

Compilation of Existing Testing and Supervision Standards, Recommendations and Regulations

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I. Current Exchange Standards/Controls

a. CME Group¹

Equal access to host proximity and data

- All participants have non-discriminatory access to the same connectivity options at the same prices
- Market data is disseminated to all participants simultaneously
- All participants have access to identical data
- Anonymity of traders and firms is protected in all bids, offers and execution reports
- All orders are processed in the order received
- Bids and offers are available to all participants and matched according to transparent algorithms (primarily Price/Time or Pro-Rata)

CME Group Surveillance Systems

- Comprehensive audit trail of all message data, order book data and cleared trade data
- RAPID System – real-time and historical message data and query/aggregation tool
- Live Alerts – real time position and volume anomaly alerts at account level
- MASS – real time price and volume anomaly alerts at contract level
- Real time message frequency alerting at the session level
- SMART – Pattern detection, anomalies, volumetric analysis
- ARMADA – real time and historical order book data; market replay capability
- Real time system performance monitoring

Types of Surveillance

- Disruptive trading – e.g. spoofing, manipulation, pre-open abuse
- Trade practice abuse – e.g. wash trades, prearrangement, money pass, frontrunning
- Anomalies – e.g. Stop Logic events, error trades, price spikes, position anomalies
- Messaging Efficiency Program

CME Group Risk and Volatility Mitigation Tools

- Price banding
- Message volume controls
- Stop logic functionality
- Maximum order size
- Protection points for market and stop orders
- Market Maker Sweep Protections
- Product price limits and circuit breakers
- Transparent error trade policy
- Market Maker Sweep Protections

¹ This presentation was made by a CME representative at a TAC meeting on March 29, 2012.
http://www.cftc.gov/ucm/groups/public/@aboutcftc/documents/file/tacpresentation032912_cme.pdf.

CME Group Risk Management Tools

- Globex Credit Controls (mandatory) - provides automated pre-trade risk controls at firm level and clearing firm has the ability to select real-time actions if risk limits are hit.
- Risk Management Interface (RMI) - allows clearing firm to block and cancel orders by firm, account, futures/options, product or exchange. Allows cross exchange risk management.
- Cancel on Disconnect – automatically cancels user’s resting day orders if connection is involuntarily dropped
- Drop Copy – facilitates real-time risk management by sending real-time copies of all order messages and executions for defined sessions to trading firms and clearing firms
- FirmSoft – browser based order management tool that provides firm administrators, risk management and trading personnel with consolidated activity and order cancel functionality.
- Conformance Testing

b. ICE²

ICE Functional Controls for Automated Trading Systems (ATS)

- Automated order entry validations
 - Message throttle limits
 - Max quantity limits
 - Price Reasonability Validation
 - Position validation
 - Orders removed upon logout
- Manual validations and controls
 - Kill All button / Log Off user button/ Suspend clearing accounts
 - Cleared error trade policy and “No Cancellation Range”
- Interval Price Limit
 - ICE’s circuit breaker protection for price spikes
 - Provides a floor/ceiling price limits for within a specific timeframe configurable by market
 - New floor/ceiling price limits recalculated each new time interval based on current market price
 - If floor/ceiling price exceeded, market put in HOLD state
 - Does not halt trading in opposite direction of HOLD
 - Traders can manage resting orders & enter new orders
 - Market HOLD notification sent to all users
 - After HOLD ends, new Upper/Lower IPL limits calculated

ICE Systems Monitoring and Controls for ATS

- ATS conformance testing and approval

² This presentation was made by an ICE representative at a TAC meeting on March 29, 2012.
http://www.cftc.gov/ucm/groups/public/@aboutcftc/documents/file/tacpresentation032912_ice.pdf.

- Message rate threshold alerts
- Systems performance reports
- ATS efficiency reports
- SMARTs – Real-time Market Surveillance
 - Real-time and historical graphical representation of the entire market including orders, trades, and blocks
 - Reconstruct full order book, synchronized playback of multiple markets (spread months)
 - Customized alerts to detect anomalies, significant price movements and potential market abuses
 - Overlay related markets to view correlations
- Message policy and WVR Report (discourages inefficient messaging – 33% reduction)

II. Recommendations

a. FIA Market Access Risk Management Recommendations³

Execution Risk Tools

To reduce the inevitable errors that occur with manual data entry, exchanges should work towards providing a standard communication protocol that would allow firms to automate setting and updating risk parameters for individual trading entities. This would also give clearing firm risk managers the ability to more efficiently disable a client from multiple exchanges simultaneously. An API based on an agreed standard protocol such as FIX would be the preferred method for entering and updating limits.

