. Capital Alpha's advanced analytics offer AI-driven sentiment analysis to gain actionable insights from unstructured data, which helps in the investment decision process.

Capital Alpha offers a complete workflow for the planning, monitoring, and mitigation of risks. Planning is performed through a robust rule-driven engine with multiple levels of configuration and rules set by risk stakeholders. Monitoring is done in both real-time and through batch processing. Mitigation of risk is accomplished in real-time using the system's features of price alerts, bulk order cancellation, and bulk square-off of open positions. Capital Alpha supports multiple real-time technologies like Multiplex ITXR, low latency trading, real-time market data, multiple markets, colocation/proximity hosting, and fix gateway. The technology flexibility is further enhanced through out-of-the-box connectors/integrators such as exchange adapters (FIX and Proprietary), payment gateways, FIX (MPN and Bloomberg), and market information data providers (FAST, ITCH, and Matriks). Additionally, the solution also supports SOAP, RESTful API, Web Services, Files, etc. The product offers flexible deployment options of on-premise to cloud-based, supporting single tenant or multi-tenant, as a managed service offering combining IaaS and SaaS through a hosted infrastructure or as a SaaS offering through a stock exchange private cloud.

Analyst Perspective

Following is the analysis of Intellect Design Arena's capabilities in the Trade Surveillance and Monitoring solutions market:

- Capital Alpha provides an omnichannel trading experience for the investor through contextual trading, backed by research and analytics. It ensures compliance through real-time and integrated pre and post-trade risk management and increases the efficiency of operations through a comprehensive back office, combining clearing & settlements, fees & commissions, corporate actions, reports, and interfaces to market entities. The platform enables brokerage houses to scale up their business by supporting both domestic and cross-border trading for retail and institutional clients. Capital Alpha's

capabilities encompass the entire workflow of planning, monitoring, and mitigating risks via precise surveillance on three different levels: Broker Firm Level, Investor Level, and Asset-Class Level.

- Capital Alpha's modular and decoupled nature of architecture enables brokerages to easily deploy part of the solution on a requirement basis with API-based interfaces to existing IT systems. The major differentiators of Intellect Design Arena include integration of order and risk management with the back office on a real-time basis to avoid imbalance and unnecessary data, low latency order routing and colocation ready for faster order execution, and omnichannel access to end-users. The solution also offers a framework for regulatory compliance for member firms and internal compliance for investors with the member firm. Additionally, it provides the facility to adjust risk limits, risk rules, margin rules, and exposure rules based on the investor trading pattern.
- Concerning geographical presence, Intellect Design Arena has a strong presence in the APAC region. From an industry vertical perspective, retail brokerage houses in the regions of Colombo, Bangladesh, Philippines, Malaysia, Thailand, and Istanbul form a majority of the customers, followed by stock exchanges. Capital Alpha supports various use cases, including latency optimization, integrated front, mid, and back-office functions, real-time risk monitoring, omnichannel access, and an online bank/depository interface.
- Intellect Design Arena faces competition from well-established players offering a broad range of fraud and risk management solutions. The company may face a challenge in expanding beyond the APAC region due to the dominance of other well-established players. However, with its comprehensive functional capabilities, robust roadmap, and high customer value proposition demonstrated by compelling customer references, Intellect Design Arena is well-positioned to maintain and grow its market share in the trade surveillance & monitoring market.
- Concerning roadmap, Intellect Design Arena is focusing on further automation by applying RPA (Robotic Process Automation) to manual processes and adding more decision support tools based on trading behavior patterns. Furthermore, Intellect Design Arena is focusing

on leveraging advanced AI and machine learning to integrate market monitoring, trade surveillance, and sentiment analysis for improving in taking better investment decisions.

Eventus

URL: www.eventus.com

Founded in 2015 and headquartered in Austin, TX, Eventus is a global provider of multi-asset class trade surveillance and market risk solutions. The company provides a comprehensive platform, Validus, that combines surveillance, market risk, algo monitoring, and AML/transaction monitoring to maximize the efficiency of regulatory operations. Its Validus solution is designed for both traditional and digital assets, including equities, futures, options, foreign exchange (FX), fixed income, and cryptocurrencies. The solution's key trade surveillance capabilities include comprehensive coverage and connectivity, account data integration, market risk, algo monitoring, anti-money laundering and transaction monitoring, alert and workflow management, data integration, analytics, visualization, and order book replay.

