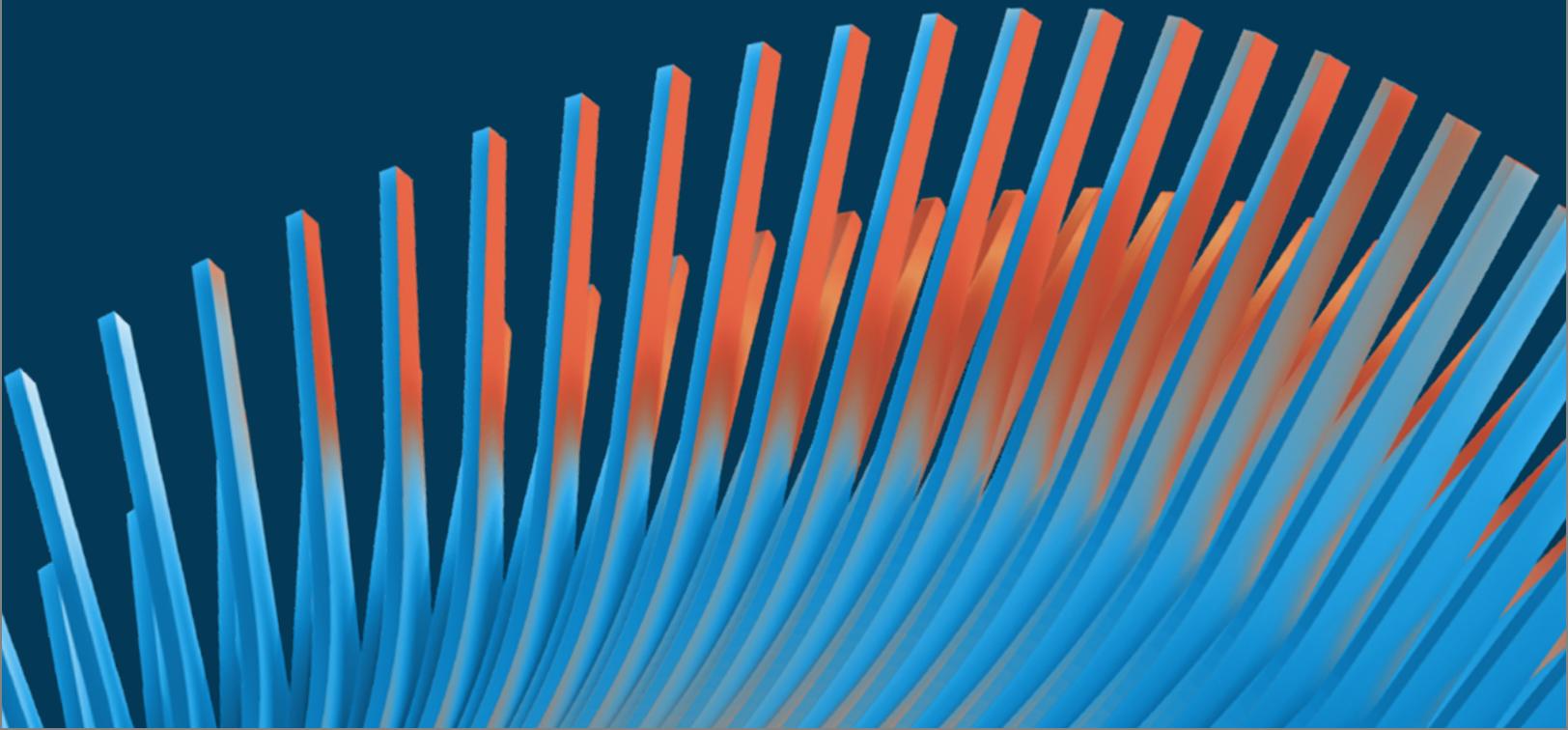


DTCC

ADVANCING FINANCIAL MARKETS. TOGETHER.™



MARKET STRUCTURE RISK CONTROLS: AN INDUSTRY REPORT



NOTABLE INCIDENTS AND PROGRESS MADE OVER PAST DECADE