Unless otherwise indicated, exchange risk control systems should provide clearing firms with the ability to define risk controls by product. All limits should be set by positive permissioning. The auto-default should be set to zero (i.e. clearing firm will set limits only for the products that they are allowing the trading firm to trade).

- **Order Size:** quantity-per-order limits should be mandatory. The clearing firm should establish limits with the trading firm to avoid generating and sending erroneously-sized orders to the market. Occasionally, larger-sized orders are legitimate. In such cases, the trading firm needs to contact the clearing firm to adjust their limits. The exchange should provide default limits to protect the integrity of its market.
 - A clearing firm providing direct access to a market should have visibility to the limits and the ability to set appropriate limits for the trading firm's activity, regardless of whether the trading firm accesses the market directly (DA-E), through the clearing member system (DA-C) or through a third-party system (DA-V).
 - Risk controls need to be sophisticated enough to allow the clearing firm to set pre-trade limits per product for each client and prevent trading beyond established limits. Different sized limits are required for more liquid versus less liquid instruments (e.g., front month versus back month futures or options, in-the-money versus out-of-the-money options).
 - Trading firm access to products should be blocked until limits are established by the clearing firm. Default limits should not allow "unlimited" trading.

- **Intraday Position Limits:** The exchange should make available the ability to set pre-trade intraday position limits. Once the trading entity has reached these limits, only risk-reducing trades would be allowed. The position limit capability should have the following characteristics:
 - Set by trader, account, or firm and with the ability to set by groups of traders or accounts.
 - Set maximum cumulative long positions and maximum cumulative short positions.

³ These recommendations were published in April 2010.
http://www.futuresindustry.org/downloads/Market_Access-6.pdf.

- Include working orders in maximum long/maximum short position calculations.
 - Set by product level.
 - Provide the ability to raise or lower limits intraday.
 - Be configurable by open API, preferably FIX API.
 - Be mandatory for all participants so that latency is the same for all.
 - Recognizing that options have a lower delta than futures, position limit capability must include the ability to differentiate limits by product type.
- **Cancel-On-Disconnect:** exchanges should implement a flexible system that allows a user to determine whether their orders should be left in the market upon disconnection. This should only be implemented if the clearing firm's risk manager has the ability to cancel working orders for the trader if the trading system is disconnected. The exchange should establish a policy whether the default setting for all market participants should be to maintain or cancel all working orders.
 - **Kill Button:** exchanges should provide clearing firms with the ability to: 1) delete all open orders and quotes and 2) reject entry of new orders and quotes.
 - The exchange should have a registration system that requires firms to specify which staff members are authorized to use the kill button.
 - The system itself should have explicit warnings informing authorized users of the consequences of activating the kill button.
 - Similar functionality could be implemented to allow a trading firm to halt trading activity on a firm-wide, trading group or individual trader basis.
 - **Order Cancel Capabilities:** exchanges should provide to clearing members an order management tool that allows real-time access to information on working and filled electronic orders. The tool should provide risk mitigation functionality in the event of an electronic trading system failure.
 - The clearing member and trading firm should have the ability to view and cancel orders via this tool. Clearing members should be able to delegate and permission the tool for individual traders or firms at granular levels.
 - The tool should provide view capabilities for: current order status; fill information, including partial fills; cancel and replace history; and order timestamps.
 - The tool should provide cancel capabilities for: individual orders; groups of orders; and all working orders via a single command.
 - **Price Banding/Dynamic Price Limits:** the exchange should have the ability to set price limits on a dynamic basis, continuously adjusting throughout the day to account for current market conditions.
 - Exchanges should have the ability to widen price bands throughout the trading day when necessary to account for additional volatility in the market. The width of the price limits should be determined by product. Price banding occasionally can be too strict for less liquid markets and may need manual intervention to facilitate trading if the current range is deemed unsuitable.

- **Market Maker/Sweep Protections:** exchanges should allow a level of protection for market makers who quote simultaneously on both sides of the market.
 - Protection parameters should be optional and should allow values to be set by each market maker or market-making entity. When market maker-defined protection values are met or exceeded within certain time intervals, the protections should be triggered. When triggered, the electronic trading system would initiate the market-maker protection functionality, which rejects new messages and/or cancels resting quotes associated with the market maker.
- **Internal Trade Crossing:** Wash trades are prohibited to prevent manipulating the market by artificially distorting market price or volume. Inadvertent crosses do not have the intent to mislead the public. Exchanges, working within the framework provided by their respective regulators, should set guidelines for vendors, customers, and clearing members, defining what would be acceptable reasons for inadvertent cross trades. Existing rules should be re-examined in the context of today's trading environment.