Eventus's trade surveillance solution offers comprehensive coverage across a variety of market manipulation strategies, including Reg NMS/order marking, intermarket sweep orders (ISOs), spoofing, layering, wash trading, momentum ignition, and others. The solution offers hundreds of out-of-the-box integrations to suit specific organizational requirements. The solution includes integrated alerting, investigation, and remediation functionalities to effectively minimize market abuse and risks. Additionally, it leverages ML and robotic process automation (RPA) to effectively manage a large volume of alerts and their remediation. The solution streamlines account data integrations through full-featured APIs and helps organizations reconcile data collected through multiple counterparties and platforms.

Eventus's Validus market risk solution provides an integrated view and ensures compliance with the financial risk controls in every pre-trade and trading system, including OMS and EMS. The solution offers validation checks to determine that all systems are functioning properly. Further, the solution captures violations that are missed by other systems and allows further addition of a set of risk limits that are beyond the organizations' pre-trade systems. Additionally, the solution integrates alerting, investigation, and remediation and offers flexible reporting capabilities to reduce risk, increase the organization's confidence, meet regulatory compliance, and improve efficiency to quickly solve the issues.

Eventus's Validus algo monitoring solution offers real-time trading algorithms performance monitoring across multiple customizable parameters, including volume, frequency of orders, cancels, fills, and more. The solution generates actionable alerts within five seconds after a parameter breach. The solution supports the "kill switch functionality" by rapidly identifying the algo responsible for the breach. Additionally, the solution provides a sandbox environment for in-depth algo testing and integrates alerting, investigation, and remediation to reduce risk, and prevent interruptions of proper functioning algos. Further, the solution supports MiFID's Regulatory Technical Standard (RTS 6) requirements for immediate remedial action when an alert is generated, increases the documentation efficiency of testing results, and ensures compliance with regulations, including Market Abuse Regulations (MAR).

Eventus's Validus anti-money laundering and transaction monitoring solution is specifically customized for broker-dealers and market centers that offer real-time transaction monitoring to empower quick detection of suspicious behavior. It smoothly integrates into both KYC and deposit/withdrawal platforms to detect suspicious transactions and support KYC and AML activities. The solution includes robust detection tools and a full trade life cycle viewer having time and sales data integrated with order-level data and a market visualizer to display order-level data covered with market data. Additionally, the solution includes a comprehensive, customizable, and configurable reporting solution that augments the statistics package with capabilities such as trader and account profiling to meet their specific business requirements.

Validus is flexible and offers a data integration capability that enables organizations to ingest customer order and trade data, reference data, and public data messages. The solution can ingest data in any format, including client proprietary formats. The solution offers an analytics capability that provides organizations with hundreds of customizable analytical functions to combine order lifecycle data with public market data, reference data, and additional third-party data to identify events or patterns that help meet specific criteria and trigger an actionable alert for follow-up.

Validus's visualization capability provides organizations with advanced visualization tools such as a Market Visualizer and Insider Trading Visualizer. These tools display a series of events during a specific time frame. The events covered include the time when the alert is generated, displaying orders, cancels, fills, the addition of instruments, or contextual data such as regulatory news announcements. This

allows surveillance teams to perform a detailed review of events around an alert and accordingly take action to close the alert or initiate a deeper investigation. The solution's order book replay capability utilizes historical data to allow organizations to analyze the order book over a specific time frame. This capability allows organizations to have access to full order book data to view the full context around a particular alert or series of suspicious events. The solution supports multiple deployment options, including cloud and on-premise.