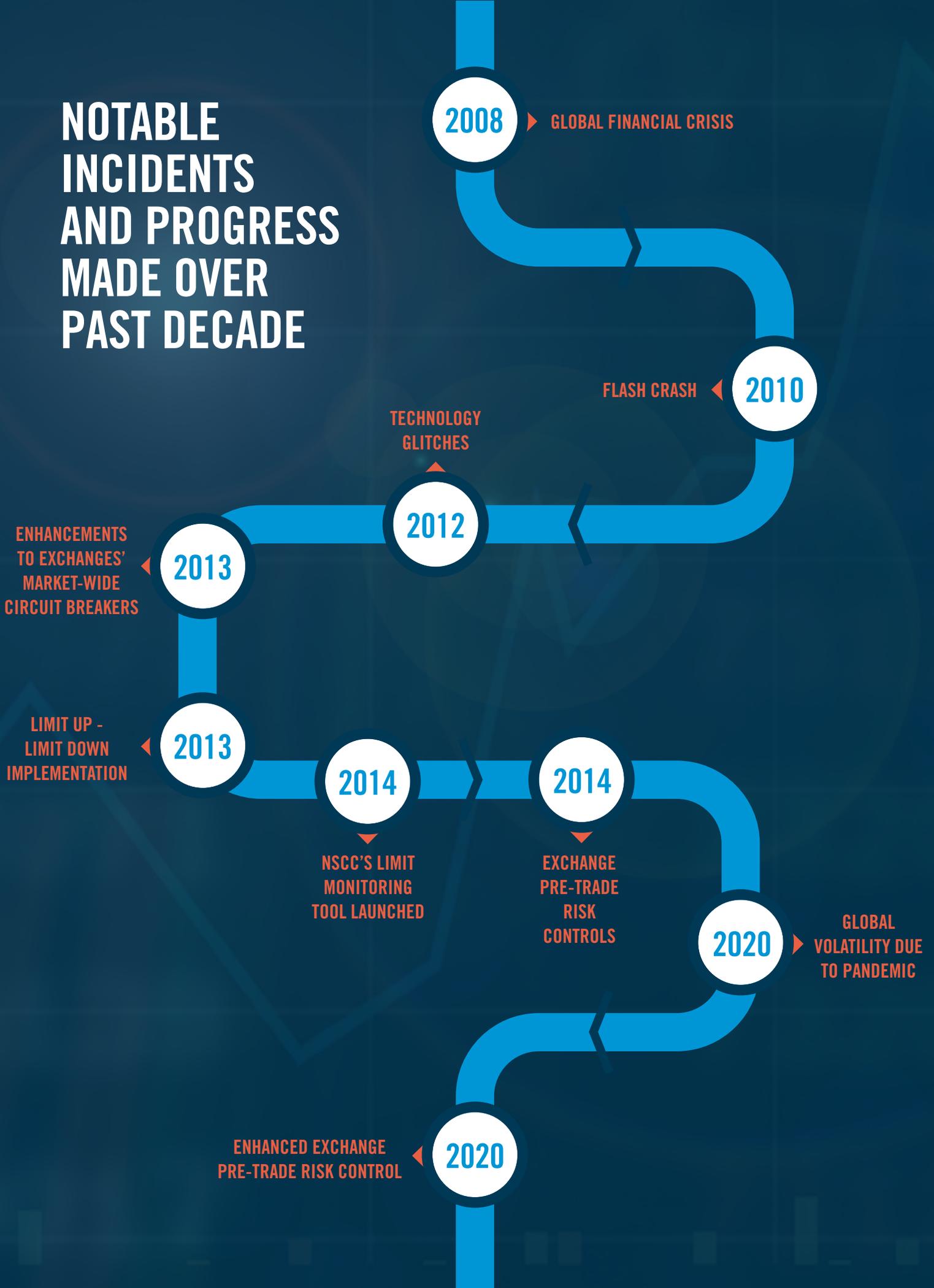


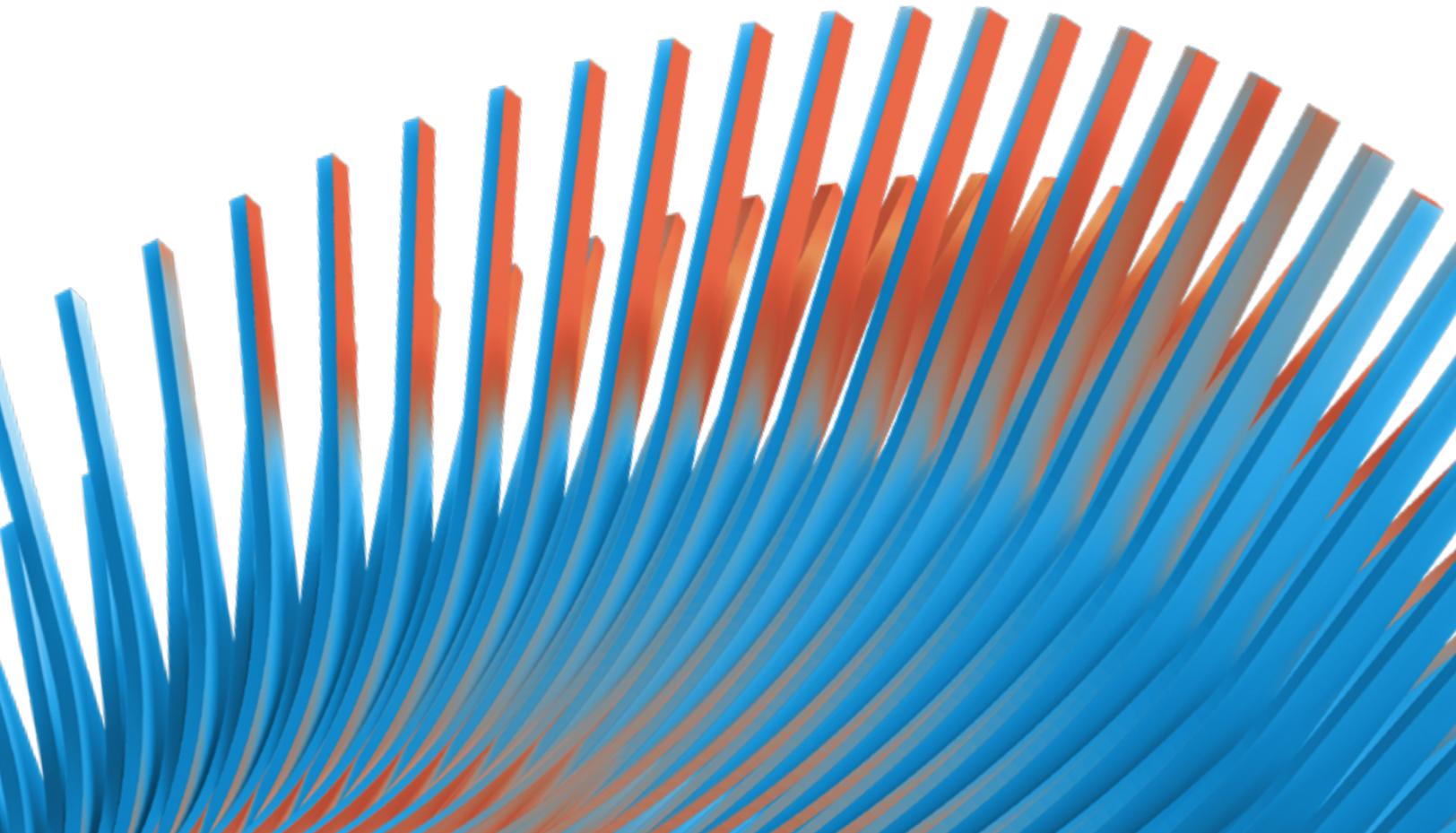
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IMPLEMENTING EFFECTIVE CONTROLS

As the technology that underpins the global financial services evolves and improves, so does our industry's dependence on it. With more reliance on automation and speed, the risk exists that the markets become more exposed when the technology goes awry.