Post-Trade Checks

Exchanges should make drop copies available to clearing and trading firms.

- **Trade capture drop copy:** exchanges should provide clearing firms with drop copies of orders and executed trades. This allows clearing firms to get their current set of trades and positions from a secondary channel independent of the primary trading system.
- **Post-clearing drop copy:** exchanges should provide clearing firms net position per maturity per contract as soon as the trade is matched at the clearinghouse. This functionality needs to be as close to real-time as possible.
- **Exchange drop-copy functionality** should allow clearing firms to enable trading firms to receive trade capture and post-clearing drop copies.

Co-Location Policies

Steps should be taken to ensure that access to co-location is available to every firm that is interested in such a service and that the terms of the co-location service remain transparent to all market participants.

Conformance/Certification Testing

All trading firms that wish to write directly to the order entry or market data interfaces of an exchange should be required to pass an initial set of conformance tests for execution and market data that highlight basic functionality of the trading system that will be making the direct connection. All ISVs and proprietary systems should be required to pass the same conformance tests, so the proprietary system client using the ISV should not be required to pass conformance.

The exchange should be required to provide a conformance environment on demand for re-certification requirements.

Error Trade Policy

- **Trade Certainty:** exchanges should adopt a "Preferred Adjust-Only Policy" to ensure absolute trade certainty to all parties to an error trade. In a Preferred Adjust-Only Policy

all trades inside of a product-specific “no-adjust” range are ineligible for adjustment. All trades outside of the no-adjust range potentially could be adjusted to the edge of the no-adjust range from the prevailing market at the time of execution. The Preferred Adjust-Only Policy would not eliminate the authority of an exchange to cancel or correct trades under extreme circumstances.

- **Contingency Orders:** contingent or stop orders executed as a result of an error trade should be eligible for compensation from the party that made the error. An exchange’s authority to cancel orders under extreme circumstances should not be invoked merely because an order is a contingent order.
- **Notification:** the exchange should establish a minimal reporting time of less than five minutes for firms to notify the exchange that an error has occurred. The exchange should announce a potential adjust-or-bust situation immediately upon notification and the adjust decision should be disseminated to the marketplace within a reasonable timeframe via a specific market data message, email and/or other established mode of communication on a best efforts basis.

b. FIA Principal Traders Group: Recommendations for Risk Controls for Trading Firms⁴

Access & Oversight

Each ETS should have a management console to display information about the actions and market exposure. This management console should also provide the trader with the capability to control the ETS.

Firms should have policies and processes for setting, modifying and tracking changes to pre and post-trade risk checks. Policies should specify who is authorized to enter, view and modify pre- and post-trade checks, which checks are enforced, and in what manner. Firms should consider how responsibilities are assigned for managing pre- and post-trade checks, inputting settings and operating other parts of the ETS and should strive to minimize potential opportunities for unauthorized trading.

- **Change Management & Testing**—Firms should have processes in place to allow representatives from trading, risk, and software management to approve changes and verify internal testing before a new trading system can be enabled in production.
- **Conformance Testing**—Trading firms are required to pass conformance testing with the party providing access when implementing a new direct access system or when the exchange deems it necessary because of a fundamental change in exchange functionality. The onus is on the trading firm to determine when it must recertify due to a change in logic within their system.
- **Error Control**— Trading firms should have documented procedures that direct the actions of traders, ETS trading monitors and support staff in the event of a trading system

⁴ These recommendations were published in November 2010.
http://www.futuresindustry.org/downloads/Trading_Best_Practices.pdf.

error. The procedures should be aimed at evaluating, managing and mitigating market disruption and firm risk and should specify people to be notified in the event of an error resulting in violations of risk profile, or potential violations of exchange rules.

- **Firm Level Controls:** In addition to pre-trade risk controls at the exchange and clearing firm levels, trading firms should set risk controls at the trading firm level.

Pre-Trade Risk Management

In addition to pre-trade risk controls at the exchange and clearing firm levels, trading firms should set risk controls at the trading firm level.