Analyst Perspectives

Following is the analysis of Eventus's capabilities in the Trade Surveillance and Monitoring solutions market:

- Eventus offers a holistic trade surveillance and market risk solution portfolio addressing regulatory, operational, financial, and technology risks in a single platform. The company has successfully served many large, high-volume trading firms to meet their scalability requirements. Key differentiators of Validus include RPA and ML-driven capabilities for alert and workflow management, enhanced Python scripts to offer quick customization, and robust alert audit-trail functionality that enables managers to supervise surveillance analysts more effectively. The company also provides the Jupyter Labs Python interface that allows organizations to develop their own reports by utilizing data sourced from the Validus solution.
- Validus is recognized by Eventus customers for its scalability, ease of configuration, and customization to suit organization-specific requirements and ease of use.
- The Validus platform offers seamless connectivity to over 100 exchanges and market centers to improve the performance of trade surveillance and monitoring functions. With numerous out-of-the-box APIs and the ability to offer custom integration, the platform offers a robust interoperability experience across various systems.
- The company has a strong presence in North America and has been growing its presence steadily across several geographical locations including UK/Europe, the Middle East, and the APAC region. The

company covers a variety of functions, including surveillance for market abuse and fraud, staying compliant with regulations in regions across the globe, fulfilling regulatory requirements to do business (e.g., crypto exchanges in the APAC region and helping clients satisfy Designated Contract Markets (DCM) requirements for the CFTC), management reporting, behavioral analytics and signaling, and risk and position monitoring.

- From a challenges perspective, the majority of Eventus customers are in North America, however in recent years it has expanded its customer base into EMEA and APAC, with the latter now representing 25% of its business. The company may consider tapping the growth opportunities across other geographies to further enhance its market penetration. While the company previously faced challenges in competing with its larger, well-established competitors with integrated solutions for AML, it has since enhanced its capabilities to enable integrated solutions for fraud, AML, and trade surveillance. From the technology perspective, while the company has no plans of venturing into communication surveillance and has opted to partner with leaders in this space such as VoxSmart, other competitors have done so, which includes integrating emerging digital channels. However, with the robust product strategy and roadmap and strong customer ratings, the company is well on track to overcome the above challenges in the near future.
- From a product roadmap perspective, the company is constantly expanding its partner ecosystem, improving integration and interoperability and built-in connectors for a range of systems and data sources. The company is also enhancing its data integration capabilities and abuse detection capabilities to further augment its trade surveillance and monitoring performance. The company is further strengthening the platform, including improving digital asset transaction monitoring, developing and testing traders' profiles, as well as enhancing insider trading, AML, and statistical functionality. The company is also focusing on the new order book replay feature to support the investigation of suspicious events and ways of improving surveillance. The platform is continuously updated, based largely on client input.

SteelEye

URL: www.steel-eye.com

Founded in 2017 and headquartered in London, UK, SteelEye provides a holistic compliance platform offering trade and communication oversights and regulatory reporting to financial markets. The company offers trade surveillance and monitoring capability through its solution, SteelEye Trade Surveillance, which offers enhanced market abuse detection for financial services. The solution offers comprehensive capabilities, including data capture, customized search, backtesting, and case management.

SteelEye's Trade Surveillance solution's data capture capability allows organizations to seamlessly capture data from various sources. This capability also allows organizations to seamlessly consolidate their structured and unstructured data regarding any asset class or instrument. This consolidated data is aggregated with embedded market data from a range of international exchanges and global news to help organizations effectively manage their trade surveillance data.

The SteelEye solution's customized search capability enables organizations to create and customize searches to accelerate investigations easily. The solution utilizes the advanced refine capabilities that allow organizations to quickly identify and retrieve any dataset and resolve market abuse risks. It also allows organizations to configure and tweak their alerts by utilizing an extensive list of defined parameters that help reduce false positives and adjust to current market conditions.

SteelEye's Trade Surveillance solution's backtesting capability enables organizations to test any new watches against historical data to evaluate the impact of a new alert. This assessment also helps organizations to reduce false positives and tweak surveillance procedures. The fully integrated case management capability enables organizations to easily build auditable cases for investigation and escalation. The capability also offers advanced visualization tools that can accommodate relevant, aggregated data across different markets, instruments, and asset classes to allow organizations to investigate triggered alerts. The solution supports cloud-based deployment.