These vulnerabilities can be because of unforeseen risks such as errant algorithms, technology glitches, cyber-attacks, market volatility and even rogue traders. Any one of the various risks that impacts the speed and precision of trade execution can have a devastating – and cascading – effect on our interconnected financial services industry.

Despite the many enhancements to financial stability that have been implemented since 2008, these risks have intensified. Technology issues have been increasingly impactful over the past decade with major incidents resulting in both reputational damage and the potential for significant financial losses. While the markets have never been perfect, DTCC has worked with the industry to stay ahead of these risks.

In order to protect the markets, DTCC believes firms must quickly detect and efficiently shut off errant trade orders, and exchanges also need the ability to respond to these crises by pulling orders out of the market if algorithms or a trading platform goes amiss. These corrective actions must be taken swiftly, without causing additional disruption, and while keeping others informed as necessary to protect the safety and soundness of the U.S equity markets from the impacts of these events. The SEC and market infrastructure professionals have coined this specific concept as “kill switches.”

The concept of a kill switch emerged from the metaphor of a factory assembly line: when workers on an assembly line fall behind or the assembly line begins to go astray, workers need to hit a kill switch to immediately stop the assembly line before real damage occurs and causes further, downstream chaos. The same holds true for an errant trading algorithm. If a model goes astray, the broker -- or the trading venue -- needs to be able to detect that something is wrong and quickly stop the process before anything more serious occurs.

The SEC passed legislation around optional kill switches in 2015, and while there was initially significant debate regarding how to develop and implement them, until last year, few firms and exchanges were in a position to follow through on building out or developing this functionality.

DTCC has seen renewed interest and traction in the past year among more firms as exchanges have implemented kill switch functionality and market structure controls.

We are recommending that as an industry, we carry this momentum forward and accelerate the discussion on enhancing market risk controls.

Providing additional, mandatory risk controls allows the industry to be more confident about preventing significant incidents from occurring -- and no longer rely on actions that minimize or limit the effects on the entire industry after an incident has occurred.

The U.S. equity markets are increasingly complex. There are currently 17 U.S. equity exchanges and more than 40 alternative trading systems (ATS).

In 2020, NSCC cleared \$1.7 Trillion daily in broker-to-broker transactions for these exchanges and trading venues.

Our primary recommendations have all evolved from industry discussions and collaborative working group meetings, and are set forth below:

1. Establish limits at individual self-regulatory organizations (SROs) that track the “Peak Net Notional Exposure” for each individual participant member firm, which would allow limits to be placed on overall and/or categories of activity.
2. Develop additional quantitative controls to better detect abnormal trading behavior in real-time.
3. Evaluate whether a longer-term consolidated control mechanism should be built at DTCC’s clearing agency subsidiaries.

Making progress on these recommendations will require strong support from industry organizations and implementing effective controls will require committed adoption by all stakeholders, including trading firms, market participants, exchanges and DTCC, as well as support from regulators.

DTCC believes that by providing additional, mandatory risk controls, the industry can be more confident about its ability to proactively prevent significant incidents from occurring – and no longer rely on actions that minimize or limit the effects on the entire industry after an incident has occurred.

MARKET RISKS AND PROGRESS MADE

From implementing market-wide circuit breakers to adopting NSCC's Limit Monitoring and continuing the discussion of exchange Kill Switches, the past decade has seen tremendous improvements in market risk mitigation.

The development of these controls was spawned by a series of major technology incidents that put a strain on the financial industry.

After the August 2012 technology issue at Knight Capital, a cross-functional working group comprised of exchanges, SROs, broker-dealers, buy-side firms and clearing organizations was established to discuss what actions the industry could take proactively to improve the stability of the markets without inhibiting the ability for firms to conduct their normal business. The working group concluded that supplemental controls, in both the exchange and

“Our prime brokerage business is predominantly focused on equity and option industry initiatives that are specifically targeted at eliminating uncapped give-in risk and other market infrastructure risk exposures that could lead to losses for clearing participants. Trading technology enhancements rarely include the post execution area of the lifecycle, so we appreciate that the SEC, DTCC and Exchange Operators are supportive of change and are creating new backstop protections. Furthermore, with the continuing trend of equity volume moving off exchange, having harmonized clearing risk controls that target this area will provide more comprehensive coverage for us.”