- **Pre-Trade Risk Limits**—Trading firms should establish and automatically enforce pre-trade risk limits that are appropriate for the firms’ capital base, clearing arrangements, trading style, experience, and risk tolerance. These risk limits can include a variety of hard limits, such as position size and order size. Depending on the trading strategy, these limits may be set at several levels of aggregation. These risk limits should be implemented in multiple independent pre-trade components of a trading system.
- **Price Collars**—Trading systems should have upper and lower limits on the price of the orders they can send, configurable by product. They should prevent any order for a price outside of the “price collar” from leaving the system.
- **Volatility Awareness**—Trading systems should take a specified action (have an alert, pause, or automatically disable) if an unusual price move or volume spike occurs during a specified timeframe.
- **Fat-Finger Quantity Limits**—Trading systems should have upper limits on the size of the orders they can send, configurable by product. They should prevent any order for a quantity larger than the fat-finger limit from leaving the system.
- **Repeated Automated Execution Throttle**—Automated trading systems should have functionality in place that monitors the number of times a strategy is filled and then re-enters the market without human intervention. After a configurable number of repeated executions the system should be disabled until a human re-enables it.
- **Outbound Message Rate**—Trading firms should limit the number of order messages their trading systems can send to the exchange in a short period of time. These limits should be in line with exchange rules and the trading firm risk tolerance.
- **Market Data Reasonability**—Trading systems should have “reasonability checks” on incoming market data as well as on generated values.
- **Kill Button**—Trading systems should have a manual “kill button” that, when activated, disables the system’s ability to trade and cancels all resting orders.
- **Market Maker Protections**—Firms acting as designated market makers should be aware of and, when appropriate, utilize exchange-provided market maker protections.

Trading Interruptions

- **Heartbeats among System Components**—Electronic trading systems should monitor “heartbeats” among their various components as well as with the exchange to identify when connectivity to any system component or the exchange has been lost. If connectivity is lost, the ETS should be disabled and working orders cancelled by the system or through exchange provided “cancel-on-disconnect” functionality.
- **Emergency Notification Procedures**—Trading operations staff should have contact details for incident response personnel responsible for network connectivity, software development, and third-party vendors as well as market operations staff at relevant exchanges.
- **Back-Up Execution Facilities**—Trading firms should have alternate execution platforms available to their traders and trading monitors in the event that their primary systems or direct market access fail. Options include exchange, clearing firm or ISV-provided execution platforms. In addition, firms should have documented procedures for alternative trade execution methods (including trading desk phone numbers, account numbers, clearing information as applicable) in the event electronic trading is not feasible. When trades are executed through alternative methods, firms should have logs documenting the execution of such trades and recording the relevant trade details.

Post-Execution and Back Office

All firms should strive to maintain timely and accurate trade and account information by reconciling as soon as practicable their own electronic trading logs with records provided by their brokers, clearing firms, or other business partners. In satisfying this objective, firms should consider segregating trading and back office roles and responsibilities in such a way that an individual cannot conceal unauthorized trading activity.

- **Post Trade**—All firms should strive to maintain timely and accurate trade and account information by reconciling as soon as practicable their own electronic trading logs with records provided by their brokers, clearing firms, or other business partners. In satisfying this objective, firms should consider segregating trading and back office roles and responsibilities in such a way that an individual cannot conceal unauthorized trading activity.
- **Post-Trade Limits**—Trading firms can also establish and automatically enforce post-trade risk limits that are appropriate for the firms’ capital base, clearing arrangements, trading style, experience, and risk tolerance. For example, a trading firm can set daily loss-limits by instrument, asset class, and strategy and automatically close out or reduce positions if those limits are breached.
- **Order Fill Validity**—Trading firms can monitor order fill messages they receive from the exchange in order to confirm they are valid. Validity can be determined by a number of trade specific factors including fill price, fill quantity, order ownership, or aggregate

measures such as net positions and fill frequencies. Should an order fail these checks, action should be taken to investigate the discrepancy.

- **Near Real-Time Reconciliation**—ETSs should have functionality to accept drop-copies from exchanges and clearing firms. Drop copies are duplicate copies of orders that allow a firm to compare the exchange or clearing firm view of trades and positions with the systems' internal view. This helps to assure that all systems are performing as expected and maintaining accurate and consistent views of trades and positions. The drop-copy data may also be used by risk managers to view their firm's risk exposure independently of the trading system.