Analyst Perspectives

Following is the analysis of SteelEye's capabilities in the Trade Surveillance and Monitoring solutions market:

- SteelEye offers an advanced market abuse detection and trade surveillance software titled SteelEye Trade Surveillance, which integrates and connects large volumes of data and applies advanced automation to enable organizations to monitor their market abuse requirements more efficiently and accurately. The asset class-agnostic Trade Surveillance solution integrates trade and order data on a single platform aggregated with market data, news, and social media sources to provide organizations with more insightful data.
- The company offers a variety of intelligent trade surveillance tools to detect a broad range of market abuse activities and behaviors that allow organizations to monitor, prevent, and mitigate market abuse risk. The solution empowers organizations to enhance their risk detection, improve oversight, and maintain compliance while allowing analysts to focus on other essential tasks and enabling organizations to achieve cost-effectiveness.
- The key differentiators of the solution include its ability to consolidate structured and unstructured data from various sources and provide organizations with usable insightful data. The solution automatically collects and collates communications and trade data from multiple sources to enable organizations to get a unified view. The solution allows organizations to search, sort, filter, and view their data quickly and effectively by utilizing its ElasticSearch technology. The solution offers a market abuse module that enables organizations to monitor the trading risk of any regulatory jurisdiction through detailed market abuse analysis. The trade data run through pre-calibrated algorithms generates alerts that are fully customizable by region, asset class, and liquidity, including trader/portfolio manager and client/fund/broker. The company's user-friendly and modern UX offers powerful visualization tools that provide organizations with a smooth user experience. The secured and browser-based UI offers intuitive dashboards that provide organizations with interactive graphs and charts.

- In terms of geographical presence, SteelEye has a strong presence in Europe, North America, and APAC. The solution serves a variety of industries, including asset and wealth managers, banks, brokers, hedge funds, and more. The solution supports use cases for various market manipulations, including wash trading, front running, insider trading, spoofing, parking, and painting the tape.
- The company may face competition from the larger and well-established players in the trade surveillance and monitoring market. The company needs to move faster in other geographies to leverage growth opportunities. However, with its sophisticated platform capabilities and robust product strategies and roadmaps, the company is well-positioned to retain its market share in the global trade surveillance and monitoring market.
- In terms of roadmap, the company continues to focus on enhancing its solution to provide a better experience. The company will continue to invest in enhancing AI technology to improve predictive pattern detection.

b-next

URL: www.b-next.com

Founded in 1989 and headquartered in Herford, Germany, b-next is a provider of corporate software in the capital markets trading surveillance and compliance sector. b-next offers trade surveillance and monitoring through its product suite titled Capital Markets Compliance (CMC). The suite comprises modules, including CMC Market Abuse, CMC Insider Compliance, CMC Trades, and CMC Best Execution to monitor trades and violations across asset classes and venues.

b-next offers the detection of market abuse through its module titled CMC Market Abuse to identify and monitor complex market abuse patterns. The robust, automated surveillance module monitors attempted market abuse and manipulation across all trading venues and asset classes. The module automatically checks trading activity against other trades by utilizing reference market data, instrument data, employee data, and other data. The module utilizes advanced trend analysis that helps organizations to identify complex market abuse patterns. The module provides early warning alerts with the ability to execute tick-by-tick market replay for investigation. The alerts are intuitive and can be viewed in a graphical format. b-next's CMC Forest module leverages machine learning algorithms that allow organizations to quickly investigate alerts and identify abusive patterns in a more accurate manner.

b-next offers insider trading detection capabilities through its module titled CMC Insider Compliance to effectively monitor trading activities in an organization. The module empowers organizations to monitor proprietary, customer, and staff trading and empowers the compliance team to extensively view all trading activities within the organization. The company offers an additional feature titled Pre-Clearing that enables organizations to automate the approval process of the employee's personal transactions. It performs all necessary checks, including pre-defined holding periods of amounts as additional parameters for evaluation, and approves the transactions.

b-next offers price surveillance through its module titled CMC Trades to effectively monitor price while monitoring trading activities in an organization. The module enables organizations to automate price surveillance for a broad range of securities, repo and lending, money market, FX, commodities, and listed OTC derivatives transactions for customer trading, proprietary trading, or staff trades.

b-next offers execution and order monitoring through its module titled CMC Best Execution to effectively manage best execution policy and reporting requirements across assets and venues. The module enables organizations to effectively manage best execution requirements while providing maximum returns. The module automatically checks all the transactions against price, liquidity, speed, VWAP (volume-weighted average price), profitability, multiple venues, customer internal trading benchmarks, and more. The module allows organizations to have more in-depth analysis to identify where the best execution was not met, thus complying with MiFID II and other regulatory requirements.