– Mark Morrison, Director, Equities Asset Management Services, Bank of America

the post-trade environments, could help further mitigate the risks associated with technology problems that are not caught by the broker-dealers' own risk management systems.

The goal of the working group was to define and develop the tools that would be complementary to controls that already existed in order to catch these extreme events or errors and prevent market disruption. In the end, the working group determined a multi-layered approach with coordinated risk checks was extremely critical.

Based on these findings, NSCC installed a new risk monitoring tool, Limit Monitoring, in 2014. The web-based tool, which offers access to the largest aggregate trading information in the U.S. equity marketplace, is designed to serve as an early warning system that alerts firms to unusual or unintended trading activity within their own trading. NSCC Limit Monitoring reinforces the various checks and balances working at the backend of the trade lifecycle and provides each NSCC member with a view into its trading activity and activity of its correspondents against pre-set trading limits. Leveraging NSCC's role as the central counterparty for the U.S. equities market, Limit Monitoring provides NSCC member firms with near real-time trade information in a centralized and standard method. NSCC members are required to utilize this rule-based trade monitoring tool.

In 2014, the exchanges also launched their own versions of a risk tool, “Pre-Trade,” to their client base. This tool, which is used by brokers on a voluntary basis, is intended for executing brokers to establish their own limits with no insight provided to the clearing broker/dealer.

Three U.S. equity exchange families installed the first phase of pre-trade risk controls in 2020, with the New York Stock Exchange (NYSE) and the Chicago Board Options Exchange (CBOE) doing so in April, followed by NASDAQ in August. These three exchange families represent one dozen total U.S. exchanges, nearly three quarters of the total number of U.S. equity exchanges. The first phase gave trading members of these exchanges an optional tool to view, set, and monitor risk controls and take Kill Switch actions. The Kill Switch functionality will eventually replace the existing risk management tool that will be decommissioned in the future.

The exchanges worked with DTCC and other market participants to enable requested functionality and set new minimum standards for trading venues, aiming to implement a set of risk controls at the U.S. equity exchange gateways. The intention of these new controls is to mitigate risks inherent in direct-to-exchange flow. In addition, these new controls will bring the U.S. equity exchanges in line with risk mitigation functionality that already exists on U.S. options and futures exchanges.

ADDITIONAL CONTROLS IMPLEMENTED: 2020

In 2020, U.S. Equity Exchanges implemented a set of risk controls to mitigate risks inherent with direct exchange transaction flow. The functionality provides members with the ability to establish maximum Gross Notional Risk limits for single orders based on notional value and quantity limits.

Member firms can establish intraday gross and net notional risk limits based on market participant identifier (MPID). Limits are configured by the trading firm by default, but a trading firm may optionally delegate control of risk limits for a particular MPID to its clearing firm.

Exposure is calculated using the total notional value of all executions and open orders against the value set by the firm. Exchanges have also introduced port-level risk controls for maximum single order notional checks. The maximum single order notional check will calculate the notional value of each incoming order against the value set by the firm.

The following functionality was implemented by the major exchange families in 2020:

1. Minimum Standards for Trading Venues (Exchanges)

- Single Order Maximum Quantity Limits
- Single Order Maximum Notional Value Limits
- Gross Credit Limits
- Kill Switch Functionality

2. Intraday Position Limits

Trading venues allow members and clearing firms to set intraday net long or short position limits in order to halt potentially errant algorithms. To be clear, the sole purpose of such limits is to enable clearing firms to prevent their customers from accumulating positions that exceed levels at which the clearing firm is financially comfortable. This tool provides firms the ability to:

- Establish Gross/Net at symbol and portfolio level
- Establish Gross/Net maximums at port level
- Modify established limits intraday on a real-time basis
- Accept instructions from clearing broker dealer to halt, discontinue clearing arrangement and reinstate to active status on a real-time basis

3. Pre-Trade Quantity Limits on Individual Orders

Orders where the quantity exceeds the specified limit are caught and rejected by the trading venue.