Electronic Security

Firms should consider the security of their trading and business networks and be aware of the risk of access to their network infrastructure by unauthorized personnel. In particular, firms with direct access to exchange matching engines should be aware of the potential, once compromised, for intruders to use their network infrastructure to launch attacks against exchange networks or others or potentially engage in unauthorized trading, and firms must take steps to mitigate such risk. The use of network firewalls, VPN connections or other security devices to prevent unauthorized remote access to business networks is strongly encouraged. Failure to use firewalls or other security measures in order to reduce latency or increase throughput is strongly discouraged.

c. Joint CFTC-SEC Recommendations on May 6 Flash Crash⁵

Volatility:

- Concurs with steps taken by the SEC (working with the exchanges and FINRA) to:
 - Create single stock pauses/circuit breakers for the Russell 1000 stocks and actively traded ETFs;
 - Enact rules that provide greater certainty as to which trades will be broken when there are multi stock aberrant price movements; and
 - Implement minimum quoting requirements by primary and supplemental market makers that effectively eliminate the ability of market makers to employ “stub quotes.”
- Commissions should require that the pause rules of the exchanges and FINRA be expanded to cover all but the most inactively traded listed equity securities, ETFs, and options and single stock futures on those securities.
- SEC should work with the Exchanges and FINRA to implement a “limit up/limit down” process to supplement the existing Pause rules and that the Commissions clarify whether securities options exchanges and single stock futures exchanges should continue to trade during any equity limit up/down periods.

⁵ The Joint CFTC-SEC Advisory Committee on Emerging Regulatory Issues was established a few days after the “Flash Crash” of May 6, 2010. It made these recommendations at a meeting of the Committee on February 18, 2011. http://www.cftc.gov/ucm/groups/public/@aboutcftc/documents/file/jacreport_021811.pdf.

- CFTC and the relevant derivative exchanges should evaluate whether a second tier of pre-trade risk safeguards with longer timeframes should be instituted when the “five second limit” does not attract contra-side liquidity.
- Commissions should evaluate the present system-wide circuit breakers and consider:
 - Reducing, at least, the initial trading halt to a period of time as short as ten minutes;
 - Allowing the halt to be triggered as late as 3:30 pm; and
 - Using the S&P 500 Index as the triggering mechanism.

Restrictions on Co-location and Direct Access:

- Supports the SEC’s “naked access” rulemaking and urges the SEC to work closely with FINRA and other exchanges with examination responsibilities to develop effective testing of sponsoring broker-dealer risk management controls and supervisory procedures.
- CFTC should use its rulemaking authority to impose strict supervisory requirements on DCMs or FCMs that employ or sponsor firms implementing algorithmic order routing strategies and that the CFTC and the SEC carefully review the benefits and costs of directly restricting “disruptive trading activities “with respect to extremely large orders or strategies.

Liquidity Pricing and Liquidity Rebates:

- SEC should evaluate the potential benefits which might be gained by changes in maker/taker pricing practices, including building in incentives for the Exchanges to provide for “peak load” pricing models.

Market Maker Obligations:

- SEC should evaluate whether incentives or regulations can be developed to encourage persons who engage in market making strategies to regularly provide buy and sell quotations that are “reasonably related to the market.”
- Commissions should explore ways to fairly allocate the costs imposed by high levels of order cancellations, including perhaps requiring a uniform fee across all exchange markets that is assessed based on the average of order cancellations to actual transactions effected by a market participant.

Preferencing, Internalization, and Routing Protocols:

- SEC should conduct further analysis regarding the impact of a broker-dealer maintaining privileged execution access as a result of internalizing its customer’s orders or through preferencing arrangements. The SEC’s review should, at a minimum, consider whether to (i) adopt its rule proposal requiring that internalized or preferenced orders only be executed at a price materially superior (e.g., 50 mils for most securities) to the quoted best bid or offer, and/or (ii) require firms internalizing customer order flow or executing preferenced order flow to be subject to market maker obligations that requires them to execute some material portion of their order flow during volatile market periods.
- SEC should study the costs and benefits of alternative routing requirements. In particular, we recommend that the SEC consider adopting a “trade at” routing regime. The Committee further recommends analysis of the current “top of book” protection protocol

and the costs and benefits of its replacement with greater protection to limit orders placed off the current quote or increased disclosure of relative liquidity in each book.

Information Provision:

- Commissions should consider reporting requirements for measures of liquidity and market imbalance for large market venues.

Regulators' Access to Information:

- SEC should proceed with a sense of urgency, and focus on meaningful cost/benefit analyses, to implement a consolidated audit trail for the US equity markets and that the CFTC similarly enhance its existing data collection regarding orders and executions.

d. TAC Subcommittee on Pre-Trade Functionality Recommendations⁶

Trading Firms:

- **Pre-Trade quantity limits on individual orders**—Orders where the quantity exceeds the specified limit would be caught before being sent to an exchange, and rejected internally (so never sent to the exchange).
- **Pre-Trade price collars**—Orders where the price is too far away from the current market would be caught, rejected internally, and never sent to the exchange.
- **Execution Throttles**—If a particular algorithm or group of algorithms receives too many fills over a specified period of time, it will disable that algorithm (or group) and prevent it from placing new orders until there is human intervention to verify that the system is functioning properly.
- **Message Throttles**—If a particular algorithm or group of algorithms sends too many messages in a specified period of time, it will disable that algorithm (or group) and prevent it (them) from placing new orders until there is human verification that the system is functioning properly.
- **Kill Button**—As a failsafe, every firm should have the capability to simultaneously cancel all existing orders, and to prevent the entire firm from placing any new orders.