Analyst Perspectives

Following is the analysis of b-next's capabilities in the Trade Surveillance and Monitoring solutions market:

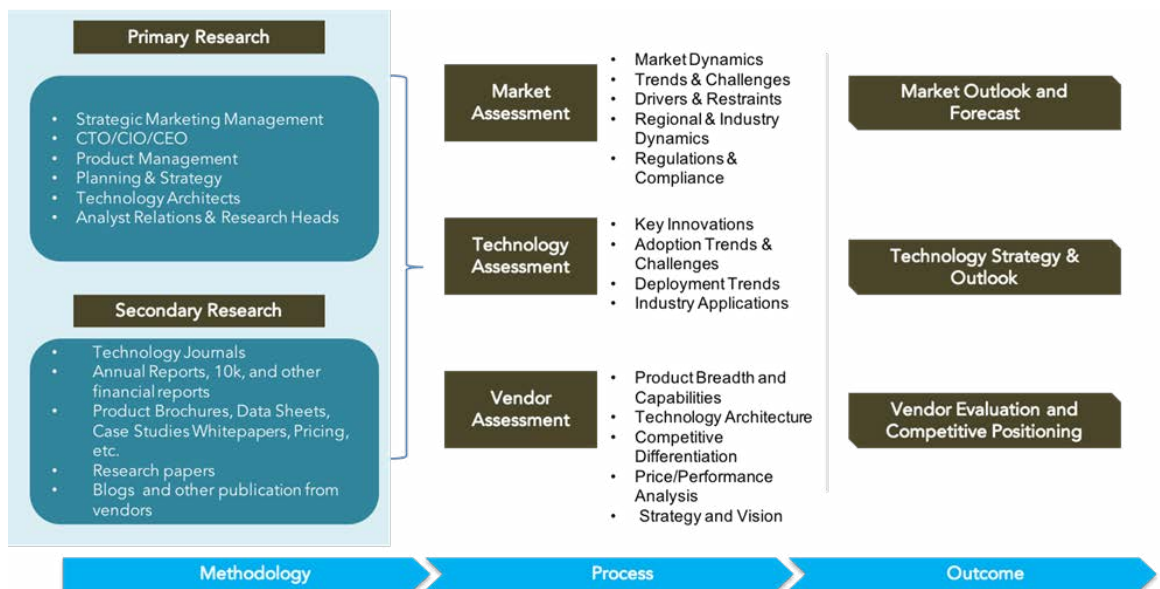
- b-next offers trade surveillance and monitoring capabilities through its product suite titled Capital Markets Compliance (CMC) to monitor market abuse across asset classes and trading venues. The suite offers various modules, including CMC Market Abuse, CMC Insider Compliance, CMC Trades, and CMC Best Execution, to monitor market abuse and report any suspicious activity. The modules provide organizations with various types of monitoring and reporting capabilities, including market abuse monitoring, insider monitoring, cross-market/asset class monitoring, quote monitoring, OTC trade monitoring, and execution and order monitoring. The CMC product suite provides support to sell-side and buy-side firms, and regulatory and trading venue operators to manage risk, comply with regulations, and manage trading efficiencies.
- CMC is a multi-language, multi-tenant configuration product suite that provides organizations with enhanced surveillance across asset classes. The product is underpinned with integrated workflows, report repositories, and security functions to meet the organization's business requirements. The product offers a tamper-proof audit trail and allows organizations to archive data and result history.
- The key differentiators of the product include its ability to provide blockchain surveillance. The product, through its module titled CMC

Blockchain Surveillance, allows organizations to monitor fraudulent activities on blockchains. The module generates alerts on trading frequencies, watchlist/restricted lists, and holding periods to identify safe areas in the blockchain.