4. Order Blocking

Trading venues block any new orders at MPID level or combination of MPID and port number when limits are breached.

5. Resting Orders

All resting orders are cancelled when limits are breached.

WORKFLOW

Limit Setting:

- Trading Participant and clearing agency can both set limits; lower of the two would be used
- Alerts/warning would occur at 50%, 70% and 90% utilization
- Limits can be adjusted on an intraday (real time) basis

Breach:

- In the event of a trading limit breach, all open orders would be cancelled, and new orders would be rejected until affirmative action is taken to refresh the limits

Re-entry:

- TBC: Anticipate a “designated approver” model; either Trading Firm or Clearing Firm would be designated with the exchange

NEXT STEPS: PHASE 2 AND BEYOND

To continue strengthening the market risk controls, additional considerations are in discussion across the industry. As a natural expansion to continue improving the controls put in place in early 2020, a second phase of additional features would potentially include:

- Limit consolidation across exchange families
- Enhance/roll out portals to track limits and utilization
- Determine possibility of consolidating the limits as a step towards a Credit Hub
- Establish additional limits: i.e., hybrid limits (Gross open + net executed)

Additional Proposals for Off-Exchange Activity

Each of the proposals below are subject to further discussion and possibly regulatory approval.

OFF-EXCHANGE ACTIVITY	HOW IT WOULD WORK	RISK MITIGATION
Expanding all NSCC trading relationship (referred to as either 9A/9B, or QSR/CORR) agreements to include client level MPID	<p>Since the inception of Universal Trade Capture (UTC), NSCC automated the process of establishing relationships that allow for QSR and Corresponding Clearing transactions to be processed, pursuant to NSCC's Rules.</p> <p>For UTC processing to occur, a valid 9A/9B relationship between both parties of the transaction must be active.</p>	Historically, these agreements have only included the clearing broker ID of both parties. There has always been the ability to include client level MPID data as part of the relationship. This feature provides extra protection to the clearing brokers (9B) and limits who a counterparty (9A) can submit locked-in trade data for. If a firm's agreements include client level MPID data, the 9A party would be limited to only submitting trades against a firm for the agreed upon corresponding clients of the firm.
Expand the NSCC portal/agreement to include the ability to add Gross Notional limits at the agreement level	To add further controls to the 9A/9B QSR and CORR transactions, limits would be established at the agreement level. NSCC's trading relationship management system (TRM) would be expanded to allow for the inclusion of these established limits.	The TRM portal would also provide the ability to modify these limits on a real-time basis. Approval for this expanded agreement would require authorization from both parties to the agreement.
NSCC/UTC to expand validation criteria that would include Gross Notional limit component for clearing input acceptance	NSCC and the UTC system would include the Gross Notional limit as part of its trade acceptance editing criteria. This expanded editing characteristic would PEND transactions that have breached the Gross Notional limit established as part of the agreement.	As previously noted, the parties to the agreement would have the ability to modify that limit on an intraday basis. UTC would continue to recycle these pended transactions throughout the day to see if they pass established limit thresholds. If these pended transactions have not been accepted for clearing by UTC at the end of day, they would be hard rejected and not included in the NSCC clearing process.
ATs to expand controls on their front-end platforms to include Gross Notional risk checks – API to portal information	Ultimately, the goal is for the ATs to read the established Gross Notional limits and utilize these values as part of their risk control checks as they are matching transactions within their trading platform.	Similar controls that have been implemented by the exchanges should also be done by ATs trading platforms.

CONCLUSION

We actively encourage you to share your thoughts and participate in the ongoing dialogue that we are looking to foster. To become an active part of this industry conversation or to obtain more information on any of the material presented in this paper, input can be provided to Bill Kapogiannis, DTCC Executive Director, Clearing Services at bkapogiannis@dtcc.com.

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