Clearing Firms:

Clearing firms should be required to institute reasonable measures to confirm that their client trading firms generally implement the pre-trade controls mentioned above. This is a sensitive issue as the trading firms will generally not want clearing firm personnel examining their proprietary code. Therefore, the clearing firms will have to rely on written certification from the

⁶ These recommendations were first publicly presented at a TAC meeting on March 1, 2011. The stated objective was to recommend “pre-trade measures that would preserve market integrity in cases of direct market access.” http://www.cftc.gov/ucm/groups/public/@swaps/documents/dfsubmission/tacpresentation030111_ptfs2.pdf.

trading firm, and from the trading firm's hosting independent software vendor (ISV), that the functionalities are in place and being used with parameters agreed to by the clearing firm. Specifically, whether the pre-trade functionalities are developed by the clearing firm, by the trading firm or by an ISV,

- The parameters used must be agreed to by the clearing firm and cannot be changed without permission from the clearing firm.
- The kill button must be accessible to both the trading firm and the clearing firm

Exchanges:

- **Pre-Trade quantity limits on individual orders**—Orders where the quantity exceeds the specified limit would be caught and rejected by the exchange. Currently, most major exchanges have this functionality, with specific limits by product and/or by trading session.
- **Intra-day Position Limits**—The exchanges should allow clearing firms to set intra-day net long or short position limits for its customers in order to halt potentially errant algorithms. To be clear, the sole purpose of such limits is to enable clearing firms to prevent customers from accumulating positions that exceed levels at which the clearing firm is financially comfortable.
- **Pre-Trade price collars**—Orders where the price is too far away from the current market would be caught and rejected. Many exchanges have such functions in place, if not active for all products.
- **Message Throttles**—Parallel to execution throttles, the exchange should similarly monitor the incoming messages from an identifiable individual and take action when the rate of messaging is too high.
- **Error Trade Policies**—Error trade policies should be clear and should favor trade price adjustment rather than trade cancellation to minimize market disruption due to errors.
- **Order cancellation policies**—To help clearing firms control risk, exchanges should:
 - a. Allow clearing firms and their clients to opt for automatic cancellation of orders should the trading firm be disconnected from the exchange network.
 - b. Provide clearing firms with an order management tool that allows them to view all of their firm's working and filled orders and to cancel working orders.

**e. FIA Principal Traders Group and FIA European Principal Traders Association:
Software Development and Change Management Recommendations⁷**

Software Development

Trading firms should have a process in place through which they can implement new code or changes to existing source code. Best practices for software development processes should address the following:

- a. **Development Environment**—Firms should maintain a development environment that is adequately isolated from the production trading environment. The development environment may include computers, networks and databases and should be used by software engineers while developing and testing new source code.
- b. **Source Code Management**—Firms should maintain a source code repository to manage source code access, persistence, and changes. The source code repository may be used to ascertain when software changes were made and the nature of the changes.
- c. **Risk Controls**—Firms should implement software based risk controls that are independent from the trader in order to reduce the risk of market disruptions due to system failures or errors (see *FIA PTG Recommended Risk Controls*).
- d. **Source Code Review**—When appropriate, firms should have a process describing how software engineers may have their source code reviewed and how that review may be conducted.

Software Testing

Trading firms should have a process for testing core software components before they are released to the production environment. Among the testing methods to consider are:

- e. **Unit Testing**—A type of testing in which discrete units of source code are tested to verify they work as desired. These tests may be configured to run automatically throughout the development process.
- f. **Functional Testing**—A type of testing in which well-defined software modules are combined to have their functionality tested as a group. Two types of functional testing that may be considered are “integration” and “regression” testing.
- g. **Non-Functional Testing**—A type of testing in which well-defined software modules are combined to have their non-functional aspects tested as a group. Such non-functional aspects might include scalability, performance, stability, and usability.
- h. **Acceptance Testing**—Software is tested by an end-user to verify conformance of a system to the stated business requirements. Acceptance testing should be done in an environment that adequately represents the environment in which the software will be released.