- In terms of geographical presence, b-next has a strong presence in Europe, North America, and APAC. The product serves a variety of industries, including banks, brokers, asset managers, regulators, exchanges, and energy firms.
- In terms of challenges, the company may face competition from the larger and well-established players in the trade surveillance and monitoring market. The company needs to move faster in other geographies to leverage growth opportunities. However, with its sophisticated platform capabilities and robust product strategies and roadmaps, the company is well-positioned to retain its market share in the global trade surveillance and monitoring market.
- In terms of the roadmap perspective, the company continues to focus on enhancing its solution to provide a better experience. The company will continue to invest in enhancing its technology to improve predictive pattern detection.

Research Methodologies

Quadrant Knowledge Solutions uses a comprehensive approach to conduct global market outlook research for various technologies. Quadrant’s research approach provides our analysts with the most effective framework to identify market and technology trends and helps in formulating meaningful growth strategies for our clients. All the sections of our research report are prepared with a considerable amount of time and thought process before moving on to the next step. Following is the brief description of the major sections of our research methodologies.



Secondary Research

Following are the major sources of information for conducting secondary research:

Quadrant’s Internal Database

Quadrant Knowledge Solutions maintains a proprietary database in several technology marketplaces. This database provides our analyst with an adequate foundation to kick-start the research project. This database includes information from the following sources:

- Annual reports and other financial reports
- Industry participant lists
- Published secondary data on companies and their products

- Database of market sizes and forecast data for different market segments
- Major market and technology trends

Literature Research

Quadrant Knowledge Solutions leverages on several magazine subscriptions and other publications that cover a wide range of subjects related to technology research. We also use the extensive library of directories and Journals on various technology domains. Our analysts use blog posts, whitepapers, case studies, and other literature published by major technology vendors, online experts, and industry news publications.

Inputs from Industry Participants

Quadrant analysts collect relevant documents such as whitepaper, brochures, case studies, price lists, datasheet, and other reports from all major industry participants.

Primary Research

Quadrant analysts use a two-step process for conducting primary research that helps us in capturing meaningful and most accurate market information. Below is the two-step process of our primary research:

Market Estimation: Based on the top-down and bottom-up approach, our analyst analyses all industry participants to estimate their business in the technology market for various market segments. We also seek information and verification of client business performance as part of our primary research interviews or through a detailed market questionnaire. The Quadrant research team conducts a detailed analysis of the comments and inputs provided by the industry participants.

Client Interview: Quadrant analyst team conducts a detailed telephonic interview of all major industry participants to get their perspectives of the current and future market dynamics. Our analyst also gets their first-hand experience with the vendor's product demo to understand their technology capabilities, user experience, product features, and other aspects. Based on the requirements, Quadrant analysts interview with more than one person from each of the market participants to verify the accuracy of the information provided. We typically engage

with client personnel in one of the following functions:

- Strategic Marketing Management
- Product Management
- Product Planning
- Planning & Strategy

Feedback from Channel Partners and End Users

Quadrant research team researches with various sales channel partners, including distributors, system integrators, and consultants to understand the detailed perspective of the market. Our analysts also get feedback from end-users from multiple industries and geographical regions to understand key issues, technology trends, and supplier capabilities in the technology market.

SPARK Matrix: Strategic Performance Assessment and Ranking

Quadrant Knowledge Solutions' SPARK Matrix provides a snapshot of the market positioning of the key market participants. SPARK Matrix representation provides a visual representation of market participants and provides strategic insights on how each supplier ranks in comparison to their competitors, concerning various performance parameters based on the category of technology excellence and customer impact.

Final Report Preparation

After finalization of market analysis and forecasts, our analyst prepares necessary graphs, charts, and table to get further insights and preparation of the final research report. Our final research report includes information including market forecast; competitive analysis; major market & technology trends; market drivers; vendor profiles, and such others.

Client Support

For information on hard-copy or electronic reprints, please contact Client Support at rmehar@quadrant-solutions.com | www.quadrant-solutions.com