⁷ These recommendations were published in March 2012.
http://www.futuresindustry.org/downloads/Software_Change_Management.pdf.

- i. **Exchange-Based Conformance Testing**—A type of testing utilized to confirm a system’s functionality while interacting with an exchange. This process is often guided by a script of tests provided by the exchange and is performed in an exchange-provided testing environment to simulate the production trading environment.

During the testing process, firms should consider potential impact to trading systems, external markets, compliance systems, middle and back office systems, user interfaces, and reporting mechanisms.

Change Management Process

Change Management Core Components

The following practices are integral to a trading firm’s change management process:

- **Authorization**—Any changes to the production environment should be subject to review by a responsible party within the organization. The depth of the review performed should align with the magnitude of the proposed change.
- **Auditability**—Trading firms should establish procedures for communicating requirements, changes and functionality related to their proprietary software and technical infrastructure. Trading firms should also maintain a historical audit trail of material changes made to their proprietary software, allowing them to accurately determine:
 - When a change was made? Who made the change? The nature of the change?

Steps Commonly Seen Within the Release Process

- **Initiation**—Every software change is initiated to meet a business, technical, or external requirement. The initiator of the change should identify the requirement(s) or nature of the change.
- **Approval**—Prior to deployment, a planned change should be reviewed and subject to approval by a responsible party. This review may occur prior to development taking place or after development is completed.
- **Scheduling**—Prior to deployment, a planned change should be scheduled for release into the production environment, and should be considered along with any other planned changes.
- **Deployment**—Deployment is the act of releasing a change into the production environment. Depending on the nature of the change, it may be appropriate to deploy to the entire production environment at once or to deploy the change in phases to further mitigate risk and ease the reversion of the change if necessary. Deployment may be thought of as containing four phases:
 - 1) **Preparation**—The change is prepared for release and the current production environment is backed up in order to allow for reversion of the change.
 - 2) **Execution**—The change is released to the production environment.

- 3) **Validation**—The change and the state of the production environment should be verified for correctness. The scope of a firm’s validation process should be appropriate and proportionate to the change being made.
 - 4) **Completion/Reversion**—A successful validation should result in completion of the change. If the change cannot be validated, the environment should be reverted to its prior stable state.
- **Post Deployment**—Special consideration should be given to how certain changes to trading systems may impact trading in the production environment. Where reasonable, substantive changes to trading systems should be activated initially with appropriately restricted risk limits and access to markets.

These practices facilitate effective risk management and are consistent with the overall development and change management process: identifying the desired or required change, developing and testing the change, deploying the change, and verifying the change.

Security

Trading firms should establish security measures within all aspects of their business. In addition to the security measures in the *FIA PTG Recommended Risk Controls*, some considerations in building effective security measures for software development and change management include:

- Maintaining source code, technical infrastructure and trading systems (“Technology”) in a physically, technologically and otherwise secure manner; and
- Allowing access to Technology to approved persons and through mechanisms that validate identity in a manner consistent with a firm’s regulatory obligations and internal requirements.

f. FIA Order Handling Risk Management Recommendations for Executing Brokers⁸

Executing Broker Pre-Trade Controls

Executing brokers should use pre-trade controls to reduce the risk of 1) inadvertent entry of orders at the wrong price or quantity, 2) unintentional triggering of a client algorithm or 3) an improperly configured client algorithm. Effective pre-trade controls may include the following:

- Trader and Automated Trading System Identifiers
- Order Size or “Fat Finger” Limits
- Position or Margin Limits
- Cancel-on-Disconnect
- Independent Order Cancellation Capability
- Kill Switch

Executing Broker Automated Execution Tools

⁸ These recommendations were published in March 2012.
http://www.futuresindustry.org/downloads/Order_Handling-Ex_Brokers.pdf.

The use of a broker-provided automated execution tool requires both client and broker to be cognizant of the performance of the tool and how it is expected to behave under different market conditions. Consistent with prudent risk management, it is recommended that executing brokers establish general controls similar to those listed above but with additional checks for the tool while it is working, as well as checks against the orders that the tool submits to the market. These may include:

- Controls Before the Execution Tool
 - Order Size Limits
- Controls Embedded Within the Execution Tool
 - Market Impact Checks
 - Dynamic Price Checks
 - Dynamic Market Move Checks
 - Market Halt Parameters
- Controls after the execution tool
 - Last-Look Reasonability Checks

Client Post-Trade Reconciliation

FIA supports the widespread industry practice of allowing clients to compare their internal trade records against the executing broker's own records. Similarly, FIA recommends processes that allow clients to reconcile both orders and fills through their executing broker's trading platforms. FIA advises that the post-trade data feed contain all fills at a minimum but may also contain additional data (messaging, cancels, etc.) at the discretion of the executing broker or at the request of the client. In addition, FIA recommends that brokers, exchanges and other trading platforms work toward an industry standard for delivering cleared information within a standard deadline (e.g., two to three minutes after a trade is executed).

Validation of Client Access and Oversight of Client Activity

Executing brokers should provide information to clients that access the brokers' trading platforms in the following areas:

- Guidance on relevant rules and regulations for trading on an exchange, including where possible a link to the exchange website.
- Alternative methods to contact the executing broker during any outage of their trading platform.

Executing brokers should develop procedures for reviewing electronic execution of orders, including:

- Trading restrictions
- Review of internal administrative terminal access
- Ratios of orders to fills

Executing brokers should also implement procedures to address inadvertent trading and errors that may result from such.

Client Conformance Testing

In the event that a client seeks to have its systems write directly to the order entry or market data interfaces of a broker's trading platforms, the executing broker should require the client

to satisfy a set of conformance tests to ensure that the client's systems interact correctly with the relevant platforms. Such conformance tests are also applicable for third-party OMS' and EMS' that interface with the broker's trading platform.

The most effective means of accomplishing this goal would be through a conformance or test environment that replicates the actual behavior of the trading platform that the client will access to trade in production. This could be accomplished by providing the client with access to an exchange test environment where available and/or a simulation environment for the broker's automated execution tools. Consistent with FIA's Market Access Risk Management Recommendations, FIA strongly recommends that exchanges provide a test environment that brokers, vendors and clients can use for certification of their message flow. This should be as close as possible to the current production environment and should be available throughout the business week.

Additional Recommended Best Practices for Executing Brokers

- **Electronic Trading Interruptions:** in cases where clients access a broker's trading platform, executing brokers should establish monitoring tools to alert support staff when a trading connection is broken and/or orders are being rejected.
- **Physical Security:** executing brokers should take steps reasonably designed to limit access to trading platforms under the broker's control to only those authorized to trade.
- **Electronic Security:** firms should consider the security of their trading and business networks and be aware of the risk of access to their network infrastructure by unauthorized personnel; use network firewalls, virtual private network (VPN) connections or other security devices to prevent unauthorized remote access to business networks; and have policies and procedures to address staff departures.
- **Business Continuity:** firms should consider the necessity of a comprehensive disaster response plan in the context of their business; consider the utility of standby failover for production infrastructure such as servers and network hardware in addition to key services such as the trading platform as well as supporting services such as back office and business e-mail continuity; and regularly test business continuity plans.
- **Electronic Error Trade Process:** executing brokers should have in place flexible but robust processes to address electronic error trades for their trading platform.

III. Relevant CFTC Regulations **(CFTC Rule Changes Pursuant to Dodd-Frank)**

Market Abuse – Disruptive Trading Practices

- Adds new section 4c(a)(5) to the Commodity Exchange Act
- Prohibits any trading, practice, or conduct on or subject to the rules of a registered entity that
 - Violates bids or offers
 - Demonstrates intentional or reckless disregard for the orderly executions in the close
 - Is spoofing (bidding or offering with intent to cancel before execution)

DCM / SEF Rules

- Commission regulation 38.255 (pre-trade risk controls): DCMs to establish risk controls that “prevent and reduce the potential risk of price distortion and market disruptions, including, but not limited to, market restrictions that pause or halt trading in conditions prescribed” by the DCM.
- DCM Core Principle 4 requires that DCMs identify pre-trade limits order size, price collars or bands and message throttles as responsive measures to demonstrate compliance with CP4
- Commission regulation 38.607: requires exchanges that permit direct market access to have effective systems and controls designed to facilitate FCM’s management of financial risk.
- SEF proposed rules require similar halt requirements to those in regulation 38.255

FCMs, SDs, and MSPs that are Clearing Members

- Commission regulation 1.73: required to screen “order” for risk limits.
- Commission regulation 23.609: requires clearing member firms to establish risk-based limits based on “position size, order size, margin requirements or other similar factors.”
- Commission regulations 1.74 and 23.610: straight through processing to pre-screen orders and allow DCO to accept or reject trades.

Traders (SD/MSP/Floor brokers)

- Commission regulation 23.600(d)(9): books and records to ensure compliance with supervision, maintenance, testing and inspection of trade programs.